

NARP Life of Project Plan
September 1987
Publication # 5

N
A
T
I
O
N
A
L

A
G
R
I
C
U
L
T
U
R
A
L

R
E
S
E
A
R
C
H

P
R
O
J
E
C
T



المجلس
القومي
للبحوث
الزراعية
National
Agricultural
Research
Project



PD-ABL-911
1st 9/10/60

**WORK PLANS PREPARED UNDER NARP
THROUGH FY 1989/90**

**N
A
T
I
O
N
A
L

A
G
R
I
C
U
L
T
U
R
A
L

R
E
S
E
A
R
C
H

P
R
O
J
E
C
T**



National Agricultural Research Project
المشروع الوطني للأبحاث الزراعية



November 1990

PD-ABL-911

NATIONAL AGRICULTURAL RESEARCH PROJECT

LIFE OF PROJECT PLAN

**Ministry of Agriculture
and Land Reclamation**

Cairo, Arab Republic of Egypt

**United States Agency
for
International Development
Cairo, Arab Republic of Egypt**

**Consortium
for
International Development
Tucson, Arizona**

**USAID Project 263-0152
Publication No. 5
Published: September 1987**

ACKNOWLEDGMENT

The Life of Project Plan provides a guide for the implementation of the National Agricultural Research Project (NARF). This plan is a team effort. Substantial assistance was provided by the Working Groups and Egyptian colleagues in developing the activity sets in each area that make up a major part of this plan. The main body utilized data and observations obtained from each of the various programs and operational segments of the project in Egypt and the administrative NARF office and Center for International Programs, New Mexico State University.

The authors include:

Dr. Ahmed Momtaz, Director General
Mrs. Ida Baca, Asst Director, CID/NARP Lead University
Dr. Gordon Beckstrand, Deputy Chief of Party/Technical and On-Farm
Research and Demonstration Advisor
Ms. Coleen Brown, Deputy Chief of Party/Manpower Development and
Training
Dr. James Collom, CID Deputy Executive Director
Dr. Susan Emerson, Library and Information Services Specialist
Dr. Ralph Finkner, Research Station Management Advisor
Prof. Richard Foote, Research Studies Coordinator
Dr. Bill Gregg, Seed Technology Advisor
Dr. Robert Harwood, Integrated Crop Protection Advisor
Dr. Amir Khan, Agricultural Mechanization Advisor
Dr. Willis McCuiston, Interdisciplinary Research Advisor
Dr. Harold Matteson, CID/NARP Project Director, CID Lead University
Mr. Cory Wengreen, Administrative Services Advisor
Dr. Robert Witters, Chief of Party

We thank all project members, staff and secretaries for their cooperation and hard work during preparation of this document.

Dr. A. Momtaz
Director General

Dr. R. Witters
Chief of Party

TABLE OF CONTENTS

	Page
I. SUMMARY	1
II. BACKGROUND	
A. Agriculture in Egypt	3
B. Strategies of the Ministry of Agriculture and the Agricultural Research Center	3
C. Previous USAID Projects	6
III. NARP METHODOLOGY	
A. NARP Goal and Purpose	7
B. Interactions Within the NARP	8
C. NARP Research Management and Transfer of Technology	13
IV. NARP Implementation	
A. Mobilization Phase	19
B. CID Technical Assistance	19
V. MONITORING, EVALUATION AND REPORTING	
A. Output/Indicators of Success	25
B. Monitoring and Evaluation Approach	28
C. Reports Required under the Contract	31
ANNEXES	
A. CID TA Strategies and Activity Sets	32
B. CID TA Life of Project Schedules	130
C. CID Technical Advisor Scopes of Work	157
D. MOA-USAID Budget	171
E. MOA-CID Contract Budget	172
F. Distribution List	173

LIST OF FIGURES

	Page
Figure 1. NARP Interactions	9
Figure 2. Focused Interdisciplinary Research Activities Flow Chart	14
Figure 3. Agricultural Technology Development and Transfer System	16
Figure 4. On-Farm Research Functional Chart	17
Figure 5. Functional Chart for NARP Program Development	24

LIFE OF PROJECT PLAN (LOPP)

I. SUMMARY

The effective implementation and execution of NARP will require changes in the operational thrust of the agricultural research system especially in research management, technical research execution, research support and on the farmer level. These activities require careful planning, integration and implementation of programs at all levels of the agricultural sector.

The LOPP has been developed through a collaborative process which involved the Consortium for International Development (CID) Technical Assistance (TA) Team, their Egyptian colleagues and officials from USAID. The LOPP describes how the resources of NARP can be utilized to improve research management and technology within the Egyptian agricultural system. It further clarifies the means to achieve the desired outputs of the Project by making changes in management and execution within an improved research system.

The Plan describes the background, NARP methodology, NARP implementation and monitoring, evaluation and reporting systems

THE LOPP components are:

I. Summary

This section contains the purpose of LOPP and a summary of the sections.

II. Background

This section contains the need, a review of some important strategies of the Ministry of Agriculture and Land Reclamation and the Agricultural Research Center which relate to NARP and identification of previous projects funded under USAID auspices.

III. NARP Methodology

This component identifies the *goal* of NARP which is to increase agricultural productivity by improving the quality of technologies available to farmer. The *purpose* is to develop the capability of the agricultural research community to provide a continuous flow of improved appropriate agricultural technology. A description is given concerning the broad aims, interactions and methods of research management and transfer of technology.

IV NARP Implementation

The implementation section describes the early mobilization

phase, CID technical assistance, which reviews the CID approach toward NARP and the technical assistance functional relationships in NARP.

V. Monitoring, Evaluation and Reporting

This component contains the output indicators as given in the Project Paper and Amendment 1 plus additional ones which were not covered, the monitoring and evaluation approach and the reports required under the CID contract.

Annexes contain the detailed information which outlines the activities of each technical assistance advisor, an outline of their activities by quarters, their scopes of work and budget information.

II. BACKGROUND

A. Agriculture in Egypt

Egyptian agriculture is unique. Although the currently productive land area is limited, there is rich, fertile soil throughout the Nile River and Delta area. A good water supply for irrigation and optimal climatic conditions permit year round farming.

In order for Egypt to capitalize on these assets and fulfill its potential for feeding its growing population, a significant level of research has been conducted to help increase food and feed production so as to minimize the gap between consumption and production. The consumption of major food commodities significantly exceeds production increased per capita consumption and a rapidly increasing population.

Although relatively high levels of productivity have already been achieved in Egypt. Research has shown that a larger increase in production is possible. Additional programs need to be implemented to overcome some of the limiting factors in the agricultural system.

B. Strategies of the Ministry of Agriculture and the Agricultural Research Center

The Ministry of Agriculture and Land Reclamation has developed strategies for improving agricultural conditions in Egypt. Policies and program strategies are important to understand when trying to institute improvements in any system. A review of some strategies, priorities, methods and outputs from major documents* is briefly presented in four broad categories below as follows:

1. Policy -

The issue of policy is important and very complex. The report by Dr. Wally states that maximization of net agricultural national products requires directing agricultural resources toward production that conforms with the principles of specialization and comparative advantage. It emphasizes policies which increase the productivity of land, labor, capital and organizational aspects of production. This report also states that future agricultural policy should adjust food priorities as related to food security and adjust

- *1. Strategy of Agricultural Development in the Eighties, a report by Deputy Prime Minister of Agriculture and Land Reclamation, H.E. Dr. Youssef Wally, March 1982.
2. Strategies for Accelerating Agricultural Development: A report of the Presidential Mission on Agricultural Development in Egypt, July 1982.
3. Agricultural Research Center, Five-Year Plan (1982/83 - 1986/87), Arab Republic of Egypt, Ministry of Agriculture, Agricultural Research Centre.

agricultural development policy in a complementary manner. Priority should be assigned to food commodities required by the majority of the population, especially those consumed by low income groups: for example cereals and pulses will have priority over meat, and dairy products will have a higher priority than red meat.

Future policies must emphasize the needs of rural society and the interests of small farmers. Gradual relaxation is needed in the area of government price and production controls.

2) Institutions and Organizations -

Many institutions and organizations are related to the agricultural system and have an impact on it. Large numbers of government staff are working in the agricultural system. All facets need to be better integrated and involved in planning and in executing the program. Some of the strategies are to:

- a. Develop an adequate linkage between the Ministry and non-ministerial organizations such as the universities, private sector and international agricultural organizations.
- b. Develop an efficient and effective inter and intra organizational and management system which will:
 - Provide methodologies for establishing priorities and implementing programs;
 - Create better cooperation between the various research institutes, departments and laboratories within the Agricultural Research Center, Ministry of Agriculture and Land Reclamation, and agriculturally oriented agencies;
 - Efficiently utilize financial and manpower resources;
 - Increase the flow and dissemination of information and communication;
 - Promote better integration between research and extension; and,
 - Efficiently utilize technical assistance funds

3) Resources -

The amount of arable land is a key constraint to increased agricultural production, conservation and maintenance. This constraint requires an integrated set of programs centered around rational uses of irrigation water and fertilizer, pest management, soil management and appropriate cropping patterns.

In mechanization, appropriate machinery, equipment and tools are needed to increase the efficiency of both human and animal energy in a manner consistent with Egypt's socioeconomic conditions. Research centers and engineering companies will be encouraged to design and produce machines that represent appropriate mechanical technology for Egypt.

Human resources need to be upgraded. Egyptian agricultural officials need training to enhance their planning, management and policy implementation skills, while research staff need training which will promote technological advances. Practical training programs should improve the development of professional and personal capabilities and skills of the agricultural labor force, using resources of the MOA and other ministries. More attention should be given to the needs and training of the rural family as a means of improving production.

47 Technology -)

Agricultural programs which are concerned with developing means to increase food and feed production must develop new basic research, explore emerging technologies, adapt technologies developed elsewhere for use in Egypt, and utilize suitable technology that has been developed in Egypt but not implemented on farmers' fields. More emphasis will be directed toward applied research in ARC, and through the Grants Progra

Technological constraints in Egyptian agriculture are greater and more sophisticated than those operating in most other developing countries. Plans will be made to adopt a long term policy for transfer of biological technology on a broad scale for field crops, horticultural crops and livestock.

Production goals stress major increases for grain crops, edible oils, sugar, poultry and export items such as rice, vegetables, fruits and flowers. Significant production increases are planned for milk and fish.

Economic and statistical studies ^{individual} are needed to determine the ^{profitability} economics of producing agricultural products for domestic and export purposes, with special studies on new or proposed technologies, credit and marketing.

Crop yields need to be increased through improved practices, especially when research confirms the likelihood of achievement. All appropriate means and programs should be taken, which include improved seeds, testing rates of fertilization, and providing pesticides and chemicals for pest control.

Effective linkages must be made between researchers, research centers, extension and farmers to increase the transfer of new

technology.

Previous research projects which were broad in scope and scale conducted basic research, research verification and large demonstration trials involving thousands of feddans on farmers' fields. They have shown that yields can be significantly increased when new technological practices are tested and implemented. It has been demonstrated that part of the solution in meeting the future food requirements lies in increasing crop yields and changing cropping patterns to intensify the use of land and labor.

C. Previous USAID Projects

Previous projects sponsored under USAID focused on agricultural technology and its dissemination, as well as building infrastructure, institution building, marketing, credit, financial management, irrigation systems operations and on-farm water management. Those Projects were:

- Rice Research and Training
- Agricultural Mechanization
- Agricultural Development Systems
- Major Cereals Improvement
- Data Collection and Analysis
- Water Use and Management
- Irrigation Management
- Small Farmer Production
- Aquaculture Development
- Agricultural Management Development
- Poultry Improvement
- Agricultural Cooperatives Development
- Small Scale Agriculture Activities

USAID in 1982 began planning to incorporate all of the work being done in agriculture into one large project which would result in increased impact on the entire agricultural sector. The National Agricultural Production Project (NAPP) was approved in November 1984. It was designed to build on the results of prior USAID projects and its goal was to increase agricultural production.

A decision was reached in 1985 by USAID/Cairo to substitute two projects in place of the NAPP. These projects were:

The National Agricultural Research Project
The Agricultural Production and Credit Project

The NARP Project Paper was approved in August 1985 and the Agricultural Production and Credit Project Paper was approved in November 1986.

III. NARP METHODOLOGY

A. NARP Goal and Purpose

The Project Paper states that the *goal* of NARP is to increase agricultural productivity by improving the quality of technologies available to farmers. The *purpose* of the Project is to develop the capability of the agricultural research community to provide a continuous flow of improved appropriate agricultural technology.

The broad aims of the Ministry of Agriculture and Land Reclamation clearly include increasing overall agricultural productivity, improving national food security by increasing agricultural products used by the majority of the population, enhancing the socioeconomic welfare of farmers, and expanding foreign exchange earnings by increasing exports.

The Agricultural Research Center, the implementing agency of the MOA for NARP, aims to achieve these results by improving research management, technical research execution, and research technology transfer to the farmers' level. The implementation of NARP will require financial resources to:

- Obtain technical assistance;
- Improve management capacity, research methods, techniques and skills of professional and technical staff within the agricultural research community;
- Provide commodities;
- Upgrade and equip research facilities;
- Develop capacity to collect and analyze data;
- Utilize and disseminate information; and,
- Develop linkages with international agricultural research centers and universities.

The general overview of interactions within the NARP which follows this section shows how the ARC can accomplish its aims through a variety of processes that can result in verifiable achievements. The general overview then proceeds to more specific interactions by discussing the role of interdisciplinary research and on-farm trials in blending research into a system that addresses important national requirements, at the same time improving the needs of farmers and agroindustries.

B. Interactions within the NARP

Interactions within the NARP will be continuous processes, from inputs to action groups, which can adjust to circumstances that change over time, symbolically represented by Figure 1. These dynamic processes can be led and influenced by MOA and ARC management policies. The outcomes are not predictable in detail, therefore adjustments in the process will be an ongoing feature in the NARP implementation. The end results sought, namely significant improvements in the management of research within the ARC and in the agricultural research community at large, as well as transfer of the fruits of such improvements to farmers, industries and other users, depend on the analytical capabilities and the ability of relevant institutions to function logically and effectively. The willingness of action groups to accept findings and mature these into outputs of significance to the research community is also important. The effectiveness of research and technology transfer processes in reaching farmers and the agroindustry, and the readiness of these user groups to adopt changes, are ultimately important to the success of the NARP. Improvement and institutionalization of outputs is needed to permit continuous evolution within the system. Some explanation of elements in Figure 1 will help clarify the nature of these processes.

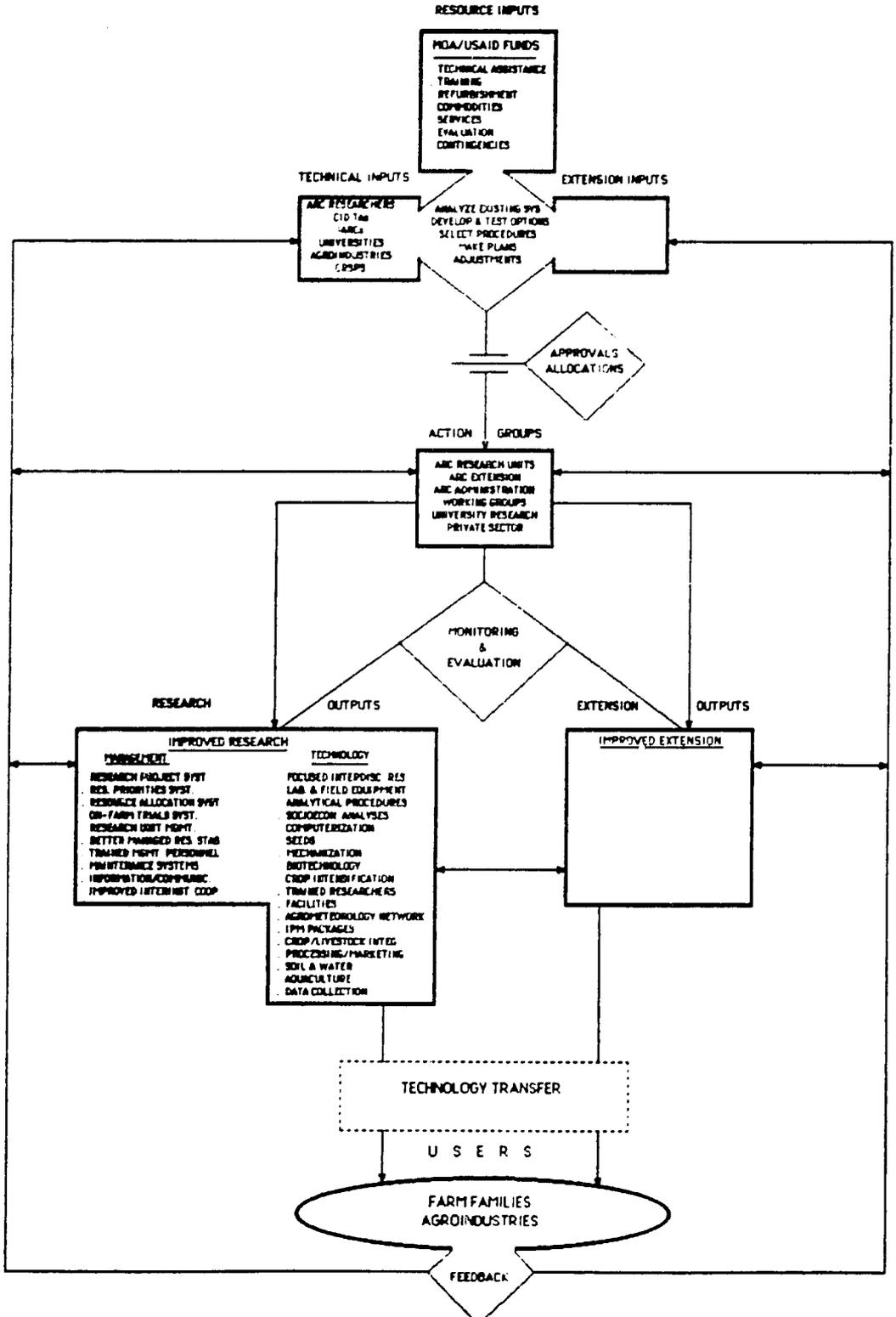
Processes within the NARP are logically initiated by inputs of technical knowledge and monetary resources. *Technical inputs* consist of:

- A large group of knowledgeable and experienced researchers in the Ministry of Agriculture and Land Reclamation, long term technical assistance staff, and many person months of specialized TDY assistance staff.
- Linkages with International Agricultural Research Centers (IARCs) and USAID-supported Commodity Research Support Programs (CRSPs);
- Universities in Egypt and the USA;
- Private sector research groups in Egypt; and,
- Egyptian industries that supply essential products or that use agricultural raw materials.

These technical inputs can be integrated into a functional system through the guidance of working groups. Integration can also be formalized by the development of contracts, working agreements, symposia and workshops.

Resource inputs are provided by funding from USAID, and funding plus in-kind inputs from the Government of Egypt (GOE). These resources provide technical assistance, training, refurbishment, commodities, evaluations and contingencies. Resources are better utilized by management improvements such as prioritized allocation systems and a well developed system of research projects.

Figure 1. NARP INTERACTIONS



Extension Inputs are an additional key element, but these and their outputs have not yet been integrated into the NARP in the early implementation period.

Both technical and financial inputs can improve the effectiveness of systems by following procedures that:

- Review existing management and technical processes;
- Develop, test and select new or improved procedures;
- Present plans for courses of action that include scheduling;
- Recommend the allocation of resources required to implement plans; and,
- Allow for flexibility, so that adjustments may be made as feedback reveals the need for changes.

NARP management, consisting of MOA and ARC administrators, and policy or overall program advisory groups, plays a key role in providing guidelines and policies to carry out processes for meeting agricultural targets. In particular, management gives approval for the inputs assigned to action groups for execution and allocates the resources required for conduct of the courses of action.

The capability of action groups in Egyptian agricultural research is highly developed. Within ARC they consist of 21 research units that include research institutes, departments and central laboratories, supplemented by a network of 31 regional research stations located throughout Egypt. ARC administration plays a vital role in presenting research policies and guidelines that promote valuable outputs in the MOA and throughout the Egyptian research community. Between 1935 and 1986, fifteen Faculties of Agriculture were established at Egyptian regional universities and there are three Faculties of Veterinary Medicine. Agricultural research is also conducted by the National Research Centre, National Academy of Scientific Research and Technology, Ministry of Irrigation Water Research Center, Desert Institute, Desert Development Center at American University in Cairo, the Higher Institute of Agricultural Cooperatives plus some agrobusiness firms. A substantial group of these institutions will receive grant allocations under NARP that will enable them to respond to important agricultural research needs in the diverse agricultural zones. The private sector, particularly companies that provide such commodities as agrochemicals, irrigation equipment, seeds and machinery, are an important component of the action groups. Extension and its farm clientele consist of another action group. If it is to succeed maximally, NARP must develop conferences, field days, planning meetings and other means of encouraging cooperation between these disparate action groups.

While many elements of improved agricultural research will provide measurable outputs of NARP, those within the ARC are the most relevant

to the life-of-project plan. Basically, improved research in ARC can be divided into management and technology; both of which can be subdivided into several major elements.

Improved ***agricultural research management***, as indicated in the NARP logical framework, will produce a system with trained managers. It will yield improved research methods that can be effectively developed by way of interdisciplinary research approaches. It will provide standard management procedures for all ARC research units, including the network of research stations. It will be a systems approach, oriented to consider relationships of cropping patterns and to incorporate animals into the analyses.

Specific elements of improved ***ARC research management*** will include:

- A research project system that is under continuous review and improvement and that is computerized to facilitate accountability of research management, resource allocations and manpower components;
- A research priorities system that responds to farmer needs and national targets and the need to expand the use of modern research technologies;
- A resource allocation system that provides regular funding of research projects as well as extra allocations to priority research;
- An on-farm trials system that utilizes farmers as adopters, adapters and teachers, to gain rapid acceptance of improved agricultural practices;
- Research units that carry priority and allocation decisions down to the section and project level;
- Field stations that are improved to conduct regionally important inquiries and to communicate and cooperate better with non ARC researchers in the area, such as those at regional universities, and with local farmers and extension staff.
- Management personnel with skills improved through in-country on the job training and short courses.
- Maintenance procedures established and implemented, by ARC staff or by private enterprise, to ensure that laboratory equipment, vehicles and farm and field plot equipment are continuously functional;
- An information/communications system that can provide scientists and administrators with updated local and international findings and that can promptly present ARC research results; and,
- An ongoing process of improved cooperation between ARC

research units and with other Egyptian and international agricultural research groups.

ARC research technology specific improvements will include:

- Interdisciplinary activities focused on complex nationally or regionally important problems or opportunities;
- Modern analytical and field equipment in use;
- Intermediate and advanced analytical procedures such as statistical, chemical and physical analyses;
- Increased use of relevant socioeconomic analyses;
- Provision of computers and development of user skills for data management, communications, systems modeling, etc;
- Improved seed research to support an active and improved governmental and private seed industry;
- Mechanization that includes the ability to develop prototype machines for manufacture by industry, with emphasis on small farms;
- Biotechnology, such as the production of pathogen-free plants with superior genetic characteristics by use in plant tissue culture;
- Crop intensification programs that can increase annual production significantly;
- Researchers trained in the more advanced research techniques;
- Refurbished facilities, such as better regional research support stations with adequate staff housing and infrastructure and a centralized library/information coordinating center;
- An agrometeorology network that serves the needs of crop production, integrated pest management, irrigation research and other areas;
- Integrated pest management practices packaged by crops to reduce production costs and provide a safer environment;
- Integrated crop/livestock systems including animal production and animal health, programmed to meet the needs of specific agronomic zones;
- Increased emphasis on the needs of processing industries and marketing groups;
- Specific soil and water management attuned to specific crops and

agronomic zones;

- More productive aquaculture; and
- A comprehensive national data collection system.

Extension outputs will also be specifically targeted, but cannot be stated in detail until these are incorporated into NARP. NARP outputs will proceed to users through **technology transfer**. It will be pursued through such mechanisms as on-farm research trials and on-farm demonstrations, workshops, farmer meetings at the governorate, district and village level, and production and widespread distribution of recommendations through a variety of audiovisual media. Technology transfer for agroindustries is a more direct process between administrative groups, researchers and the industries involved.

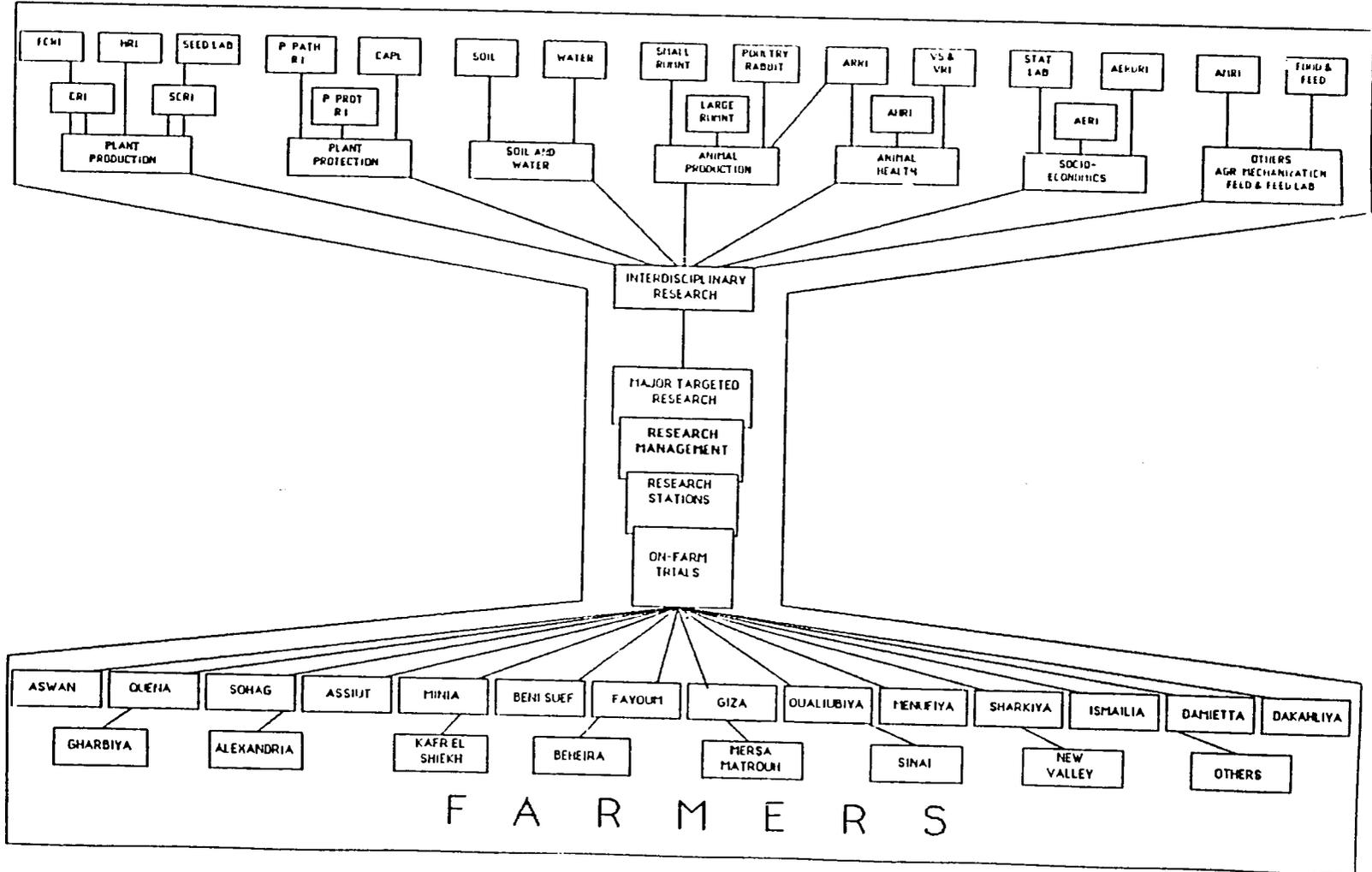
Feedback is important for ensuring that NARP programs are reaching the right targets. The most important element of feedback is farmers, or rather farm families since these are the total agricultural production unit. Feedback may occur in a structured way, such as the distribution of questionnaires and analysis of the results, or discussions at workshops and farmer meetings. Informal interactions are also very important. As indicated in Figure 1, feedback occurs at many levels. Much of it will go directly toward modification of outputs and some of it will result in actions at the level of research and extension input.

Monitoring and evaluation of research (and extension) outputs will serve as a feedback for analytical testing and selection procedures. This must be a continuous process under the responsibility of working groups, advisory committees and action groups. These entities must develop processes for carrying out monitoring and evaluation. In addition, the NARP grant includes resources to program evaluations that may address all elements of ARC research and that are independent from such research. Monitoring and evaluation is further elaborated in Section IV, but consists of continuous project monitoring, annual program reviews, external evaluation and special studies.

C. NARP Research Management and Transfer of Technology

The ARC exists, as do most agricultural research centers, to determine the needs and constraints at the level of the farmer or industry and to address them in major targeted research activities. These identified constraints must be considered and resolved by qualified scientists in various disciplines (multidisciplinary research). An organized system of research planning and management is required to properly identify the constraints of the farmer, develop an interdisciplinary research (IR) step-wise approach to addressing and resolving constraints, and to transfer new technologies to farmers. Focused IR activities will consist of research teams selected from all disciplines related to the major targeted research area, as depicted in Figure 2. The disciplines may combine the research areas of plant production, plant protection, soil and water, animal production and health, socioeconomics and others, such as

Figure 2. FOCUSED INTERDISCIPLINARY RESEARCH ACTIVITIES FLOW CHART



agricultural mechanization or foods and feeds. The ARC research institutes and central laboratories are, of course, responsible for providing the specialized research scientists that form the research teams.

The research management system can be considered as a reversible hour glass. Communications and cooperative relationships must be established, and encouraged to operate by research management, if the proposed system is to flow smoothly. A successful NARP research management system will institutionalize interdisciplinary research. It will progress from the research coordinator to the farmer and back to the coordinator. Basic and applied research activities will be conducted in the laboratories and fields of the central and regional research stations. Newly developed technology identified in applied research experiments will then convert to adaptive research trials and be tested as research packages on farmers' fields. Analyses of technical and socioeconomic factors related to the on-farm trials will provide information needed to select appropriate technology for transfer to farmers. This transfer will occur directly from the on-farm staff and through follow up demonstration trials by the extension staff.

To accomplish the appropriate linkage to develop and transfer technology, a well-organized agricultural technology development and transfer system, as shown in Figure 3, will provide communications between researchers, crop and animal specialists and farmers. The transfer system will permit continuous evaluation and monitoring of research activities at all levels in the system and provide feedback to researchers from farmers, extensionists and on-farm specialists. The goal of the research and extension units will be to optimize production and maximize net farm income. Success of IR is directly based on the continual supply of new and revised information being generated from strong, well organized and well supported disciplinary research being conducted in each research unit within ARC. Equally important are research information sources resulting from strong linkages with international agricultural centers, universities locally and abroad, the private and semiprivate sectors and other governmental agencies.

Actual organization, coordination, evaluation and monitoring of on-farm research (OFR) trials as shown in Figure 4 will be directed by designated working groups within NARP. These working groups will communicate with general program coordinators located at Giza, who will then communicate with regional coordinators at research stations and directors of on-farm trial staff in the governorates. An overall OFR coordinator will be appointed to coordinate the technical and financial aspects of the trials.

Disciplinary coordinators for each commodity will be appointed at ARC/Giza and will report to the overall OFR Coordinator. Specific disciplinary coordinators at Giza are responsible for development of IR activities and subsequent technical packages for OFR implementation, technical package coordination and management, monitoring and evaluation of trials.

Figure 3. AGRICULTURAL TECHNOLOGY DEVELOPMENT & TRANSFER SYSTEM

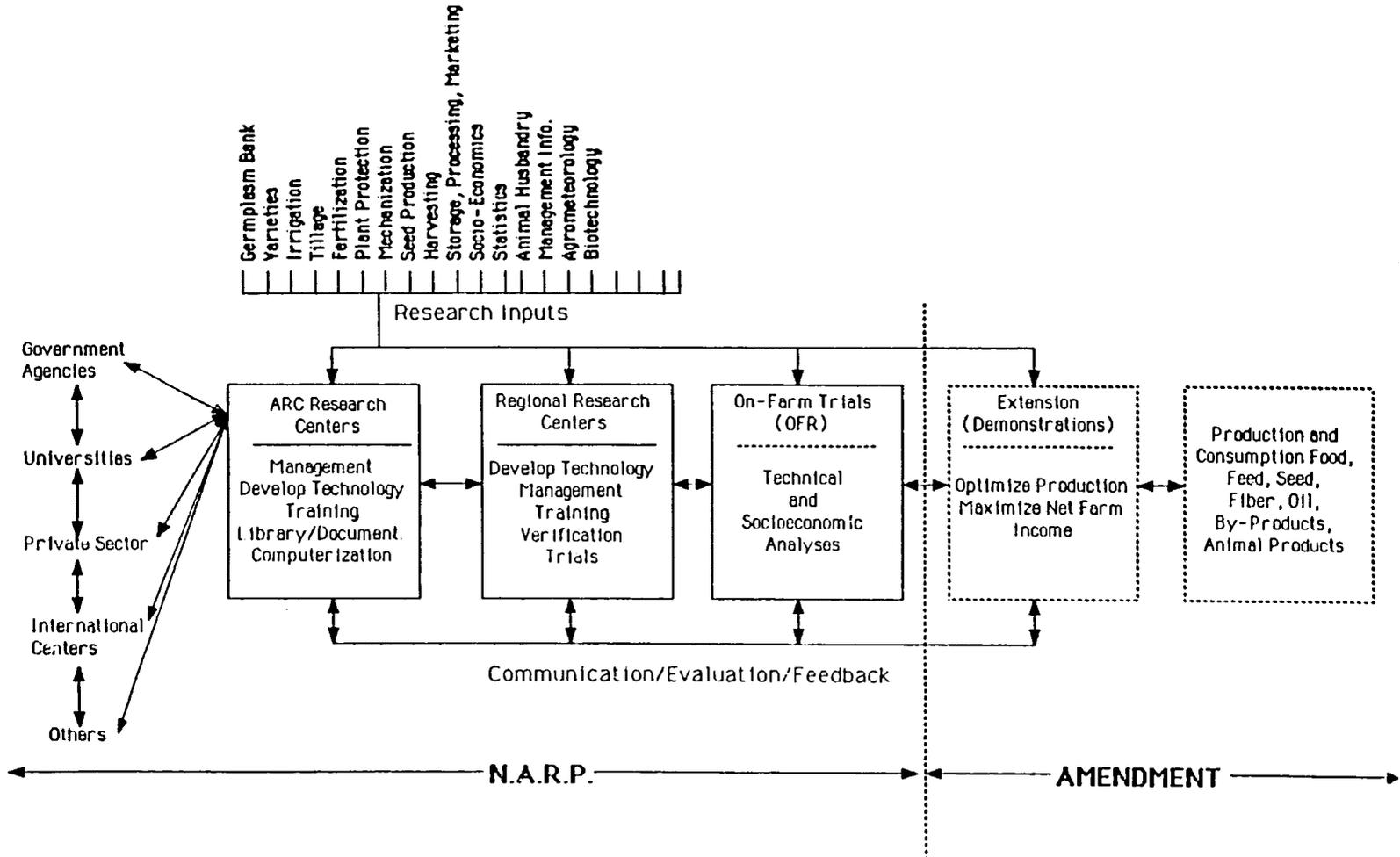
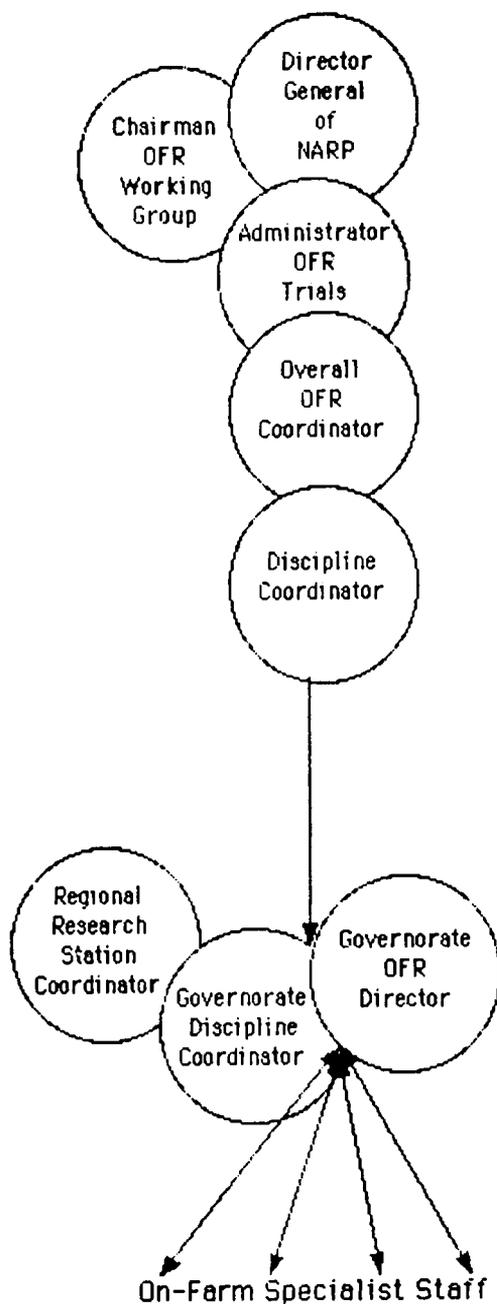


Figure 4. ON-FARM RESEARCH FUNCTIONAL CHART*



* Functional chart for technical program and finance.

In the governorates, disciplinary coordinators will be appointed to work under the director of the on-farm staff to assume the same responsibilities as the ARC/Giza disciplinary coordinator. They will work closely with the researchers located at the regional research stations, direct the assigned OFR staff to conduct trials for their commodity in the Governorate, be responsible for overall OFR management and provide feedback for further research intervention.

Effective IR activities will require close monitoring and evaluation of team members by coordinators, timely allocation of funds, and annual reporting of results in workshops or symposia. Modifications of activities can be made through analyses conducted in these meetings. All team members must receive appropriate recognition for their part in the research activity. Part of this recognition comes through publication and the process of preparing and transferring usable technology gained from the research to the producer.

The CID TA staff will function as an interdisciplinary research and management team to assist the ARC in further developing and strengthening their research and management system. This team will provide technical and managerial support in areas of :

- Program planning,
- Allocation and disbursement of finances for research;
- Inter-, multi- and single-disciplinary research approaches;
- Transfer of technology through on-farm trials;
- Improvement of the infrastructure and facilities of research stations;
- Development and maintenance of mechanization for research, industry and the farmer;
- Improved seed research, processing facilities, and a strong governmental and private seed industry;
- Integrated pest management practices packaged by crops to reduce production costs and provide a safer environment;
- Training in-country and internationally, as needed, for short-term, advanced degrees, postdoctorates.
- Centralized and regional library/information coordinating centers; and
- Research grants to universities and the private sector to encourage maximum use of available research expertise and coordination of the same.

Expertise is also available on the TA team in planning and coordinating extension activities, with the technology flow from research to extension to farmers, and reverse flow by feedback in two-way communications. Feedback assures that appropriate research is conducted on well defined problems.

IV. NARP IMPLEMENTATION

The Grant Agreement was signed in October 1985. Implementation activities began immediately. Those activities are given under the mobilization phase. A technical assistance contract was signed with the Consortium for International Development (CID) in November, 1986. The CID approach and functions of the technical assistance team are given in the following Section B while the TA strategies and activity sets, activity charts, and scopes of work are included in Annexes A, B and C.

A. Mobilization Phase

The following achievements were completed by the MOA from October 1985 to January 1987.

- USAID approved NARP Project Paper
- USAID Project Officer designated
- Grant Agreement signed
- RFP for Technical Assistance completed/advertised
- IRRI Contract negotiations initiated for Technical Assistance
- MOA appointed NARP Project Director
- English training initiated
- ARC research stations physical plant inventories completed
- CID Technical Assistance Contract signed
- Technical assistance team selected
- MOA officials and NARP Project Director visited NMSU and CID
- MOA officials attended CID Team Planning Meeting at NMSU
- First technical assistance team member arrived in Egypt
- Funding provided for academic students from previous projects
- Planning committees established by MOA submitted final reports in the areas of administration, training, interdisciplinary research, on-farm demonstrations, agricultural mechanization, research stations, plant protection, library/communication, seed technology, research studies, construction, and commodities procurement

B. CID Technical Assistance

1. The CID Approach Toward NARP

The Consortium for International Development (CID) and associated universities, organizations and firms will cooperate to assist the Ministry of Agriculture and Land Reclamation (MOA) in the major emphasis of NARP to improve the management of the Egyptian agricultural research system, and in the institutionalization of means

of improvement. Close cooperation will be sought between Egyptian and American colleagues for creative problem solving and timely responses to opportunities. CID's role as an organization is primarily advisory and facilitative while the role of technical assistance team members is more participatory, with continuous interactions between them and Egyptian colleagues.

The CID approach and the technical assistance team will advocate a program management system which employs the following principles:

- Close collaboration between Egyptian and U.S. colleagues. Effective communications throughout the organizational structure are essential to such collaboration;
- Flexibility at all levels of project management and administration, especially with respect to funding allocations and timing of project inputs;
- Problem solving through multidisciplinary cooperation, emphasizing appropriate solutions;
- Improving management of the agricultural research system, emphasizing improvement of existing systems more than creating new ones. Improvements are to be developed in the Egyptian context, and sustainable;
- Linkages will be made with International Agricultural Research Centers (CIMMYT, IRRI, IRCRISAT, ICARDA, etc.) as major components in developing international research networks. These linkages must extend to research scientists and to senior administrators and managers; and,
- Institutional development is a key requirement for strengthening the agricultural research system. Effective management of that system will require strong leadership, a clear sense of direction, commitment to established programs and priorities, productive use of resources, and orderly administrative processes to achieve long-term objectives.

The CID role in improving management of the NARP is to promote interactions between Egyptian and American staff under the following guidelines:

- Egyptian personnel have ultimate responsibility and decision-making authority in the NARP. The American technical assistance team provides an advisory and support role, and assists Egyptian colleagues as required;
- Roles and responsibilities are mutually agreed upon by all key Egyptian and American managers and administrators of the project;
- Egyptian and American team members have decision-making

authority equal to their responsibilities;

- Decision making should allow for the participation of representatives of all persons or groups affected;
- Communication and coordination is to be emphasized among all project participants;
- Flexibility, especially in managing project financial resources, is to be a feature of planning and implementation;
- The project should emphasize quality of outputs rather than quantity;
- Home office technical backstopping and administration support must be timely and responsive to the needs of the project staff in Egypt; and,
- Management of project resources must ensure cost effectiveness, efficiency, and quality of performance at all stages of project implementation.

Interaction between the NARP agricultural research system and the policy and resource allocation system will be encouraged to:

- Consider national goals and objectives in developing research priorities;
- Improve mechanisms for communicating farmer problems, concerns and situations to policymakers;
- Strengthen the ability of the research system to provide useful information to policymakers; and,
- Improve development of information about the productivity of research and needs of the research system, to inform policymakers and financial resource allocations.

Efforts to strengthen ARC's management and administration of its programs will require close collaboration between the technical assistance team and senior Egyptian administrators. Changes recommended for research management should be evaluated for appropriateness within the Egyptian context. Effective changes should then be institutionalized within the structural, procedural and policy-making framework of the system.

The NARP program management system will have a conceptual framework, techniques and decision making process. The conceptual framework consists of common reorganization of a problem, a commitment to change, and the allocation of resources to accomplish the solutions proposed and selected. Techniques for program management consist of organizational diagnoses, planning meetings, teams appointed for problem solving, formal and informal workshops,

sharing of information, building project staff consensus and learning-by-doing.

Decision making must be logical and sequential, providing feedback of ideas, evaluation, and modification to actions where and when needed. The following sequential steps are proposed:

- Assessment of problems and opportunities, including data collection and analysis;
- Agreement upon specific objectives;
- Development of an organizational structure to achieve objectives;
- Evaluation of policies and procedures to enhance achievement of objectives;
- Settling priorities based on available funds, manpower, facilities and times. Development of a plan for accomplishing priority tasks;
- Implementation of the plan; and.
- Development of evaluation or validation mechanisms.

Management functions apply to all of the separate administrative units in the ARC, across all program elements. They include:

- Program planning and evaluation;
- Financial resource acquisition and utilization;
- Personnel management and development;
- Facility development and management;
- Commodity procurement and inventory systems;
- Information and communication systems; and
- National and international organization linkages.

The CID technical assistance includes two major components provided by New Mexico State University:

- Logistical and technical backstopping from the United States; and,
- An in country technical assistance team.

Specific roles for members of the TA team are defined. These roles are expressed for each position in Annex A, by presentation of a strategy that explains the current situation, processes, action groups and outputs. Each strategy is followed by activity sets where a TA will be involved, either by actions of sole responsibility or, more

frequently, as joint actions of advisor with counterparts.

2. Technical Assistance Functional Relationships in NARP

The CID Technical Assistance (TA) team was selected to provide support to NARP program development . Figure 5 shows the functional relationships of the TA staff for the NARP. The Chief-of-Party (COP) advises the Director General of NARP in development of a system of research policy determination and planning and in the establishment of procedures to effectively manage agricultural research. The Chief of Party coordinates the overall management of the CID TA staff but his major thrust is in management areas which include university grants, information/documentation, and budget, administration and reports.

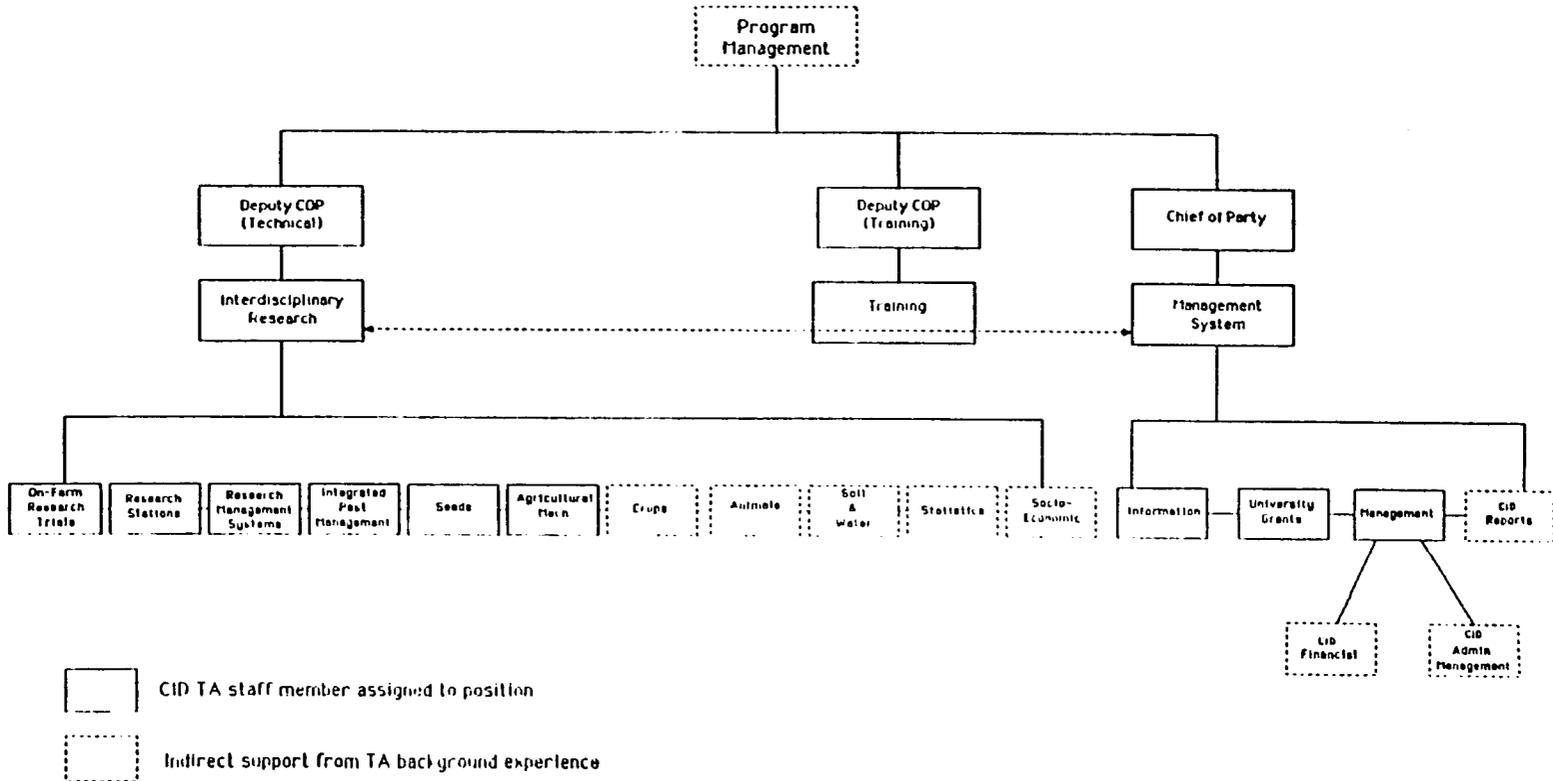
Deputy Chief of Party (DCOP) positions have also been assigned for technical program development and for manpower development and training activities in response to the needs of the NARP. The DCOP/Technical Programs will coordinate and integrate the TA team members working in developing effective research management systems. The major thrust will be to promote IR activities that involve disciplines and research units of ARC where TA staff are working directly or indirectly. Those areas supported directly are interdisciplinary research (IR), on-farm research (OFR) trials, research stations, research management, integrated pest management (IPM), seeds, agricultural mechanization and indirectly such areas as crops, animals, soil and water, statistics and socioeconomics. Each of these research units has several interactions (for example, commodity groups), to insure multidisciplinary integrative decision making, technical package development, training, on-farm testing and needs identification for further research intervention.

The DCOP/Manpower Development and Training will assist the NARP staff in integrating training opportunities which will develop human resources critical to improving the management and operation of the agricultural research system. This extensive training effort includes both in-country and out of country training for all levels of staff at the Ministry, Agricultural Research Center, Universities, farmers and private sector.

V. MONITORING, EVALUATION AND REPORTING

Effective implementation of a complex project such as the NARP requires a system of monitoring, evaluation and reporting to serve as a source of information and guidance of decisions concerning the management and direction of the project. The NARP is comprised of several major components, implemented across a large agency of the GOE, with potential involvement of several different outside contractors. Thus, both accomplishments and shortcomings during implementation could easily go unnoticed. Further, it may be difficult to determine whether activities in

Figure 5. FUNCTIONAL CHART FOR NARP PROGRAM DEVELOPMENT



various areas are coordinated, and whether overall project objectives are being achieved, without a systematic approach to monitoring, evaluation and reporting.

A. Output/Indicators of Success

The following chart lists the outputs and indicators of success as stated in the Project Paper Logical Framework Annex 1. As the Project progresses the outputs and indicators of success may need to be modified.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS
Project Outputs:	Magnitude of Outputs
1 An established management system with trained managers	Standard management procedures being used in all 11 institutes and 31 experiment stations.
2 Improved research methods using an interdisciplinary system approach	Systems approach being used which considers relationships (magnitude) of cropping patterns and incorporates animals in analysis.
3 Balanced mix of research scientists and of skilled technicians.	100 participants in long term training; 10,000 participants in short term training.
4 Timely and accurate source of agricultural production data.	Data on production, yields of crops, number of animals, and their production, factor and market prices published regularly.
5 An extensive and current collection of research documents and a constant diffusion of research results.	A collection of no less than 30,000 items and dissemination of 50 specific technical reports per year.
6 Sufficient certified seed available to meet farmer's demands.	70% of cereal seed demand and 100% of hybrid, vegetable and legume seeds demand met.
7 Appropriate research facilities adequately equipped and furnished.	Laboratories fully equipped and functioning in 31 research stations.

- | | |
|--|---|
| 8 A coordinated and collaborative agricultural research community. | At least 3 professional associations related to research organized e.g. plant genetics, veterinarians, and agricultural economists. |
|--|---|

The following anticipated outputs 1 through 8 are described in the Project Paper, Annex 1B. There were no outputs listed in this annex for the research grant program, integrated crop protection, on-farm trials, agricultural mechanization, biotechnology, or agrometeorology. These have been added in items 9 - 14.

1. Improved Management:

- Full complement of approved positions;
- Standard operating procedures being followed;
- Periodically adjusted approved research agenda;
- Operating plan and budget approved prior to initiation of fiscal year;
- Operating within budgetary limitations; and,
- Research plans being implemented on schedule.

2. Improved Research Methods:

- Use of a farming systems approach to identify constraints to increased production;
- Greater use of appropriate designs for field and station experiments;
- More effective control of research experiments;
- Reduced time in analyzing and reporting on research findings; and,
- More reliance on computer technology to accelerate research analysis.

3. Personnel Development:

- The establishment of a staff development program;
- The inclusion of specific training objectives in the ARC's annual operating plans; and,
- The accomplishment of the stated training objectives as found in the annual operating plans.

4. Data Collection and Analysis:

- Improved agricultural data base;
- Expanded data processing capability within the MOA;
- Improved agriculture and food policy analysis capacity; and,
- Regularly scheduled publication of agricultural statistics.

5. Information Utilization and Dissemination:

- A single classification and cataloging system;
- An efficient circulation system;
- Trained personnel to manage the library collection; and,
- Effective mechanisms to disseminate relevant research results to farmers.

6. Seed Production:

- A vigorous private sector seed industry for hybrids, vegetables and forages;
- Three seed testing stations properly equipped and sufficiently mobile; and,
- Adequate supplies of improved varieties available to farmers.

7. Improved Facilities:

- Full occupancy and utilization of the completed facilities, and
- Completed facilities being maintained.

8. Commodities:

- Equipment fully used and
- Vehicles serviced according to manufacturer's instructions and schedule.

9. Research Grant Program:

- Research that will supplement that at ARC in high priority areas will have been conducted, reviewed, and disseminated;
- Administrative staff will have been trained so as to be able to continue such programs in future if funds permit ;
- Capability of university staff to conduct research that is interdisciplinary and adaptive, will have been increased, with strong ~~with strong~~ emphasis on on-farm trials and needed economic evaluations;
- Progress will have been made in using the regional universities as problem solving institutions for farmers and others related to agriculture in nearby agronomic zones; and,
- Collaboration among agricultural research institutions in Egypt and with U.S. universities and international agricultural research centers will have increased, and means to foster this in future will have been developed.

10. Integrated Crop Protection:

- Packages of ICP practices directed toward eight major crops or crop groups;
- Required pest and disease diagnostic centers;
- A survey system for more accurately measuring crop losses caused by diseases, insects and mites, vertebrate pests and weeds; and,
- Development of a training plan for specialists on safer handling of pesticides.

11. On Farm Trials:

- A system that incorporates specific means of identifying research needs of farmers;
- Technical packages responding to needs of farmers;
- A system that identifies socioeconomic needs of farmers;
- A system in place capable of managing 5,000 on farm trials annually; and,
- Reduced costs per trial to ensure future affordability.

12. Agricultural Mechanization:

- A system for developing prototype machinery for the private sector;
- A development of a multicrop thresher and a grain crop harvester; and,
- Development of a private sector industry responsive to small farm machinery needs.

13. Biotechnology:

- Operation of one or more plant tissue culture laboratories and
- Trained ARC personnel in recent biotechnology methodologies.

14. Agrometeorology:

- A network of strategically located meteorology stations that are linked to the existing stations and
- A data collection, transmission, analysis and distribution system.

B. Monitoring and Evaluation Approach

A monitoring, evaluation and reporting system, as described below, will be part of the NARP in order to meet the needs described above. The system and its various outputs are perceived as management tools, designed to facilitate good management within the project and to enhance decision making at all levels including that of the donor agency,

USAID. The system described will answer, for all involved, the following questions:

- What activities are being implemented through the project?
- How are project inputs being utilized?
- How are resources managed to produce research outputs?
- Is management of the research system becoming more effective?
- Are research efforts applied consistently with a recognized and agreed upon set of priorities related to a well described set of constraints that affect farmers' productivity and income?
- Are improved methods and procedures for both management and conduct of research being institutionalized in ARC?
- Are research outputs delivered so that user groups can and will make effective use of them?

Monitoring and evaluation activities for the NARP will include the following:

1. Continuous project monitoring

The administrative unit (AU) developed to serve the NARP will develop a project Management Information System (MIS) to facilitate continuous project monitoring. A project monitoring and evaluation (ME) committee, consisting of the Project Director General, the COP for Technical Assistance, and the USAID project officer will provide guidance for monitoring and evaluation activities. The committee will identify baseline data requirements and periodic data collection needs to be fulfilled by the MIS. While the MIS will serve on-going management decision making, it will also provide a data base for periodic reporting on project activities and status. Quarterly project reports will use this data. The AU will also draw upon this data as required to meet information needs of other evaluation efforts described below.

The ME Committee will utilize short term technical assistance to develop the details of the MIS and the baseline data collection process.

2. Annual program reviews

An annual review of the NARP will be implemented during the fourth quarter of each GOE fiscal year, beginning in Fy 87-88, during the life of the project. The primary focus of this review is to examine recent activities and current directions. The draft plan of work will be reviewed for the subsequent year's project operations. This annual review will be highly collaborative, guided by the

previously described Monitoring and Evaluation Committee, with full participation by THENARP/ARC leadership, USAID, the Technical Assistance Contractor and others. The annual review will utilize lessons learned, and project accomplishments and shortcomings, as guides to administrative modifications and to indicate the direction of subsequent activities.

3. External evaluations

External evaluations of the NARP will occur during the last half of the third year of project activity and again during the last half of the final year of project activity. This evaluation, will involve members outside the ME Committee and the annual review team. The external evaluation team, will also be conducted as a highly collaborative process.

Planning for these evaluations will be carried out by the previously described Monitoring and Evaluation Committee. The evaluation team will be composed of a representative of the ARC, a representative of USAID, a representative of CID and three outside evaluators selected by the ME Committee. Support arrangements and funding for these evaluations will be provided by AID. These evaluations will focus on the project as a whole, and will utilize the Outputs/Indicators of Success. They will include analyses to evaluate the Impact of the project on the staff and functions of the ARC from an institutional development point of view, on the behavior of research output users *vis a vis* research results, and on the strength and utility of linkages to other relevant organizations.

4. Special studies

From time to time special studies may be conducted which are related to evaluation or monitoring of particular aspects of the NARP. These studies will be coordinated through the monitoring and evaluation committee depending upon their nature and origin. As possible, the MIS may be drawn upon as a data base for use in such studies with the recommendation of the ME Committee. One such study will be conducted early in the implementation of the project by CID. The Consortium will conduct a review of those aspects of the project related to technical assistance as part of its system of internal monitoring of performance related to the contract with the MOA. Scheduling of that study will be negotiated with the ME committee.

Pages 15-16 of Amendment No.1 to the Project Paper gives an evaluation plan. However, this mainly relates to project first-year activities, which took place prior to the arrival of the TA team. Also the evaluation activities described are mainly to be performed by USAID staff.

C. Reports Required under the Contract

The following reports are to be submitted by the date indicated to the NARP Project Director and the USAID/Cairo Project Officer:

- A preliminary workplan which describes the contractor's strategy for accomplishing the work under the contract due on March 7, 1987;
- A more general life-of-project plan which incorporates a final workplan, based on a collaborative effort with the MOA, which refines the preliminary workplan and covers both the agreed upon strategy of the contractor and that of the MOA through the life of the project - due May 7, 1987;
- Progress reports on a quarterly basis will summarize work completed during the prior quarter, problems encountered and the means for solution and significant findings. These will cover calendar quarters and will be due by the 15th of the following month;
- An annual report which is similar in coverage to the quarterly reports. This is due 30 days after the end of the year covered. For the last year, however, it will be replaced by the final report;
- A final report which reviews the work performed and the resulting findings. Problems or issues affecting the overall project and its success in the future are to be highlighted. This is due by January 31, 1993; and,
- Quarterly fiscal reports for all funds under the contract. These are due 60 days after the close of the quarterly reporting period.

All required reports except work plans will begin with a summary and a statement of conclusions and recommendations, followed by the detailed report.

ANNEX A

CID TA Strategies and Activity Sets

Before presenting specific plans and activities, it might be well to clarify the role of technical advisors.

An advisor assists in the development of management systems in a technical specialty so as to accomplish specific, agreed upon objectives according to an approved plan of action. The advisor, in concert with a working group, helps to accomplish specific problem definition, assists in formulating a plan of action to overcome the problem, instructs and guides counterparts in technical methodology and reviews progress toward objectives. The advisor engages in planning, organizing, directing and reviewing programs from both a technical and management perspective.

Each CID TA has produced activity sets to accomplish goals with his or her area of responsibility. These activity sets are products of a planning strategy for obtaining the kinds of end products desired. These individual TA strategies describe a) the main constraints that justify the need for specific activities, b) describe the existing situation in Egypt, c) relate what the advisor and relevant counterparts will do, d) identify groups both inside and outside of Egypt that will help to provide solutions to problems, e) suggest ways of arriving at the best courses of action, f) identify groups that can provide assistance for accomplishing the required tasks and g) the final products expected.

Activity sets describe the main activities, and associated subactivities, that will be carried out to produce results desired as outputs of a strategy. Anticipated scheduling of activities and subactivities of each TA is presented in Annex B. The period of this scheduling is no longer than the anticipated duration of the TA position. However, it should be recognized that many of these activities will continue for as long as the life of the project, and even beyond.

----- **NARP IMPLEMENTATION - MANAGEMENT** -----

1. RESEARCH MANAGEMENT

STRATEGY

According to the NARP Project Paper (PP), one of the major areas of emphasis in the NARP is that of improving the management of research in the agricultural research community, with special focus on the MOA/ARC. Improvement in management is needed in the areas of: (1) policy and planning; (2) management of ARC institutes, research stations and production farms; and (3) management of research projects, sections and personnel. The relative level of skill with which these essential management functions is implemented will largely determine the contribution that agricultural research will make to increased food production in Egypt.

The establishment of a management system that provides for the setting of priorities for all functions within the national policy framework, together with efficient implementation and dissemination of results for the identified priority research, is probably the most important aspect in strengthening agricultural research systems. Therefore, improvements in research management will focus on:

1. Strengthening the process which considers national goals in developing research priorities.
2. Improving communication of useful information to policy makers and resource allocation agencies critical to the development of agricultural research.
3. Upgrading the development of research planning at all levels by encouraging extensive cooperation within and among participating institutions.
4. Improving the management structure of organizations to better accomplish research goals.
5. Establishing management processes for monitoring and evaluating all aspects of the research system, including dissemination of farm-tested economically-sound recommendations.

Cooperation and coordination is needed between and within many agricultural agencies in Egypt. The following agencies will be critical to the success of research productivity:

1. Ministry of Agriculture and Land Reclamation
2. MOA - Agricultural Research Center
3. Ministry of Irrigation - Water Research Center
4. Ministry of Planning
5. Ministry of Finance
6. Egyptian Universities - Faculties of Agriculture and Veterinary Medicine plus some other disciplines
7. National Research Center
8. National Academy of Scientific Research and Technology
9. Egyptian agricultural private sector agencies involved with research relating to agriculture
10. U.S. Agricultural Universities
11. International Agricultural Research Centers
12. Agricultural Donor Agencies
13. U.S. Agency for International Development
14. Consortium for International Development and its associates for NARP

Management encompasses all operational aspects of an organization. It includes planning, budgeting, resource availability and utilization, and both inter- and intra-organizational communications. To improve management systems, consideration must be given to decision making, resource allocation and quality control in order to meet stated objectives. Therefore, analyses and recommendations must be made on where responsibility and influence is placed on decision-making, and the extent to which those with responsibility have control or influence over the resources and conditions they are expected to manage.

To establish a logical and sequential decision-making process, with opportunity for feedback of ideas and evaluation and modification of courses of action at any given point, the following steps should be incorporated into problem solving:

1. Assessment of problems and opportunities, including data collection and analysis.
2. Establishment of specific objectives.
3. Development of an organizational structure that facilitates the achievement of objectives.
4. Development of policies and procedures that help achieve objectives.
5. Establishment of priorities based on available funds, manpower, facilities, and time and development of a plan for accomplishing priority tasks.
6. Implementation of the plan.

7. Development of a mechanism to evaluate or validate the process used in the activity and to quickly disseminate the results to those who can utilize them.

The conceptual approach stated above is not difficult to master in problem-solving situations. Under proper guidance and through application to real-life problems, this systems approach can become a useful tool for analyzing problems, selecting alternatives and improving institutional performance.

The following groups are participants in management of the NARP:

1. MOA/ARC managers
2. NARP Working Groups in all areas and their related TA staff
3. U.S. Agency for International Development
4. Consortium for International Development

Expected research management products include:

1. Many reports and recommendations related to items outlined in the strategy section.
2. Reports from short-term technical advisors in specific areas such as management techniques/principles and computer use and management.
3. Procurement lists of equipment for improving research management.
4. Standard management procedures in use by all units of the MOA/ARC.
5. A functioning computerized record of the research staff in the ARC.
6. Use of improved planning, monitoring and evaluation methods for research programs and budgets.
7. A substantial body of completed research based on these principles with increased emphases in the following areas:
 - a) An interdisciplinary team approach.
 - b) Collaboration among scientists in many different institutions in Egypt and between these scientists and the international research community.
 - c) Results of research conducted elsewhere adapted to conditions in Egypt.
 - d) On-farm testing to provide feedback from farmers and farm families so as to forestall unforeseen obstacles from preventing farmer adoption of recommended packages.

- e) Economic evaluations relating to net farm returns for all recommendations.
- f) Examination of the physical and/or organizational infrastructure to assure that inputs, including credit, are available when needed and to promote profitable markets for the expanded output.

ACTIVITY SETS

a. Assess and recommend improvement of administrative and program policies.

- (1) Assist in the collection and assessment of present administrative policies.
- (2) Recommend revisions in policies where needed.
- (3) Assess government, economic, and social policies that impinge on agricultural research.
- (4) Recommend a system to assess research feasibilities and potential productivity of various alternative future technologies, based upon research experiences, scientific judgement and other sources.
- (5) Identify agricultural research policies that are consistent with resources available for research.
- (6) Recommend revised research policies where needed.

Justification: Research and researchers can most effectively be supported if standard policies are followed when making decisions. Following standard policies promotes consistency in decisions among managers, even when a specific research manager is absent from post.

In order for research to achieve desired results in a cost effective manner, research managers need to follow standard research program policies when setting research priorities. Cooperative and complementary research, and hence research productivity, is enhanced if researchers are aware of the policies that will guide managers in selecting, funding and evaluating research projects.

Expected Products: Consensus, documentation and adherence with respect to policies which research managers will follow in identifying research priorities. Improvement of policies for administration.

Administrative policies comprise the principles which guide decisions about non-technical operations such as reporting and approval of accounts, international and local travel of staff, entitlement of staff to local

and international training, hierarchy of authority among staff, performance evaluation and salaries of staff and other administrative decisions.

b. Assist in the development of a system for identifying and establishing activities on a priority basis.

- (1) Assist in defining present procedures for identifying research activities.
- (2) Assess means to allocate resources to alternative research activities.
- (3) Evaluate the effectiveness of present procedures for setting research priorities.
- (4) Request a TDY on use of computers in research management.
- (5) Recommend changes in the system for setting priorities as needed.
- (6) Test the revised system for setting priorities.
- (7) Recommend adjustment to the system based upon experience in previous years.

Justification: In order for agricultural research to respond to national and agricultural sector policies, research managers must identify high priority projects and allocate resources among them according to those policies. This process of identifying and establishing research activities "on a priority basis" must translate national and agricultural sector policies into research priorities. Research priorities are, in turn, translated into specific research plans.

Expected Products: A system for identifying optimal research activities and allocating resources among them in a manner that reflects agricultural research policies is a major product of this activity. The system to be developed will routinely produce annual documentation of research priorities. Intermediate documentation may include lists of proposed research projects and, for each project, the duration of research, expected costs of research by time period, expected products of research, justification in terms of GOE policies, and a list of the subactivities that comprise the projected and suggested priority ranking of the project. The final documentation each year will include a list of projects approved for funding and an associated level of funding for each.

c. Develop an improved system of planning, implementing, monitoring and evaluating research programs based on research priorities.

- (1) Assist in an assessment of the current system for planning, implementing, monitoring and evaluating research projects.
- (2) Identify constraints which inhibit the planning, implementation, monitoring and evaluation process.
- (3) Recommend viable means of alleviating the effects of these constraints.
- (4) Assist in an evaluation and adjustment of the revised procedures for planning, implementation, monitoring and evaluation, and make any needed adjustments.

Justification: When research activities have been selected and the level of funding is determined (i.e., once research priorities are set), it is necessary to plan the specific activities and resource input levels for each subactivity in the project. Such a plan should be based upon possible synergistic effects among different subactivities of different projects as well as external conditions such as weather, manpower, training, budget allocation, etc. Planning procedures which reflect those considerations are necessary in order for research to be cost-effective.

Once plans are set, procedures for implementation should be identified to assure that research is carried out according to the plan. A system for implementation consists chiefly of procedures for transmitting research directives to the responsible research unit from the top-level management through to the lowest research unit level.

Monitoring of research while it is being conducted is needed in order to keep research managers informed on whether activities are being carried out according to plan. Using this information, research managers can make corrections in plans or in the conduct of research, if necessary. Also, information which is obtained through monitoring activities is needed to evaluate research (e.g., to analyze whether or not the expected results are being obtained in accordance with national and agricultural sector policies). Such evaluation can then be used as a basis for adjusting research priorities. Research that is not producing results consistent with national and agricultural sector policies should be deleted or refocused.

Expected Products:

- (1) A documented improved system for planning research based upon necessary priorities (i.e., the research activities that have been identified for funding, and the respective levels of funding).

- (2) A documented improved system for implementing research according to research plans.
- (3) A documented improved system for monitoring and evaluating the conducting of research according to plans, and results consistent with approved policies.

d. Assess and adjust the structure of the National Agricultural Research (NAR) System.

- (1) Assist in an assessment of the NAR structure in relation to needs for nationally coordinated interdisciplinary on-farm research focusing on production constraints.
- (2) Conduct a national workshop on the NAR system and how to improve it.
- (3) Recommend a research system structure to accommodate needed changes.
- (4) Assist in a reassessment of the NAR system.
- (5) Recommend adjustments to the research system structure to accommodate needed changes.
- (6) Monitor and evaluate implemented changes and actual accomplishments.

Justification: The NARP goal of increased agricultural productivity will be promoted through: (a) stronger interdisciplinary research linkages, (b) on-farm research methods, (c) identification of production constraints by agroclimatic zone, (d) closer coordination of research initiatives among research units; and (e) other measures. To introduce and strengthen these aspects in the national agriculture research system may require certain adjustments in the system. To accomplish this, the research system structure should be assessed and adjusted where necessary.

Expected Products:

- (1) An improved structure for research that accommodates and interrelates all the research units involved in agricultural research and shows their relationship to other governmental units whose functions impact on agriculture.
- (2) Charts and other documentation of the above structure.

e. Develop and recommend Implementation of an Improved system of ARC personnel management.

- (1) Assess information on professional and support personnel regarding their: (a) job description, (b) qualifications and training and (c) policies and procedures used for personnel management of professional and support staff. Request a TDY on development of a personnel management system.
- (2) Identify improvements for the current system.
- (3) Develop a set of recommendations to overcome constraints in personnel management.
- (4) Monitor the revised procedures on a pilot basis.
- (5) Based on feedback, recommend changes in the system.

Justification: The key to an effective and efficient organization is a cadre of well qualified and trained staff working in an environment which encourages performance at the optimal level. The purpose of this activity set is to: (a) assess and, if appropriate, recommend improvements in the qualifications and training needed by ARC professional and technical staff and (b) assess the work environment (i.e., salary levels, incentives and other factors which stimulate employees to work at their full capacity) and, if necessary, recommend improvements.

Expected Products: A set of recommendations for a personnel system will exist which will include: (a) a scope of work (SOW) for each employee, (b) a salary, fringe benefit and merit system for each staff member based on their SOW, qualifications and performance if employment regulations allow such a merit system, (c) a plan for providing training for employees and (d) a set of policies and procedures for the management of the system.

f. Assist with the linkage of national and international agricultural research organizations into an effective and efficient National Agricultural Research System.

- (1) Identify potential linkages between NARP and other Egyptian and international organizations that will improve research programs and will be beneficial in increasing agricultural productivity.
- (2) Recommend linkages (and types of linkages) to national and international organizations to: (a) promote effective research planning, (b) formalize committees and participation in international research networks and (c) promote attendance at international conferences and workshops.

- (3) Monitor and evaluate effectiveness of identifying, establishing and maintaining linkages.
- (4) Recommend adjustments as needed to improve the agricultural research system.

Justification: Agricultural research should be responsive to priorities set for the agricultural sector and for the country as a whole. To assure this responsiveness, functional linkages with agricultural and national policy and planning institutions must be formed. Also, the results of research must be formulated into recommendations to be given to farmers by extension workers. Organizations such as the international agricultural research centers (IARCs) can be valuable sources of information, genetic material and other technology.

Expected Products:

- (1) Functional linkages between the ARC and other units of the Ministry of Agriculture.
- (2) Linkages between the ARC and national and international organizations whose operations or influence might benefit the national agricultural research system.

3. Facilitate and coordinate the CID technical assistance team.

- (1) Meet with CID/NARP staff to assess their respective roles and responsibilities.
- (2) Counsel with technical assistance personnel regarding their performance in their roles relating to professional and personnel needs which enable them to perform effectively.
- (3) Direct performance of technical assistance personnel as appropriate and direct professional and personal support to those personnel as appropriate to assure that they fill their roles effectively.
- (4) Meet with scientists, other research managers and organizations associated with the ARC to identify possible needs for special short-term technical assistance.
- (5) Specify job assignments of short-term technical assistance personnel and select, schedule and guide personnel who fill those assignments.
- (6) Evaluate the accomplishments of short-term and long-term technical assistance personnel and recommend future requests for technical assistance.

Justification: An essential function of research management is to understand the roles of personnel engaged in technical assistance and assure that those roles are effectively filled. Effective management of technical assistance to meet the goals of the ARC requires that high levels of expertise be employed and that the expertise be appropriately guided including counseling of personnel and structuring their contributions one with another so that maximum complementary benefits can be obtained. Appropriate choice, scheduling and guidance of short-term personnel is an important aspect of the manager's role.

Expected Products:

- (1) Timely, focused, high quality technical assistance to improve research through long-term staff who are well integrated into and responsive to the program needs of the ARC.
- (2) Short-term technical assistance to support the resolution of CID contract special issues.
- (3) Selection, scheduling and guidance of short-term technical assistance to resolve special research, research management, and research support issues.

Administer and fulfill requirements of the CID/MOA contract.

- (1) Clearly understand the NARP project paper, the RFP for advisory services, the CID proposal in response to the RFP, the CID/MOA contract and other relevant documents.
- (2) Develop a monitoring system which schedules all key reports, documents, and specific activities needed to meet the terms of the CID/MOA contract.
- (3) Develop and follow administrative policies and procedures which are in compliance with the financial and legal requirements of the contract.
- (4) Establish and supervise an administrative unit which has major responsibility for financial, logistical and other administrative functions required to fulfill terms of the CID contract.
- (5) Develop a means of communicating with the CID executive office and the lead university so that these entities receive sufficient information in order to effectively fulfill their duties and responsibilities.
- (6) Assure that all terms of the CID contract for the NARP have been fulfilled.

Justification: Certain expected improvements in agricultural research in the ARC have been identified in the CID/MOA contract for NARP and must be confirmed. Expectations of the MOA have been identified in the contract as "project outputs" which are measured by "verifiable indicators". Since the NARP is an integral and essential part of the research program of the MOA, the GOE through the Ministry of Agriculture and Land Reclamation must be continually supported under the terms of the contract and officially informed of the progress of the NARP. Further, since the GOE provides certain resources to the NARP which will not have been productive unless the contractor (CID) meets the terms of the contract, it is essential that at the end of project the GOE is satisfied that the terms of the contract have been met. It is also essential that research management inspect the contract and assure on an ongoing basis that all contract terms are met.

Expected Products:

- (1) The client (GOE) will be satisfied that all reasonable effort is being made by the contractor (CID) to fulfill the terms of the contract with respect to improvement in the agricultural research systems in Egypt.
- (2) The client (GOE) will be satisfied at the end of the NARP that all terms of the contract have been fulfilled by utilization of the resources made available under the terms of the contract.

2. ADMINISTRATIVE SUPPORT

STRATEGY

The role and responsibility of management in a research setting is to manage available resources in such a way as to maximize their use and achieve the research goals and objectives. The primary focus of the Administrative Services position is to provide advice and assistance to ARC's management for improvement of financial procedures, and for increased utilization of available resources.

The present administrative and financial system of the ARC does not have enough flexibility or capability to handle all the operational needs required by various donor agencies. The governmental budget allocation for research is not based on realistic needs. This budget allocation method is used also at the operational unit level. This method of funding for research has over time resulted in operating inefficiencies and inhibited maximum utilization of available resources.

Assistance will be provided to ARC's financial and administrative department wherever improvement is needed. Part of this assistance will be through study and analysis of the overall administrative and financial system. It will include, but not be limited to, the financial reporting system, budget development, forecasting and management system, inventory control system, employee position review, and procurement processes.

The objective is to improve the management of existing resources while maintaining operating efficiency and financial control. This will be done by improvements in the present financial system, the implementation of new operating procedures, and the training of management and staff in policies and procedures aimed at increased efficiency.

Interactions will encompass every group involved in research or the support of research. The administrative and financial area is developed to support research, and report results as resources consumed or utilized.

The selection of recommended options to implement will be decided upon by management. All options recommended to management will be a result of the study and analysis of the present systems.

To assure success, certain action groups must be involved on a constant basis. The cooperation of these groups is essential. The groups identifiable at this time are: ARC's financial group, Inventory Group, Interdisciplinary Group, Research Station Group, the Procurement Committee, Training Group, and Mechanization.

The expected results of the changes to be implemented are:

- An improved financial system responsive to donor agencies.
- Standardized operating procedures used by all units.
- An improved budgeting system, responsive to resources.

- A staff performance evaluation system.
- Utilization of all resources in research activities.
- Staff trained on new procedures and computerization.

ACTIVITY SETS

a. **Analyze present administrative and financial procedures in ARC research units and other related areas within the Ministry of Agriculture and Land Reclamation.**

- (1) Officially request through the Director General of NARP the present administrative and financial procedures, handbooks and manuals of the ARC.
- (2) Collect the requested documents.
- (3) Have all documents translated into English.
- (4) Arrange documents into a chronological order for study.
- (5) Study the procedures to understand the flow of documents and actions for the overall financial system.
- (6) Analyze the system manuals to identify any procedures which could result in inefficiencies.
- (7) Evaluate the findings for importance to overall system efficiency.
- (8) Apply tests on compliance to reveal constraints and weaknesses of existing procedures.

Justification: These activities will improve the management of resources by identifying inefficiencies in the present ARC system.

Expected Products: First steps in improved standardized operating procedures.

b. **Identify constraints within the present operating system which interfere with effective management.**

- (1) List identified constraints from activity a.
- (2) List constraints by priority for human, financial, physical and information resources.
- (3) Study materials on constraints and resource materials to develop optional or recommended procedures.

Justification: Clear identification of weaknesses and shortcomings in the present system must be established.

Expected Products: A set of constraints will be identified which will facilitate development of modified operating procedures to assist in achieving more effective management.

c. Recommend options to the Director General of NARP and senior management within ARC to improve the administrative effectiveness of management with required financial control.

- (1) Document options and present recommendations to management and modify as needed.
- (2) Obtain management approval for modifications and agreement on timetables for training and implementation.
- (3) Prepare for the introduction of recommendations.

Justification: Improved financial/administrative management procedures are needed to increase efficiencies and utilization of resources by management.

Expected Procedures: a set of approved recommendations that will improve current operating systems, including procedures for development of operating plans and related budgets.

d. Introduce into the present system new or improved methods and procedures for financial management.

- (1) Introduce the philosophy of management.
- (2) Prepare documentation to visualize the proposed changes and distribute for discussion.
- (3) Arrange a training schedule.
- (4) Prepare visual documentation to increase understanding of the new procedures.
- (5) Introduce tentative new procedures and discuss changes.

Justification: Understanding of the new procedures is vital for implementing needed changes.

Expected Products: Implementation of a set of standardized operating financial management procedures that improves managerial effectiveness.

g. Train management and their support staff during the implementation stage in the application of new procedures and systems.

- (1) Conduct meetings to outline the overall objectives of the new procedures, explaining to management and staff the benefits of improved new administrative methods.
- (2) Assess, through reviews of job descriptions and current staff expertise, the amount and type of training needed.
- (3) Train management and then staff in the new administrative procedures.
- (4) Observe and advise on the implementation process.
- (5) Repeat the process as required.

Justification: Training is needed to permit staff to properly implement and manage the new procedures.

Expected Procedures:

- (1) Improved standardized operating procedures are in use.
 - (2) Both managers and support staff are trained in the use of improved procedures.
 - (3) Operating plans are prepared as required to meet specified time schedules.
 - (4) A sound management system is in place.
- f. Reevaluate implemented changes for adherence to, and overall system acceptance of, the recommended modifications.**
- (1) Assess recommended changes in the system as follows: (a) observe for adherence, (b) review manuals, (c) discuss implementation with management and (d) compare flow charts for management transactions against the actual daily flow.
 - (2) Identify constraints, if any are noted.
 - (3) Recommend changed procedures if needed.

- (4) Assure that the operating system can be practically maintained.

Justification: Frequent reviews, particularly for newly introduced systems, are needed to assure that all procedures are functioning.

Expected products: Validity reviews to assure adherence to the new procedures and to confirm that project objectives are being met.

- g. Provide advice and assistance as required in the areas of financial control and administrative management for: (1) The administrative unit in the office of the Project Director General, (2) the CID technical assistance team, NMSU, and CID; and (3) operational counterparts within the ARC/MOA.**

- (1) Assist in the development of the financial reporting system of the NARP.
- (2) Monitor and evaluate financial activities.
- (3) Participate in budget development and tracking.
- (4) Give direction and assistance to the NARP Purchasing Committee.
- (5) Give direction and assistance on operating procedures and related matters.
- (6) Help develop an *Administrative Operating Manual and Employee Handbook*.
- (7) Develop and supervise a financial reporting system for the CID technical assistance team.
- (8) Interact with ARC officials on NARP-related financial matters.
- (9) Monitor expenditure reporting procedures and accounting functions as they relate to the NARP and donor agencies.

Justification: Activities of this type are required to introduce and maintain an improved management system.

Expected Products: Improved management relating to all resources available to the ARC under the NARP.

NARP IMPLEMENTATION - METHODOLOGY

1. INTERDISCIPLINARY RESEARCH (IR)

STRATEGY

The Agricultural Research Center (ARC) encompasses fourteen research institutes, four central laboratories, and the offices for agricultural research stations and on-farm research trials. Each of these is composed of sections and units. Research is conducted centrally and at outside research locations. Because of previous special projects in some of these research components, positive procedures have been made in developing a team approach to research. These procedures need to be strongly supported and adapted for expanded team efforts applied to all research programs within ARC. A key goal is the institutionalization of interdisciplinary approaches throughout the ARC. There is a need to move many presently isolated disciplinary programs into combined interdisciplinary research (IR) activities focused on solving agricultural constraints. A network exists of researchers at ARC - Giza and Dokki, Research Stations and Universities, to be linked with the On-Farm research specialists which should interact with extensionists and farmers. Informal feedback channels from farmers to research scientists need to be exploited, and may be even developed more, to identify and prioritize research that is essential for solving production problems on farms.

The interdisciplinary research management system must focus on present means of production at the farm level, evaluate their strengths and weaknesses, and determine changes needed to improve the socio-economic conditions of the farm family while maximizing production of agricultural commodities. The IR system must be taught to researchers, extension staff and farmers through training activities during the life of the NARP. This system will eventually include all crops and farm animals, and will extend throughout the agricultural zones of Egypt. The system must promote the participation of all related disciplines for any research subject from the beginning, in order to clarify the role, timing and resources required for each investigator on the team. Principal investigators should be selected for technical competency needed on the team rather than friendship or longevity in the system. Priority areas presently envisioned for IR activities are research for development of the new lands, crop intensification, forage-livestock integration, and production, harvesting, processing and marketing quality food products.

Objectives of IR activities are: (1) to institutionalize a team approach to problem solving through appropriate research within and out of the ARC; (2) close interactions between ARC and universities, the private sector, extensionists and farmers; (3) to review present research, recommend areas needing strengthening, and assist in introduction of new methods and techniques of research; (4) to assist in identifying constraints to agricultural production, developing research teams to find solutions and transfer

technology to the producer; (5) to incorporate microcomputer technology into IR management systems; (6) to encourage and assist scientists to report and publish research results using computerized literature search facilities; (7) to assist in developing linkages with International Agricultural Research Centers (ARCs) for consultation and short-term training; and, (8) to support in-country and out-of-country training for research scientists.

Agricultural research and production in Egypt must be closely coordinated among all agencies within and from outside the country. Public and/or private agencies should not work in isolation, as such practices are short-term and short sighted, and do not utilize expertise available to solve production constraints. This includes MOA/ARC institutes, national and external universities, private companies and Egyptian agricultural producers (farmers).

Interdisciplinary research will follow a stepwise approach to identify and solve production constraints by a management system that encourages the flow of research findings from institute laboratories and fields to farmers. There will be feedback from farmers to researchers. The action group for all IR activities is the Interdisciplinary Research Working Group composed of representatives of the major commodity and support institutes of ARC.

Outputs of IR activities will be measured by the level of planning and adoption of the proposed management system, but more importantly by the numbers of IR teams, the number of researchers (basic and applied), and the number of on-farm specialists trained and *working effectively* with farmers. A final indicator is the improved production and profit realized by farmers because of the transfer of new technology.

ACTIVITY SETS

a. Develop a procedures system to optimize IR in ARC.

- (1) Formulate the new system
- (2) Identify means and techniques.
- (3) Implement the identified means and techniques.
- (4) Reevaluate and standardize the system based on NARP policy.
- (5) Form groups on an institutional and/or commodity basis to introduce new IR techniques and to provide in-country training.

Justification: These activities will facilitate coordination and monitoring of IR activities, assist in avoiding duplication within research programs, and assist in developing complete packages of production practices that have been adequately tested and evaluated for the producers and users of agricultural commodities.

Expected Products: Identified working systems or relationships within and among national research organizations (ARC and others).

b. Review ongoing ARC research and classify as disciplinary or interdisciplinary.

- (1) Visit Research Units to establish and maintain channels of communication.
- (2) Visit Agricultural Research Stations and Governorate Veterinary Laboratories.
- (3) Develop reports on the progress of IR and related disciplinary activities.
- (4) Recommend areas to be strengthened and support these for financing and development.
- (5) Introduce and/or develop new techniques needed for IR.
- (6) Assist with training courses in biotechnology by use of requested short-term technical assistance.

Justification: These activities will assist in bringing together more disciplines to collaborate with present IR activities in the ARC, and provide direct training toward incorporation of new scientific methods, information and equipment.

Expected Products:

- (1) Ongoing research activities, including basic research topics, will be classified as disciplinary or interdisciplinary.
- (2) All research activities will be evaluated in terms of potential effectiveness in realizing research objectives of transferring improved technologies to farmers.
- (3) Areas where IR should be strengthened will be identified.
- (4) New research techniques will be promoted.

c. Develop and recommend IR projects relating to major production constraints.

- (1) Assist in identifying specific constraints within each agroecological zone.
- (2) Continuously monitor constraints.

- (3) Assist in developing and selecting IR programs to eliminate constraints within zones.
- (4) Encourage technology transfer from research findings through on-farm demonstrations to the producer.
- (5) Assist in evaluating the progress of research programs.

Justification: These activities are designed to maximize utilization of all available resources, e.g. human, animal, water and land, into useful production, improve the capabilities of research staffs in Egypt, improve agricultural production systems within each agroecological zone, adjust research objectives to meet the demands of farmers and agricultural policy makers, and optimize the cost/benefit ratio in relation to the system of farming being used.

Expected Products:

- (1) A system for identifying production constraints within each agroecological zone.
- (2) Resolved bottlenecks for optimization of research results, thus providing prompt, statistically-sound research data for use in regional and national decision making.
- (3) Developed and adopted systems for agricultural intensification of human, animal, soil and water resources.
- (4) Systematic consideration for use of sound IR projects.

d. Increase use of microcomputer technology for IR and introduce other activities to improve its efficiency.

- (1) Assist in surveying computer facilities and software presently available for research within ARC.
- (2) Provide leadership for conducting training sessions in operation of computers and to learn the IR program.
- (3) Help develop a master plan for implementing computerized IR.
- (4) Encourage regular distribution of agricultural statistical publications.
- (5) Assist in evaluating the IR system and modifying as required.
- (6) Organize training workshops by selected leaders in biotechnology.

Justification: These activities will integrate needed information for IR, monitor research data and findings for agricultural production and policy makers, and provide a means of linking past, present and planned research activities and results for Egyptian agriculture.

Expected Products:

- (1) An improved agricultural data base relating to ARC activities.
- (2) Improved data processing capabilities within the ARC Institutes.
- (3) Improved data analysis of IR programs and timely publication of results.
- (4) Coordinated IR activities, regionally and nationally, through a standardized computer system.

e. Establish an agrometeorological station network.

- (1) Assist in describing data collection needs.
- (2) Help to combine with overall ARC needs.
- (3) Request a short-term agrometeorology expert.
- (4) Assist in executing recommended programs.

Justification: Improved data in this area should help to stabilize agricultural production through minimizing losses due to weather-related factors.

Expected Products:

- (1) Established uniform network of agroclimatic data for Egypt using a standardized International Meteorological Organization (IMO) system.
- (2) Improved management and commodity improvement for crops and livestock.
- (3) Reduced losses from epidemics of diseases, outbreaks of insects and other losses due to stress and competition.
- (4) Improved crop, soil, livestock and water management.

f. Link IR activities within the NARP through meetings, scientific publications and improved motivation for scientists.

- (1) Organize and help to conduct meetings, seminars, conferences and field tours on IR activities.
- (2) Encourage IR publication through a newsletter, quarterly and annual reports, existing ARC media, and in national and international journals.
- (3) Promote improved motivation of research staff and upgrading of their research based on their involvement in IR activities.
- (4) Assist in developing strong linkages with non-ARC Egyptian research institutions, including the regional universities, and with US universities and international agricultural research centers.

Justification: These activities will bring constraints and proposed solutions to the attention of researchers, acquaint research workers with the results of IR and thus encourage its increased use.

Communication of results will clarify major production issues for administrators, and inform national and international scientific communities of research accomplishments in Egypt. Publication will provide proper recognition of achievements of individual researchers immediately following completion of research, and accelerate research activities.

The IR approach will assist in integrating research efforts toward national problems of concern to producers. Linkages with other agencies will permit Egyptian researchers to make more use of findings generated elsewhere, increase the open exchange of genetic material and research results, and assist in transfer of new technologies among cooperating agencies.

Expected Products:

- (1) Prompt dissemination of information throughout the ARC.
- (2) Closer collaboration among research disciplines and research units.
- (3) Prompt publication of research results, with wider circulation.
- (4) More constraints being addressed with an IR approach.
- (5) Strengthened linkages for improved provision and sharing of information.

- (6) Increased sharing of knowledge between national and international scientists.

g. Linkages: NARP training and documentation.

- (1) Support IR training with other NARP staff, including selection of areas for postdoctoral training and arranging for in-country training.
- (2) Add IR publications to the NARP documentation section and facilitate transfer from that section back to researchers.

Justification: These activities will upgrade the capabilities of research workers and assist them in keeping abreast of new technologies, enhance transfer of technology developed under IR and provide a continuing series of available references for agricultural researchers both in and outside of the ARC.

Expected Products:

- (1) Developed capabilities for scientists in agricultural research.
- (2) Availability of appropriate reference journals, periodicals, texts, etc. from national and international sources.

2. RESEARCH STATIONS

STRATEGY

Agricultural research is conducted to increase productivity from a given resource base. Scientists develop many ideas and theories on how best to achieve this increase in productivity. They also must be concerned about product quality and production costs. Some fundamental studies can be conducted in laboratories and greenhouses, however, the final tests must be conducted under field conditions. Agricultural research stations were designed in order to conduct research tests in a field environment. The ideal research station would have uniform environments, (i.e. soil, water, drainage, etc.), so scientists could manipulate one or two variables per test. Such a situation is not usually achievable, therefore statistical analyses are employed using randomization and replications to increase the precision of field experiments. However, uniformity is desirable and the basic infrastructure of most stations can be improved.

Many ARC agricultural research stations were developed 30 to 50 years ago. Because of financial constraints, very few technological improvements have been made. In nearly all stations the very basic infrastructure of soil, water, and drainage needs to be improved to increase the reliability of data obtained. Likewise, in animal research, the pens, sheds, corrals, hutches and stores need to be upgraded. Many stations are also in need of farm and laboratory equipment.

Good communications between the station scientists and their respective research institutes in Giza and other research units are of paramount importance. Reliable telephone service could increase the efficiency of many management operations, and could keep all scientists and administrators informed on the current progress of research.

Some research stations are quite isolated, so it is essential to keep staff morale and motivation as high as possible. This can be assisted by developing good living (flats) and working quarters, providing schools and/or school transportation for children, establishing health care centers near the stations, and an active social-cultural club.

The land used by scientists at research stations is mainly controlled by the "State Farm Institute." In many instances the philosophy and needs of stations and state farms are completely different and certain research principles must be compromised for the sake of cooperation. These compromises increase the probability of generating data of poor quality. Researchers may use additional replications to compensate for variability, but this increases research costs. A logical solution to this difficult situation is to transfer management of all needed research land at each site to the control of the ARC agriculture research station. It then becomes the research station's responsibility to maintain and improve these areas. The objectives of research station management are to improve and maintain infrastructure and operations so high quality meaningful results will come from crop and animal research. The first phase will be to determine the

amount of land needed by research units and designate a specific area at each station to be used exclusively for research. This land area will be placed under the control and responsibility of the Research Station Institute. The second phase will be to improve the designated land by leveling, underground irrigation delivery systems, improved drainage systems, and an ongoing weed management program, using the latest available technology. Offices and laboratories will be remodeled at selected research stations. Committees will be appointed to set priorities concerning which stations are to be improved first.

Contacts will be made with telecommunication companies with the objective of having a telephone system available at each station, capable of ordinary voice communications and of transmitting computerized data. A uniform research station management system will be developed, outlining the responsibilities of directors, establishing equipment/facility maintenance and repair programs, and providing land use and inventory histories. The system will be computer compatible.

Morale will be improved at certain stations by the establishment of social-cultural clubs, remodeled housing and easier access to schools and medical care.

To achieve these objectives will require the strong support of many elements in ARC. Certain ARC institutes will have cooperative research programs with several IARCs and many of these projects will be conducted on the research stations. If facilities on the stations are of high quality, university scientists may also wish to develop cooperative programs with the station staff. The Ministry of Irrigation and Drainage may become involved in developing the improved irrigation and drainage systems. The ARC Soil and Water Research Institute and the Agricultural Mechanization Research Institute should become deeply involved in the land preparation projects. The appointed Research Station Working Group will be advisory in developing priorities.

Once infrastructure has been improved, station scientists should obtain meaningful results with lower coefficients of variation from their replicated tests. This also should help the breeders (plant and animal) and improve their chances of finding and selecting genetically superior individuals. With newer and better farm and laboratory equipment, and better management, more timely operations can be expected. Good communication systems, plus computer capacity, should increase the efficiency of data processing, information acquisition, bookkeeping and reporting.

ACTIVITY SETS

- a. Develop the capacity to support crop research leading to high yield production potential at selected locations.**
 - (1) Review and define requirements for research on higher yield potential production systems for field crops, i.e. infrastructure, commodities, field mechanization and research station resources.

- (2) Assist in developing priorities by research station/location for two planning periods: 1987-1990 and 1990-1993.
- (3) Assist in developing plans for land improvement activities, i.e. land leveling, soil mapping, a water management system, and weed control.
- (4) Assist in developing engineering plans and specifications for contract work on remodeling of laboratories, soil leveling, irrigation and drainage systems, and new construction.
- (5) Assist in developing specifications on commodities for 1987-1990.
- (6) Assist in developing contracts for soil and water management systems and facility development.
- (7) Assist in planning for procurement of commodities.
- (8) Assist in receiving and supervising installation of equipment.
- (9) Help train researchers, technicians and other support staff on new equipment and methodologies (soil leveling, sprinkler and drip irrigation, computerized bookkeeping, plot equipment).
- (10) Encourage the use of improved land use records.
- (11) Help to initiate the enhanced research programs.
- (12) Assist in developing plans for improved maintenance and operation of equipment and facilities.
- (13) Review the development of research programs during 1987-1990 and repeat steps (3) through (12) as appropriate in planning for 1990-1993.

Justification: A highly specialized environment needs to be developed in carrying out crop production research. This environment should have as few limiting factors as possible except those under investigation. Establishing a high yield potential crop production system is essential for research activities in field, laboratory or hothouses. Such intensive research on stations should reveal ways of increasing farmer production.

Expected Products:

- (1) An established, improved research station management system.
- (2) Improved research methods in crop production.
- (3) Interdisciplinary research established.

- (4) Trained station staff and support personnel.
 - (5) Appropriate research facilities and equipment available.
- b. Develop the capacity to support high yield meat/milk research in the Delta, concentrating on the buffalo and cattle.**
- (1) Review present research infrastructure and support equipment, emphasizing improvements at Sakha and El-Serw.
 - (2) Review present and past research objectives and establish priorities for two planning periods: 1987-1990 and 1990-1993/
 - (3) Assist in developing detailed commodity procurement lists for 1987-1990.
 - (4) Assist in requesting procurement of needed research commodities.
 - (5) Assist in developing specifications for remodeling animal laboratories and animal housing sheds and for new animal sheds, and to replace and/or repair water, electrical and sanitary lines and stores as needed, and assist in designing specifications and obtaining bids for remodeling construction.
 - (6) As requested, assist in the review of contracts for remodeling and new construction.
 - (7) Assist in the supervision of installation of equipment.
 - (8) Schedule training for technicians and support personnel for the affected research areas.
 - (9) Assist in developing plans for continued maintenance and operation of equipment and facilities.
 - (10) Assist with the review of research programs in 1987-1990.
 - (11) Assist in determining requirements for 1990-1993 and repeat steps (3)-(9) as needed.

Justification: The buffalo is the main meat/dairy animal which contributes to the development of the rural economy. Milk/meat production from buffalo could be greatly increased through the use of frozen semen from genetically proven bulls by artificial insemination (AI). Live embryos from genetically proven dams could also be implanted in the uterus of surrogate mothers. In order to implement this highly sophisticated research system, new equipment and facilities are needed. Cattle are also important and similar research programs are needed.

Expected Products:

- (1) Established improved management systems for buffaloes and cattle.
- (2) Improved research methods in animal science and an effective AI program.
- (3) Interdisciplinary research established.
- (4) Trained staff and support help.
- (5) Appropriate research facilities and equipment available.

c. Develop the capacity to support an expanded research program to increase productivity of horticultural crops (glass houses, plastic houses/row tunnels, etc.).

- (1) Review research station support requirements for horticultural crop production research by zones and by years.
- (2) Assist in setting priorities for research stations during two planning periods: 1987-1990 and 1990-1993.
- (3) Assist in developing detailed commodity procurement lists for the 1987-1990 period.
- (4) Assist in requesting procurement of commodities for horticultural research.
- (5) Assist in developing specifications for screen and plastic houses for initial development in 1987-1990.
- (6) Assist in planning for procurement of screen and plastic houses, including electrical and watering systems, and on site preparation, including utilities.
- (7) Assist in developing specifications on other construction for priority stations and assist in planning for the design and engineering.
- (8) Assist in reviewing construction bids and contracts.
- (9) Assist the installation program for screen and plastic houses.
- (10) Assess the installation progress of screen and plastic houses.
- (11) Assist in scheduling training of technicians and other support personnel for the affected research areas.
- (12) Help initiate the expanded research programs, making use of these new facilities.

- (13) **Assist in developing plans for continued maintenance and operation of equipment and facilities.**
- (14) **Review development of research programs in 1987-1988, project requirements for 1990-1993, and repeat steps (3) to (13) as appropriate in planning for 1990-1993.**

Justification: Egypt has a negative agricultural balance of payment. Horticultural crops have the potential for surplus production if sufficient research results and management capacity become available to producers. Surplus production of several horticultural crops could be exported, possibly producing a positive balance of payments of agricultural commodities.

Expected Products:

- (1) Established improved management systems for horticultural research.
- (2) Improved research methods in horticultural science.
- (3) Interdisciplinary research established.
- (4) Trained staff and support personnel in screen and plastic house techniques and tissue culture.
- (5) Appropriate research facilities and equipment available.

d. Implement improved agrometeorological data collection and analysis at selected locations.

- (1) Assess data collection needs.
- (2) Coordinate with overall ARC needs.
- (3) Request short-term agrometeorology expert.
- (4) Assist in executing the recommended programs.

Justification: Continuous inputs of agrometeorology data are needed for improved agricultural research in Egypt. Such data can sharpen the understanding of phenology of crops and of pests and plant pathogens. These organisms grow in a linear fashion responding to accumulative temperature units above developmental thresholds. Other parameters such as relative humidity and wind speed and direction affect crop survival and survival and distribution of pests and pathogens. At present there is no coordinated and logically located agrometeorology system in Egypt. Development of such a system will assist the development of predictive capabilities for growth stage and production levels of crops as

well as for outbreaks of pests and plant diseases. It will also provide inputs needed for computerized modeling of pest populations and plant pathogens in order to better time the application of control tactics.

Expected Products:

- (1) An agrometeorology system including assigned space, equipment, trained staff and summarized data.
- (2) Improved research methods and facilities.
- (3) Increased interdisciplinary research.
- (4) Timely and accurate weather data that relate to agricultural production.

e. Implement an improved system to coordinate research on stations, on farms and through demonstrations.

- (1) Review present farm practices and results.
- (2) Review present status of research projects.
- (3) Review technological packages under test for various environments and for specified crops.
- (4) Observe and consult with staff involved in on-farm research and demonstrations.
- (5) Seriously consider suggestions resulting from on-farm research and demonstrations and plan and set priorities for future research projects based upon reliable data obtained.

Justification: The major reasons for conducting agriculture research are to discover new and efficient ways of producing food and other agricultural products, and to increase the Egyptian farmers' standard of living. At the present time there is a gap between research station production information and information used by farmers. The transfer of agricultural technology from the research station to farmers' fields can be quickly carried out by expanded demonstration programs and related extension activities.

Expected Products:

- (1) Improved research methods using an interdisciplinary system approach.
- (2) A balanced mix of research scientists and skilled technicians trained.

(3) Improved coordination within the research community.

f. Develop and implement a system for improved communications within and between research stations and other ARC units.

- (1) Review the present types of communication systems between, among and within the research stations and ARC units, and government regulations concerning radio and other airway communication systems.
- (2) Assist in obtaining the services of a short-term communications expert.
- (3) Review recommendations with respect to a paging system, CB-type radios or other communication systems and request any needed modifications.
- (4) Assist in obtaining approval for recommended communications systems, request purchases of needed equipment, supervise its installation, and arrange for staff training in its use.

Justification: Rapid communication systems are essential for research progress at research stations. Delays must be avoided and correspondence time shortened so the research activities can proceed with greater efficiency. Effective telephone, microwave or radio system(s) would greatly contribute to timely operations on the research stations, especially in locating and obtaining repair and maintenance items.

Expected Products:

- (1) An efficient communication system.
- (2) Staff trained in its use.
- (3) Coordinated research activities executed promptly and more efficiently.

g. Implement selected activities to enhance research station staff productivity.

- (1) Assist in the evaluation of research stations' status for staff and worker housing infrastructure, health care centers, schools, cultural facilities and community services.
- (2) Help determine the number of new staff and worker housing units needed and develop specifications.

- (3) Assist in developing specifications for remodeling of staff housing at selected stations.
- (4) Help evaluate and determine the need for upgrading the utility systems on selected stations.
- (5) Assist in supervision of engineering and designing new and remodeled staff and worker houses, including utility services, and in scheduling such remodeling and new construction.
- (6) Assist in determining the number of school age children and the availability of transportation to school, if walking is not feasible, and request needed new vehicles.
- (7) Assist in upgrading research station health care programs and request purchase of first aid equipment and a training program in first aid.
- (8) Assist in the selection of rooms to be remodeled for public and staff meetings and cultural facilities, and assist in the supervision of designing and engineering for construction, and in the review of contracts.

Justification: Research activities require a highly qualified and productive staff. Without both technical and social facilities, morale will decline. Improving housing, training, transportation, equipment, etc. will help in keeping the staff happy and productive and will encourage them to live at the research stations with their families rather than in some distant city.

Expected Products:

- (1) Needed infrastructural facilities and equipment.
- (2) More senior staff living near their research activities, with increased productivity.

h. Develop infrastructure essential for expanded livestock research programs.

- (1) Review present livestock research infrastructure and support commodities at the stations.
- (2) Review present and past research objectives and set objectives for two planning periods: 1987-1990 and 1990-1993.
- (3) Assist in developing detailed commodity lists for the 1987-1990 period and assist in arranging for procurement.

- (4) Assist in developing specifications for remodeled and new animal housing, animal sheds, laboratories and the utility support system (water and electrical lines) for 1987-1990.
- (5) Assist in the supervision of designing and engineering of new and remodeled construction and help review contracts and assist in supervision of remodeling and new construction.
- (6) Assist in receiving and supervising the installation of equipment.
- (7) Assist in scheduling training for technician and support personnel for the affected research areas.
- (8) Assist in developing plans for continued maintenance and operation of equipment and facilities.
- (9) Review development of research programs in 1987-1990, project requirements for 1990-1993 and repeat steps (3)-(8) for planning in 1990-1993 as needed.

Justification: Animal production is extremely important to the Egyptian farmer. Most farmers have some type of livestock program, such as buffalo, cattle, poultry, goats and/or sheep and rabbits. A special research program is planned for improving the production of buffalo and cattle. However, the importance of eggs and meat from poultry, wool and meat from sheep, the scavenger capacity of goats and the rapid reproduction rate of rabbits should not be overlooked. To produce more meat, fiber and eggs effectively and profitably, additional research is needed in animal physiology, reproduction, nutrition and health care. The majority of this research will be conducted at the research stations. In order to execute this research properly, new technology and equipment must be used and the research station infrastructure must be improved and strengthened.

Expected Products:

- (1) Increased production of meat, milk, eggs and fiber.
- (2) Improved research methods in animal science.
- (3) Trained personnel in animal science.
- (4) Appropriate research facilities and equipment.
- (5) Increased interdisciplinary research.

I. Implement an improved uniform management system for research station planning and budgets.

- (1) Review current practices with each management advisor and explore recommendations for modifications.
- (2) Assist in providing training for administrators of research stations.
- (3) Assist in developing suggested changes in management practices.
- (4) Assist in conducting trials of changed management practices on a single research station, review results and make needed modifications in the approach.
- (5) Assist in scheduling training for office personnel at research stations.
- (6) Assist in the implementation at all stations of a fully improved system for development and monitoring of plans and budgets.
- (7) Review system implementation and conduct trouble shooting as required.

Justification: Timely operations for research tasks are important in the management of research stations. The development and implementation of yearly and quarterly plans and budgets must be organized in an efficient and orderly manner.

Expected Products:

- (1) Established station planning and budget systems.
- (2) Trained staff and support personnel.
- (3) Timely and accurate record systems.
- (4) A coordinated and collaborative research community.

J. Implement an improved uniform management system for research station operations.

- (1) Review procedures now being used by research stations for management of operations, i.e. record keeping, field work scheduling, station facilities maintenance, and identify key constraints.
- (2) Assist in developing and implementing a uniform system of land use records for research station experimental land.

- (3) Assist in identifying major interactions and demands placed on research stations and develop and implement a systematic approach that research station managers can use to effectively schedule field work.
- (4) Assist in implementing improved field work practices.
- (5) Assist in developing and implementing a uniform system, compatible with central policies, for managing stocks and inventorying supplies.
- (6) Assist in establishing guidelines for improvement of land/water resources, buildings and equipment maintenance, and develop related guidelines for improved management.
- (7) Assist in implementing training courses for management, supervisory and maintenance personnel.
- (8) Assist in implementing systems for improved maintenance at each research station.

Justification: Research stations need overall management systems characterized by timely preparation and conduct of research tasks, adequate spare parts, a stores and supplies program, timely purchases of farm operations supplies, accurate land use assignment and records, maintained and recorded irrigation schedules, and maintenance of equipment and facilities. A system of cooperative planning and linkages between stations is also needed.

Expected Products:

- (1) Uniformity of research station operational procedures.
- (2) Trained managers and support staff and the establishment of an up-to-date records system.
- (3) Cooperative inter-station linkages established.

k. Implement a program to equip and operate animal health clinics at principal animal research stations.

- (1) Assist in defining the requirements for local animal health care at research stations for farm animals and poultry, including basic space, equipment and supplies needed for various classes and quantities of livestock. Establish priorities for remodeling and new construction and assist in supervision of design and engineering work, including bid specifications.
- (2) Consult and review construction contracts for remodeling and for new facilities.

- (3) Assist in a review of equipment and animal health supplies currently at stations, as well as facilities for refrigerated storage. Develop specifications, and request procurement through the NARP Commodities Procurement Committee.
- (4) Assist in planning and request training for station technicians and animal health care specialists.
- (5) Assist in developing plans for systematic review and restocking of animal health supplies.

Justification: Animal diseases and parasites cause the loss of millions of L.E. of revenue each year. Additional research is needed to develop the capacity for the prevention and control of animal diseases and pests. Research studies concerning health involve genetics, nutrition and sanitation. Improved animal health care will make a major contribution toward reducing these losses.

Expected Products:

- (1) Improved animal health facilities and supplies at appropriate research centers.
- (2) Trained staff and support personnel in animal health care.
- (3) Animal diseases reduced.
- (4) Animal production increased.

I. Enhance capacity of regional stations to serve as administrative and support centers for research.

- (1) Assist in reviewing and clarifying the role of regional stations as administrative and support centers for the station network and identify constraints to improved regional service for each of the regional stations and priority needs for each one.
- (2) Assist in developing specifications for equipment required to meet high priority needs of each regional station and request their procurement.
- (3) Assist in identifying facility requirements and prioritize construction needs for the regional stations and review bids and contracts for construction.
- (4) Schedule training to develop skills needed by personnel at regional stations.

Justification: Administrative and technical support at ten regional stations has been established. The consolidation of the various stations within each region into a regional unit will strengthen the management system and will increase the effectiveness of technology transfer to the farmer. The capacity for communications will be increased and some equipment can be shared.

Expected Products:

- (1) Established management support systems.
- (2) Improved research methods.
- (3) Trained administrative and support personnel.
- (4) More efficient use of research station resources.

m. Expand capacity of selected research stations through infrastructure development.

Items (1)-(5) relate to New Valley. Item (6) applies to Gemmeiza and El-Serw.

- (1) Assist in the selecting of a committee of program leaders to evaluate the infrastructure needs of the New Valley Station and the types of research needed.
- (2) Assist in surveying the research site for land and water management and construction needs.
- (3) Review existing and needed field and laboratory equipment, request needed new items, and assist in supervision of its installation.
- (4) Assist in prioritizing construction and remodeling needs, preparing bid specifications and reviewing construction contracts.
- (5) Assist in training researchers and support staff in appropriate technology and research methodology.
- (6) Assist in documenting the need for improved access roads.

Justification: Few research programs are being conducted to support farmers at the New Valley Research Station near El-Kharga. In order to execute more high quality research, improved infrastructure must be developed. Gemmeiza and El-Serw are somewhat isolated by poor quality roads that can become completely mired during rainy periods. Improved roads would increase the ability to conduct research and would greatly increase the morale of the staff.

Expected Products:

- (1) Appropriate research facilities installed.
- (2) Improved morale at involved stations.
- (3) Research quality and quantity improved.

n. Cooperate with the NARP library/information section to improve information services for research station staff.

- (1) Assist in extending the services of the central library/information system to meet the needs for each of the ARC research stations and to train station staff in the use of any related equipment.

Justification: The technical staff at the research stations need access to the latest information in their respective disciplines. By reviewing the newest information, investigators can update ongoing research. Staff studying for advanced degrees need to review literature in their area of study. Having access to the latest information is essential.

Expected Products:

- (1) Increased research capacity.
- (2) Improved technical information available for scientists.
- (3) Staff trained in modern information retrieval techniques.

o. Develop improved data analysis at research stations.

- (1) Assist in identifying areas and programs where computers would be beneficial. Obtain advice and recommendations from an expert on computer usage.
- (2) Assist in developing plans for remodeling of facilities as needed and arrange for installation and testing of equipment.
- (3) Assist in obtaining training for researchers and support staff on computer use and initiate operations.
- (4) Assist in planning and initiating computer maintenance and procurement of supplies.

Justification: Planning of agricultural research can be greatly assisted by computer facilities to help in storing, filing, analyzing and classifying data. On-station computer facilities will help in preventing loss of data, reduce

the time needed for analysis, and permit interactions among researchers as the analysis proceeds so that the approach can be modified if required. Computers will also assist in maintaining station operations records.

Expected Products:

- (1) Increased research capacity.
- (2) Improved data analysis.
- (3) Improved management procedures, including tighter controls.

3. ON-FARM RESEARCH AND DEMONSTRATIONS (OFRD)

STRATEGY

An Interdisciplinary Research Program will be most effectively implemented as a sound management system is created to assure that the research is relevant to the needs of farm families.

For many years agricultural research in the ARC has been carried out by researchers at Cairo headquarters and at Research Stations throughout Egypt, as well as at universities and other public and private institutions. However, much of this research has not been assembled into package form and systematically made available to farm families. The information provided has generally emphasized maximum production without considering socioeconomic constraints. Farmers' feedback regarding response to the technology and information provided, as well as their suggestions for future research intervention, has been limited.

The objective of the On-Farm Research (OFR) component is to assist in the development of a management system prototype that provides Egyptian farm families a continuous flow of responsive agricultural knowledge and technology. The desired outcome is that this knowledge and technology will optimize productivity and maximize net farm income.

Linkage development between researchers at ARC Institutes, Research Stations, OFR staff, universities, Extension, farmers and other public and private institutions will be highlighted. Maximum participatory involvement for integrated decision making in the conduct of appropriate research will be emphasized. International institutions will be included, as needed, to provide greater exposure to successful management systems throughout the world.

The OFR Working Group will consider the most desirable alternatives for management system development. Criteria for selecting component parts will include, but not be limited to, the following:

1. Principles and procedures compatible with existing successful systems, i.e. Small Farmers, Fava Beans, etc.
2. Simple designs for program continuity.
3. Affordability for MOA management.
4. Maximum farm family involvement, with strong public and private support.

Specific outputs will include:

1. A management system prototype that will facilitate needed OFR trials, whatever the number needed.

2. Approximately 2,000 participants will receive in-country training each year (includes researchers, OFR staff, farmers and other relevant team members) to implement the designed prototype.
3. A training manual with OFR procedures, subject matter and process presentations, and program designs. Included will be procedures for data collection and statistical analysis, record keeping, report writing, etc.
4. A plan for maximizing feedback between researchers and farm families, including all relevant support components.

ACTIVITY SETS

a. Review current OFRD status.

Assist to:

- (1) Design questionnaire.
- (2) Identify and train local staff to conduct the study.
- (3) Complete the survey.
- (4) Analyze and interpret the data.

Justification: A programming benchmark is needed. This review (study) will accomplish this goal as well as provide an understanding of existing procedures for program implementation. It will also identify the strengths and weaknesses of the procedures being followed for OFRD experiments as well as identify needs for procedural adjustments. Trust relationships will be established as users see that appropriate adjustments are being made, thus increasing acceptance of information provided.

Expected Products:

- (1) Increased use of appropriate field experiments.
- (2) Effective control of OFRD experiments.
- (3) Needed knowledge of OFRD conditions prior to the NARP.
- (4) Plan for data use in OFRD expansion.

b. Establish a system for developing and conducting a farming systems research/extension (FSR/E) approach methodology.

Provide support to:

- (1) Select target zones for pilot studies.

- (2) Prioritize research activities.
- (3) Assemble available research technology information.
- (4) Develop and implement a training plan.
- (5) Develop and test needed training materials.
- (6) Implement OFRD plans by using them to solve problems facing farmers.
- (7) Monitor progress based on use of these plans and conduct studies of any constraints that emerge.
- (8) Make plans to transfer programs developed on a pilot basis to all agro-economic zones.
- (9) Request short-term staff to assist with training functions over the life of the Project.

Justification: These activities will provide help to farm families through an even flow of appropriate information and technology. They provide a means to maximize participatory involvement (interdisciplinary approach) for both research needs identification as well as institutionalization of the development of relevant research information and technology for farm family use.

Expected Products:

- (1) Increased use of appropriate applied research to increase farm family benefits from agricultural activities.
 - (2) Increased use of appropriate OFRD designs for field experiments.
 - (3) More effective control of OFRD research experiments.
 - (4) Incorporation of standard operating procedures.
 - (5) Periodic adjustments in OFRD programming as required.
 - (6) System established capable of managing at least 5,000 on-farm trials annually.
- c. Establish a system to identify factors constraining use of research results for improved agricultural practices.**

Provide leadership to:

- (1) Determine the inputs and procedures required for work in this area.

- (2) Develop needed interdisciplinary relationships.
- (3) Train staff.
- (4) Monitor and modify procedures as required.

Justification: This activity will insure maximum disciplinary and interdisciplinary inputs from all parts of research (crops, animal production, horticulture, sociology and economics) as well as extension and farm families. It will provide a systematic step-by-step procedure for processing needs/opportunities to insure that information and technology are appropriate for farm family use.

Expected Products: These are similar to those for the preceding activity.

d. Make plans for needed commodity procurement and facility improvements to conduct increased on-farm trials and farmer demonstration programs.

Assist to:

- (1) Review existing facilities and commodities for OFRD use.
- (2) Review the NARP Procurement Committee list for inclusion of OFRD requirements.
- (3) Request short-term staff assistance to develop an improved list of needs.
- (4) Request the proposed modifications to the extent that funds permit.

Justification: This activity will provide a systematic approach to commodity and facility procurement. It is most important that appropriate farm and field plot machinery is procured and, in turn, effectively and efficiently utilized.

Expected Products:

- (1) An adequate set of facilities and farm and field plot equipment to conduct desired on-farm experiments and farmer demonstrations on a wide scale.
- (2) Better planning for OFRD logistical needs.

e. Establish working committees as needed to solve OFRD program needs.

Assist to:

- (1) Identify needs for such committees.
- (2) Describe committee responsibilities.
- (3) Implement, monitor and evaluate committee activities which should include program development and reporting and continuous technology transfer to farmers.

Justification: This activity will provide inputs and relevant coordination for effective interdisciplinary involvement. It will also provide an action vehicle for program implementation of desired institutional building.

Expected Products: This is the main vehicle under which OFRD activities will be carried out by the NARP. Use of committees is designed to assure an interdisciplinary approach with wide participation by local farm leaders and strong emphasis on studies that directly address constraints faced by farmers to increased productivity and improved net family welfare from agriculture.

4. AGRICULTURAL MECHANIZATION

STRATEGY

Past efforts to mechanize Egyptian agriculture have been based primarily on imported technology. Consequently, utilization of tractors and farm machines has received major attention from the government and research institutions. This import-based technology transfer strategy has not been successful in providing modern mechanization to a majority of Egyptian farmers. Mechanization in Egypt has therefore had a rather spotty development, with larger farmers being its primary beneficiaries in the country.

Factors, such as a lack of appropriate machinery designs to generate economically viable market demands, relatively liberal imports of a wide variety of farm machines, coupled with public policies which generally favor imports over local manufacturers, have not permitted the development of local manufacturing in the country. With increasing balance of payment problems, it is becoming obvious that a sustained level of mechanization can be achieved only through indigenous development and production of appropriate farm machines which could meet the needs of a majority of Egyptian farmers. Since R & D in industry is almost nonexistent in Egypt, the public sector research institutes must play a major role in developing marketable farm machines and fostering local production.

The objectives of the NARP agricultural mechanization program are to:

- Establish a full fledged commercial style machinery development program at the Agricultural Mechanization Research Institute (AMRI) in ARC.
- Train AMRI staff in commercial style machinery development through actual development of one or two critically needed farm machines, e.g., multicrop threshers, reaper/harvesters.
- Encourage, facilitate and redirect mechanization research and machinery development activities at different Egyptian research institutes, universities and machinery manufacturers with the objective of increased problem orientation, and relevance to farmer and manufacturer needs.
- Disseminate information on technical and engineering matters among professionals in the country through seminars, information exchanges, discussions, workshops, etc.
- Review and analyze government policies, as these relate to small farm mechanization and local machinery manufacture, and make appropriate recommendations

Organizations and firms that will be interactive with the NARP agricultural mechanization program are based in-country and abroad. In Egypt these will include universities, public and private agricultural and industrial research institutes, and public and private sector agricultural machinery manufacturers. Abroad there are international agricultural research institutes, farm machinery manufacturers, national research institutions in developing and developed countries, machinery testing institutions, and universities and professional associations.

Lack of commercial-style machinery development is a serious constraint for the development of broadly based farm mechanization in Egypt. The approach advocated for fostering local manufacture has proved highly successful in a number of South & Southeast Asian countries. It has been well adapted to local cultural, commercial and environmental conditions and can prove effective in mechanizing Egypt's small farm holdings by providing locally produced farm machines.

Within Egypt, several groups will be encouraged to interact with AMRI in order to promote agricultural mechanization. These include:

Universities and Public Research Institutes:

University of Cairo
 Alexandria University
 Zagazig University at Zagazig & Mushtohor
 Ain Shams University
 Al Azhar University
 CIDDC
 Catholic Relief Organization.

Manufacturers:

Tanta Motors, Tanta
 Mabrook, Tanta
 Behera & Co., Alexandria
 AT Trade, Cairo.

Products of the NARP Agricultural Mechanization program consist of:

- A functional commercial style Machinery Development Program at AMRI with appropriately equipped design, drafting, testing and prototype fabrication facilities.
- Adequately trained staff at AMRI in machinery design, drafting and industrial extension.
- A fully developed design for a multicrop thresher appropriate for Egyptian farming conditions and for local production.
- A fully developed design for a tractor mounted reaper/harvester suitable for Egyptian farming and manufacturing conditions.

- Improved machinery research and development activities at different universities and research institutions with greater relevance to farmer and manufacturer problems and needs.
- Local introduction and functional assessment of selected farm machines from countries with agroclimatic conditions similar to Egypt.
- Improved linkages between AMRI and the small farm and manufacturing sectors.
- Improved linkages between Egyptian research institutions and foreign national and international agriengineering institutions.
- Governmental mechanization policies more conducive to the mechanization of small farm agriculture and to local manufacture of farm machines.

ACTIVITY SETS

- a. Become familiar with the major Egyptian agricultural mechanization research institutions and encourage better coordination by specified means.**
- (1) Consult with major research institutes.
 - (2) Assess existing research resources and projects.
 - (3) Assess major research problems and bottlenecks.
 - (4) Present seminars and lectures on commercial machinery development at different institutions.
 - (5) Maintain regular contacts with key researchers.
 - (6) Advise on NARP- and ARC-supported research projects.
 - (7) Advise on improving research relevance to farmer and manufacturer needs.
 - (8) Encourage better coordination between different institutions.
 - (9) Encourage key researchers to visit research institutes abroad to observe research coordination.
 - (10) Assist the Egyptian Society of Agricultural Engineers to play a more active role in research coordination.

Justification: Presently most Egyptian agricultural mechanization research institutions are working independently of each other. This activity will attempt to bring different institutions closer together by

increasing research communications between them and by orienting their research more towards meeting the needs of small farmers and local manufacturers of agricultural machines.

Expected Products :

- (1) Major mechanization research bottlenecks and problems identified.
 - (2) Increased orientation of mechanization research towards practical problems of small farmers and manufacturers.
 - (3) Improved mechanization research approach and methodology.
 - (4) Better coordination of mechanization research between different institutions.
- 5. Develop the capability of the Agricultural Mechanization Research Institute (AMRI) by organizing a commercial style machinery development program with two major components :**
- (1) machinery design and testing; (2) agroindustrial extension, including marketing and socioeconomic investigations.**
- (1) Specify drafting, design, office, shop and testing equipment for the AMRI and request purchase through the NARP Procurement Committee.
 - (2) Outline needed remodeling for the shop and test laboratory at the AMRI and forward to the NARP Construction Committee.
 - (3) Assist installation of new equipment at the AMRI.
 - (4) Assist in setting up a shop material and supplies store.
 - (5) Assist in ordering prototype fabrication materials and supplies.
 - (6) Assist in selection of design, test and industrial engineers.
 - (7) Assist in selection of draftsmen, shop and test technicians.
 - (8) Initiate the best procedures for the AMRI drawing and drafting needs.
 - (9) Provide on-the-job training to machinery development staff.
 - (10) Recommend key AMRI staff for short term training in machinery development abroad.
 - (11) Assist in the development of an AMRI section addressing mechanization extension, marketing studies and socioeconomic analyses.

Justification : Currently no research institution in Egypt can handle the development of commercially viable demand-oriented farm machines. A serious need exists for developing low cost farm machines which could be manufactured locally by small metalwork shops for use by a majority of the small farmers in the country. This activity will establish a machinery development program at the AMRI to adapt and develop a variety of low cost machines for Egyptian conditions. This program will train Egyptian engineers in commercial style machinery development and will promote local manufacture of demand-oriented machines. Such a program will help in providing an indigenous source for mechanization technology, which will help to provide sustained mechanization with greater relevance to the needs of Egyptian farmers. Studies on mechanization extension, machinery marketing and socioeconomic analyses would enhance the commercialization of machinery.

Expected Products :

- (1) Appropriate research facilities adequately equipped and staffed.
- (2) A balanced mix of research scientists and skilled technicians.
- (3) An established management system and trained engineering managers.
- (4) Improved research methods using an interdisciplinary approach.

3. Technology generation through assisting in design of development projects and related activities at the AMRI.

- (1) Plan the conduct of market and socioeconomic research to establish machinery needs of farmers and to develop specifications.
- (2) Help to develop, test, evaluate and further improve a multicrop thresher for wheat, rice and other crops.
- (3) Help to develop, test, evaluate and further improve a self propelled harvester for grain crops.
- (4) Work with local manufacturers on adapting and commercializing these and other designs for manufacture.
- (5) Assist in training engineers and staff in machinery development and in arranging local courses.
- (6) Assist in improving machinery design capabilities at the AMRI.
- (7) Assist the machinery research group at the AMRI in research planning and prioritizing.

Justification: Most of the farm machines developed in Egypt in the past have been based on an institutional approach to design. These machines have generally not been accepted by farmers and manufacturers in the country. The objective of the above activity is to demonstrate the process of developing demand-oriented farm machines for local manufacture. This activity will train Egyptian engineers and other staff in this specialized process. Assistance will also be provided on improving the other machinery designs that will be developed at the AMRI, and wherever possible at the other research institutions, so that these designs have greater relevance to farmers' needs and will facilitate acceptance by local manufacturers.

Expected Products:

- (1) A functional machinery development program at the AMRI with trained staff and management.
- (2) An appropriate thresher which could be used for a variety of prevalent crops.
- (3) A self propelled reaper suitable for use on small and medium size farms.
- (4) Local production of the above two machines.

d. Improved technology transfer through familiarization with major manufacturers of farm machinery in Egypt, and encouraging local manufacture of AMRI and other well designed machines. Assist in selecting and transferring commercially successful machines from other developing countries with similar agroindustrial conditions.

- (1) Become familiar with major manufacturers in Egypt.
- (2) Develop a list of prototype equipment to be imported from abroad and request importation of items identified.
- (3) Assist in evaluating imported machines.
- (4) Help to promote local manufacture of machines developed by the AMRI.
- (5) Assist in obtaining commercial prototype units from local manufacturers for widespread testing and demonstrations.
- (6) Assist in preparation of engineering drawings of the AMRI machines.
- (7) Encourage publication of leaflets and instruction manuals on the AMRI machines.

- (8) Help to develop agreements with major national institutes and international agricultural research centers involved with small farm agricultural machinery.
- (9) Invite distinguished researchers from abroad to lecture at Egyptian institutions.

Justification: Much of the mechanization research that is currently being undertaken in Egypt is not being utilized by farmers and manufacturers. A great need exists for more relevance of research to meet farmers' needs and for more interaction between research institutions and manufacturers, as well as with other national and international research institutions. This activity will try to alleviate these shortcomings and will hopefully improve the quality and productivity of mechanization research in Egypt. It will also foster development of the local farm machinery industry.

Expected Products:

- (1) Local production of some AMRI-developed machines.
 - (2) Introduction and assessment of new machines from abroad.
 - (3) Improved linkages between the AMRI and small farmers and manufacturers.
 - (4) Improved linkages between Egyptian institutions and other national and international institutions.
9. **Foster improved linkages and information exchange between Egyptian mechanization research institutes and other similar national and international institutions.**
- (1) Assist in obtaining AMRI subscriptions for selected professional journals.
 - (2) Disseminate information that may be relevant to Egyptian mechanization researchers.
 - (3) Develop contracts with key researchers abroad and obtain relevant information for Egyptian use.
 - (4) Collect and disseminate information on training opportunities available abroad.
 - (5) Collect and disseminate information on new research developments of interest to Egypt.
 - (6) Arrange seminars and invite distinguished researchers from abroad to lecture at Egyptian institutions.

- (7) Promote closer links between the Egyptian Society of Agriculture Engineers and professional societies in other countries.

Justification: Currently the linkage between Egyptian research community and research abroad is not strong. Egyptian mechanization research can benefit through increased dissemination of information on research developments abroad, especially from countries which are facing similar problems. Also the professional Agricultural Engineering Society can benefit from closer linkage with similar societies abroad.

Expected Products:

- (1) A more informed research community.
- (2) Improved research through better information on research developments abroad.
- (3) Better utilization of training opportunities available abroad.

8. Analyze mechanization policies of the Government of Egypt with particular focus on those which affect mechanization of small farmers and local manufacturers of farm machinery.

- (1) Review and analyze government machinery policies.
- (2) Hold discussions and consultations and present papers on issues that influence policy.
- (3) Encourage policy discussions at professional meetings.
- (4) Increase general awareness of policy shortcomings through individual contacts, group discussions, seminars, lectures, etc.

Justification: Present mechanization policies are biased in favor of technology relating to large scale imported farm machines. These policies are generally silent on the mechanization of small farms and local manufacture of farm machines. With 95% of farm holdings of a very small size, mechanization policies should be appropriately modified to cater to the needs of the majority of Egyptian farmers. Also, with an increasing shortage of foreign exchange, a great need exists to develop local machinery production.

Expected Products: Governmental mechanization policies which would be more conducive to the mechanization of small farm agriculture and to local manufacture of farm machinery.

5. INTEGRATED PEST MANAGEMENT (IPM)

STRATEGY

Research activities of crop protection and pesticide management units in Egypt are diverse. However, better integration is needed among crop protection/pesticide disciplines, and improved collaboration between these groups and plant production. Planning between ARC crop protection programs and parallel programs in Egyptian universities is also needed. As a result of the current situation, farmers rely too heavily on pesticides in such crops as cotton, citrus and onion, and underutilize pesticides in managing weeds. Because of well documented problems associated with over reliance on pesticides, research is needed to introduce more rational and safer use of pesticides, to develop more nonpesticidal disease, pest and weed management tactics, and to integrate the results into practical packages for farmers. The Egyptian crop protection research community also should be improved through better trained scientists, better equipped laboratories, and the adoption of modern techniques such as biotechnology and computer modeling. Integrated pest management and pesticide management research would further benefit by the acquisition of several supporting systems and practices.

Many Egyptian groups conduct crop protection research, extension and regulatory practices, but their activities are often poorly focused and coordinated. Therefore, IPM programs in the three ARC plant protection research units, in Egyptian universities and among firms that supply agrochemicals and provide advice for their use will be addressed. How plant quarantines support the country's crop protection needs, and how crop protection programs flow from research units and other sources to farmers through extension at the national and governorate levels will also be reviewed.

Groups to be addressed can be specifically named. In the ARC the Plant Protection Research Institute, the Plant Pathology Research Institute, the Central Agricultural Pesticides Laboratory and staff of several other units conduct plant protection research. Scientists in these units are located in Giza and Dokki, and in a number of research stations from the Delta to Upper Egypt. Activities under the Undersecretary for Plant Protection, such as pesticide regulations and plant guarantees, also must be included. A diversity of plant protection and pesticide management units in several universities, but particularly at Cairo University and the University of Alexandria, will be interacted with. Private enterprise programs, especially the research farms of companies engaged in pesticide sales, and associated personnel, should be addressed. Contacts will be maintained, and advice sought or assistance requested as needed, from the International Center for Agricultural Research In Dry Areas (ICARDA), the International Center for Insect Physiology and Ecology (ICIPE) and the Consortium for Integrated Crop Protection (CICP).

In-country and international research institutions and action committees will help to improve ARC Integrated Pest Management. ARC IPM research unit directors will meet regularly for program planning with their technical advisor. Most programs will be executed through crop-associated interdisciplinary subgroups. Other in-country working groups and committees will respond to plans of action developed by the subgroups and others. Institutions outside of Egypt will be consulted where their specialties fit the country's needs. Packages of improved practices for pest and disease management, and rational and safe use of pesticides, will be planned with on-farm trials staff.

Alternative strategies for improving IPM in Egypt will be studied. Recommendations will be made to research unit directors, to ARC central administration, or to the Pest Management Working Group, regarding the most appropriate courses of action. The decision process will be influenced by such considerations as the suitability of Egyptian researchers and relevant facilities to conduct particular kinds of research, the appropriateness of technologies for existing research staff, the affordability of programs for ARC, and the ability of ARC action groups to plan and manage research.

Several products will indicate success of the program. There will be IPM practices developed through research, and placed together to include management of insects and mites, vertebrate pests, diseases, weeds, and pesticide usage. These packages will address major crops and they will evolve through a system that flows from laboratory and field research to on-station trials, to on-farm trials, to extension and finally to farmers. Centers for the diagnosis of pests, diseases and weeds will be established in at least three regions of Egypt, coordinated through ARC in the Cairo area. A system will be in place for more accurately measuring crop losses caused by diseases, insects and mites, vertebrate pests and weeds. A program will be conducted for specialists to be trained on safer handling of pesticides. Supportive programs, such as an agrometeorology network, and improved plant quarantines, will be established. The most significant product will be the establishment of procedures in ARC IPM units, in conjunction with Plant Protection in the MOA, to develop better means of planning and executing relevant research.

ACTIVITY SETS

a. Define activities of an ARC IPM directors working group.

- (1) Determine kinds of group activities and meeting times.
- (2) Working group selects crop-IPM problems to be investigated.
- (3) Working group appoints IPM problem study teams.

- (4) Study teams established ARC IPM programs for on-farm trials and for research and development.
- (5) Working group monitors ongoing IPM activities.
- (6) Working group develops linkages with non-ARC groups (universities, IARCs and private sector).
- (7) Working group establishes a program for IPM staff in the ARC to train extension specialists.

Justification: Improper use of pesticides is threatening human and animal health and the environment, and is causing increased pest resistance and pest outbreaks.

Expected Products:

- (1) Improved coordination and conduct of IPM programs targeted at specific crops.
- (2) Less pesticide in the environment.
- (3) Improved and new IPM tactics.

b. On-station testing of familiar and unfamiliar IPM technologies.

- (1) Study teams are designated to review previous IPM on-station tests, select locations and times for testing, and develop schedules.
- (2) Study teams clarify old and new IPM tactics for testing and develop test protocols.
- (3) Research unit directors arrange logistical support for tests.
- (4) Tests started and data collected.
- (5) Data analyzed and reports prepared.
- (6) Recommendations made for further on-station or on-farm testing.

Justification: Present IPM programs are too few and are mainly not well integrated.

Expected Products:

- (1) IPM components integrated into interdisciplinary packages for all major crops.
- (2) A set of tested up-to-date specific IPM tactics.

3. Develop an on-farm IPM demonstration program.

- (1) Study teams decide on IPM practices to be demonstrated.
- (2) IPM personnel interact with the NARP on-farm demonstration section to jointly plan demonstrations.
- (3) Study teams review reports from the demonstrations and plan adjusted programs.
- (4) Observations from on-farm demonstrations reviewed by IPM personnel to be used as feedback into research plans.
- (5) IPM personnel will assist the extension program in converting on-farm results into other types of communications.

Justification: Improved agricultural practices in IPM are needed for adoption by farmers.

Expected Products:

- (1) More effective integrated control of pests and diseases.
- (2) Safer pesticide use practices.
- (3) Increased crop production at reduced costs.

I. Develop a system for making improved pesticide recommendations

- (1) Develop formulations characterized by human and environmental safety.
- (2) Use adjuvants to improve existing formulations.
- (3) Develop safer application procedures.

- (4) **Recommend pesticides with low mammalian and environmental hazard.**
- (5) **Determine pesticide residues in crops and in the environment.**

Justification: Egypt presently has too many pesticide poisonings, too much environmental contamination by pesticides, and excessive incidences of pest resistance to pesticides.

Expected Products:

- (1) **Fewer pesticide poisonings.**
- (2) **Less environmental contamination.**
- (3) **Delayed resistance of pests and pathogens.**

e. Literature searches for review and possible testing of IPM tactics.

- (1) **IPM research units establish literature review groups by crop and/or discipline to select subjects for review.**
- (2) **Groups meet with the NARP Library/Information Section and set priorities for search.**
- (3) **Searches reviewed by literature groups and reports for studying strategies and tactics presented to working group for prioritizing.**
- (4) **Updated subject printouts are periodically reviewed and findings are placed into a priority system**

Justification: There is presently no systematic input of updated technology in IPM programs.

Expected Products: Updated information on IPM tactics and practices.

f. Improve IPM institutions in the ARC.

- (1) **With relevant directors, conduct overall review of the ARC crop protection, plant pathology and pesticide institutes.**

- (2) With directors, determine training needs in the ARC crop protection research units.
- (3) With directors, determine institutional commodity needs.
- (4) List constraints and develop solutions.
- (5) Through working group discussions, enhance inter-and intrainstitutional linkages in the MOA and with outside organizations.

Justification: Crop protection institutions in the ARC need to be improved by systematically defining constraints in their outputs and seeking suitable solutions to such constraints. Additionally, better interinstitutional activities need to be developed.

Expected Products:

- (1) Improved planning and operations for each ARC IPM institution.
- (2) Increased collaboration among ARC IPM institutions in developing IPM information packages for extension.
- (3) Improved procedures for identifying and solving programmatic constraints

g. Improve agrometeorology for IPM (and other) purposes.

- (1) Determine agrometeorology data collection needs.
- (2) Combine IPM agrometeorology data needs with other ARC agrometeorology needs and develop a scope of work for a TDY expert.
- (3) Request a TDY expert to make recommendations on locations, equipment, data summarization and distribution, and staff training needs.
- (4) Request the NARP to execute the program recommended by the TDY expert.

Justification: No adequate agrometeorology system is presently available. this is needed for improved continuous flow of agricultural technology.

Expected products:

- (1) Improved weather inputs to assist predictive capabilities on pest and disease outbreaks, and to support many other areas in ARC.
- (2) Weather inputs necessary for modeling populations of pests and beneficial organisms, including the status of plant pathogens and weeds.

h. Develop a minicomputer system for pest, disease and pesticide/environmental modeling.

- (1) With IPM researchers, describe functional outputs desired.
- (2) Combine IPM computer needs with other computer needs in the ARC.
- (3) Request TDY experts to recommend procedures for satisfying overall needs.
- (4) Ask IPM staff to execute steps recommended by the expert.

Justification: Presently no accurate predictive pest and plant disease status analyses exist.

Expected Products:

- (1) Prediction of pest and disease outbreaks.
- (2) Modeling of pest population dynamics in order to develop better IPM strategies and better timing of application of IPM tactics.

i. Provide regional plant pest and disease identification and monitoring centers.

- (1) With IPM working group, define needs (locations, staff, functions, equipment, supplies, etc.).
- (2) Help develop a list of necessary equipment for ordering.
- (3) Request staff and assist in conducting in-country training.
- (4) Assist IPM research units to establish linkages between regional diagnostic centers and headquarters to provide backup as necessary.

Justification: Present extension programs do not provide satisfactory diagnosis of pests and diseases in the field. Monitoring of pests and diseases is not done on a routine basis.

Expected Products:

- (1) Improve the accuracy of modeling pests and diseases and of predicting outbreaks.
- (2) Provide more rapid response to crop protection needs of farmers.
- (3) Improve extension activities in crop protection.

j. Develop a crop loss assessment system.

- (1) Study literature on existing crop loss programs, especially FAO protocols.
- (2) IPM working group will designate a panel of ARC experts to develop loss assessment protocols by crops.
- (3) IPM research units will designate field staff to carry out protocols.
- (4) IPM crop loss panel will evaluate protocols and test results.
- (5) IPM research units will develop a systematic crop loss reporting system.
- (6) IPM research units will institutionalize preparation of annual reports.

Justification: No systematic accurate crop loss program exists. Significant gains in food production can be expected by better management of pests and diseases. A crop loss survey will be a means of measuring gains in production through improved crop protection practices.

Expected Products:

- (1) More accurate information on crop losses due to pests and diseases.
- (2) Ability to monitor the programs of national IPM programs.

k. Support the extension delivery system for IPM strategies.

- (1) IPM working group selects programs to be promoted by extension.
- (2) IPM working group meets with extension to decide on the kind of assistance needed.
- (3) IPM research units provide materials (audiovisuals, pamphlets, recommendations, etc).
- (4) Personnel at the Central Agricultural Pesticides Laboratory will train Subject Matter Specialists in safe procedures for handling of pesticides; the Plant Protection Research Institute (PI Prot RI) and Plant Pathology Research Institute (PI Path RI) will train Subject Matter Specialists in pest control measures.
- (5) Linkages will be developed between these two institutes, and between their researchers and the Subject Matter specialists, to develop economic thresholds for insect pests and diseases.

Justification: At present IPM information is not passing to farmers in a systematic way through extension.

Expected Products:

- (1) Superior IPM information in the form of audiovisuals, pamphlets, etc for extension.
- (2) Economic thresholds to determine when pesticides are needed.

l. Review Egypt's quarantine policies and practices to recommend improvements.

- (1) Review literature describing quarantine practices in several representative countries.
- (2) Visit agencies and individuals involved with quarantines in Egypt.
- (3) Prepare a report that describes the current situation and recommends courses of action.

Justification: Egypt's current quarantine practices allow situations where exotic pests and diseases can be introduced and established. This situation can affect crops and animals.

Expected Products: A report that reviews the current practices and organization of quarantine services in Egypt and recommends procedures for improving the system.

6. SEED PROGRAM

STRATEGY

Increased production of food, feed and fiber can be achieved only through higher yields per feddan, which in turn can be greatly assisted by general farmer use of higher yielding seed. Improved seed is the only means of taking the results of genetic research to farmers. Improved seed is also the forerunner of improved farmer technology; seed is the easiest improved technology to introduce and let farmers to accept. Farmers easily understand using higher yielding seed instead of lower yielding seed, and are more willing to accept other yield-increasing technological innovations when they see the benefits of improved seed. The present seed program is making a heroic effort to supply the needed quantity in seed despite lack of efficient facilities and training for personnel. Facilities are inadequate, outdated, incomplete, and uneconomic; personnel have not received the ongoing training needed to update them technologically and to upgrade their skills.

To develop a coordinated, cost efficient, technically effective Egyptian seed program requires:

1. Developing the complete infrastructure required to implement and coordinate the many essential operations.
2. Establishing technically adequate and economically efficient facilities.
3. Training personnel to supply high quality seed, to operate efficiently and economically, and to prevent problems and losses.
4. Establishing a coordinated, responsive organizational structure which can integrate all activities and focus efforts on the broader goal of agro-economic development.

Actions must be taken by all agencies involved in development, dissemination, support and use of improved crop varieties and crop production technology. As it can be encouraged to participate, the Private Sector can be involved and effective in a wide range of seed and seed equipment activities, thereby saving scarce governmental funds. Relevant agencies include:

ARC: Crop research/production, protection, and variety development

CAS and other Government seed production agencies: Seed production, processing and supply

CAS: Seed testing

CAS: Seed certification

Agricultural extension: Promotion and education

PBDAC and other agencies: Seed marketing, distribution and credit.

These and other input supply and crop marketing entities must coordinate and interact closely.

A stable supply of high-yielding seed requires realistic recognition of the requirements and constraints of Egyptian agriculture and agroindustry, and the socioeconomic environment in which they operate. This requires technical/economic coordination to ensure up to date applied technology, efficient and economic operations, high quality seed, effective management and timely coordination within the local operating context. Success will require:

1. Adequate, properly balanced equipment and facilities for seed research, production, testing, processing, storage, and distribution.
2. In depth technical/scientific/managerial training so all responsible staff can recognize potential problems and develop solutions before losses occur, operate efficiently, and minimize operating costs while maximizing seed quality and quantity.
3. Effective organization, coordination and unified guidance of the many different agencies involved, so all essential operations are complete, coordinated and integrated, and work toward the same objectives without duplication or competition. All possible activities should be under the same ultimate authority to ensure close coordination.
4. Effective yet supportive quality control, so farmers trust the improved seed and so reliable operations are protected from unscrupulous dealings.
5. Close support from, and feedback to, research agencies which support the seed industry.
5. Economizing on government funding by integrating the private sector where possible. This requires developing essential government support operations, providing investment incentives, and recognizing the practical limitations/capabilities of the private sector.

Two ultimate objectives/results must guide all activities:

1. High-quality, higher-yielding seed available to the majority of Egyptian farmers, when and where they need it, at prices they can afford.
2. A permanent, ongoing, self-supporting, self-updating indigenous seed system to supply Egyptian seed needs.

ACTIVITY SETS

a. Seed resources and infrastructure.

- (1) Study and catalog existing seed industry and support resources.
- (2) Evaluate existing resources as to condition, suitability, and sufficiency for existing and near-future needs.
- (3) Identify new resources and improvements needed for a balanced, self sustaining supply of improved seed, and seek approaches/methods for putting them in place.
- (4) Assist in preparing a comprehensive review/directory of the "Seed Resources of Egypt" for publication.
- (5) Study organization of the government seed program and recommend changes in organization and administrative structure to bring the seed infrastructure into a cohesive unit which can operate efficiently.

Justification: These activities will provide a basis for achieving other objectives listed in the scope of work and specifically to facilitate coordination within and among public and private entities.

Expected Products:

- (1) Identification of improvements started and/or completed under prior projects.
- (2) Developed function-oriented organizational relationships.
- (3) Publication of an Egyptian seed industry directory.

b. Equipment needs.

- (1) Identify replacement and additional equipment needed. Request new equipment and transfer of existing equipment to balance existing facilities.
- (2) Assist in setting up an equipment inventory system oriented toward maintenance and orderly replacement and/or upgrading.
- (3) Inventory all equipment and evaluate its condition.
- (4) Cooperate with the NARP centralized computer-based system for reporting the condition of equipment.

- (5) **Make recommendations for procuring equipment and assist in supervising its installation, operation and control.**

Justification: This activity is essential to improve the capability of concerned staff to operate seed processing plants efficiently and to provide adequate equipment in operable condition.

Expected Products: Improved condition, use and control of seed processing equipment. to enable it to perform more efficiently and operate longer.

c. Seed processing plants.

- (1) Compile current and projected needs for seed and determine the required processing capacity and kind.
- (2) Evaluate existing seed plants as to efficiency, condition and adequacy for current and expected needs.
- (3) Assist in preparing proposals to finance, procure and install additional seed processing capacity required and to replace worn/outdated plants with more cost efficient facilities.
- (4) Suggest improved layouts, additional/replacement machine needs, improved flow and adjustment, etc., to improve efficiency and upgrade existing plants.
- (5) Provide technical support in installing, improving and operating new seed processing plants.
- (6) Help prepare specific operating manuals/guidelines and arrange for translating them into Arabic to assist in specific operational and management procedures.

Justification: Present facilities are not capable of supplying the desired 70-100% of seed needed for annual planting due to inadequacy and unsuitability of facilities. This activity seeks to identify needs, make improvements as possible within present project capabilities, and request the further facilities identified as essential to meet seed needs.

Expected Products:

- (1) Establishment of a basis for realistic estimation of capabilities and needs for seed processing facilities.
- (2) Identification of needed improvements in these facilities.

- (3) More efficient existing plants based on studies conducted and procedures modified.
- (4) Manuals/guidelines relating to specific operational and management procedures.

1. Upgrade seed testing facilities.

- (1) Analyze each laboratory's operations flow, records, sanitary practices, staff technical training, staffing pattern, etc.
- (2) Evaluate equipment and facilities for condition, maintenance, and new equipment needed. Prepare specifications for and request needed new equipment.
- (3) Develop and assist in implementing improvements in organization, systems and work flow to improve operating efficiency and uniformity of results.
- (4) Identify supplies needed and prepare recurring budget requests which enable laboratories to maintain stocks and develop stock planning.
- (5) Identify and request spare parts required. Train staff in equipment maintenance, repair and adjustment.
- (6) Request a short-term consultant for one month to (a) conduct a training course on seed law regulations, operations and enforcement; (b) advise seed control personnel on improving services and operating efficiency; and, (c) use seed law enforcement to guide seed operations and help promote seed industry development. The consultant will also prepare an operations manual in collaboration with the Central Authority for Seed (CAS) officers. The manual should be translated into Arabic and published by CAS.
- (7) Identify training needed for seed testing laboratory staff. Identify staff and request training of one senior officer for each laboratory at the MS level in seed technology.
- (8) Prepare schedule for a 4- to 6-week local training course in seed testing laboratory organization, operation and seed testing. Identify and request a short term consultant (two months) to conduct training.
- (9) Identify and request a short term consultant for six weeks to conduct a 3-week training course in tetrazolium testing for 30-40 personnel from seed testing laboratories, seed research, and seed processing plants. Written materials to be compiled into a manual, translated into Arabic, and published by CAS.

- (10) Identify suitable guidelines/methods/materials and assist in compiling these into a detailed operations and technical manual on seed testing. This should be translated into Arabic and distributed to seed laboratory staff.
- (11) Conduct annual refresher and upgrading training for seed testing laboratory staff.
- (12) Request a 1-month short term consultant to work with CAS seed testing personnel to help plan improvements in work flow, layout and procedures and help identify and prepare specifications for new equipment to: (a) upgrade existing laboratories; (b) establish three new laboratories; and, (c) establish small internal quality control (QC) laboratories at processing plants financed by the EMCIP.
- (13) request and, if approved, assist in establishing internal QC laboratories at the processing plants financed by the EMCIP.

Justification: The adverse effect of low seed quality has been a constraint to further improvements in Egypt's already high yield levels. To improve identification of seed quality and enable testing laboratories to provide guidance toward achieving quality improvements, and ensure accurate testing of the large number of seed samples involved, improvements in testing laboratory capability, facilities and operations are necessary. Some 100,000 samples are already being tested, which far exceeds the reasonable capability of existing facilities.

Expected Products:

- (1) Improved seed testing capability.
- (2) More accurate and repeatable test results.
- (3) More efficient laboratory operations.

ə. Improve processing operations.

- (1) At all processing plants, analyze processing requirements, flow patterns, handling of unprocessed and processed seed, records, management planning and scheduling, pre-processing analyses and data use, quality control before/during/after processing, mechanical injury, cleaning loss, use of labor and labor saving systems/procedures, lot formation, treating, packaging, labelling, handling of waste products, etc. Request (a) immediate low-cost improvements and (b) longer-term upgrading to improve operating costs and efficiency, and reduce cost and loss of seed.
- (2) Evaluate efficiency and effectiveness of existing facilities and request funds for improvements/replacements where necessary.

- (3) Evaluate processing flow sequences and handling operations and request funds to upgrade them where required to improve efficiency and reduce operating time and cost.
- (4) Set up standard processing sequences for seed lots with specific processing requirements.
- (5) Evaluate record systems and update them to improve records on lots and processing and help identify components/amount of processing costs.
- (6) Improve and implement quality management and monitoring systems to ensure that seed lots uniformly meet quality requirements.
- (7) Evaluate processing facilities for sources of dust, request minimum-cost control systems and identify and request major dust control systems.
- (8) Evaluate handling/cleaning of seed by farmer contract growers to reduce processing costs and losses and improve seed quality, and request for each center Ferrell bicycle-powered seed cleaners for use by farmer contract growers.
- (9) Evaluate processing facilities for causes of mechanical injury. Identify likely points of occurrence and request low cost measures to minimize damage. Where required, request and supervise installation of specific equipment such as bin ladders.
- (10) Evaluate the lot-forming system and develop procedures for analyzing farmer lots and forming larger lots to improve seed lot quality and uniformity and reduce processing losses and costs.
- (11) Analyze the system of numbering fields and lots and establish a system which minimizes confusion, permits tracing seed to its origin, and provides ready data and identification of records.
- (12) Identify and request cleanup equipment and supplies needed.
- (13) Arrange to send two persons from each processing center to train at the MS level in Seed Technology to develop knowledge sufficient to identify problems and develop solutions in a practical operating context. Upon return, one person would be responsible for processing/handling operations; the other would be responsible for supervising seed harvest and delivery, quality control, and in-plant storage and delivery.
- (14) Train process plant personnel in preprocessing tests and how to determine processing requirements.

- (15) Compile manuals for all equipment and organize them into comprehensive manuals for seed plants. Arrange for translation into Arabic to assist plant operators and managers.
- (16) Visit processing centers regularly and in person-to-person contacts train operators and managers in specific operating aspects.
- (17) Request a short-term consultant for one month to help plan, organize and implement an "Internal Quality Control" system in seed production and processing operations.
- (18) Request a short-term consultant for one month to conduct a 1- to 2-week training course for processing plant personnel and prepare management guidelines and procedures for (a) making and using preprocessing tests, (b) forming uniform seed lots from small grower lots, (c) processing cleanup, and (d) avoiding contamination. Written material should be compiled into manuals, translated into Arabic, and published by CAS.
- (19) Request two short-term consultants for six weeks each, to conduct intensive 4-week seed technology courses for personnel involved in seed production and processing. Two courses will be conducted: one during the period June-December, 1988 and the second during the period June-December, 1989. Written lecture notes should be compiled into a manual, translated into Arabic and published by CAS.
- (20) Assist in improving processing efficiency and resolving problems.
- (21) Request approval to send three persons per year (total of 18) to the TC-130-3 intensive U.S. Department of Agriculture Seed Technology Training Course.

Justification: These activities will improve the capability of plant staff to operate facilities efficiently.

Expected Products:

- (1) Improved capability of plant personnel.
- (2) Increased seed plant operational efficiency.
- (3) Improved seed quality.
- (4) Seed output equal to needs.

f. Equipment maintenance.

- (1) Arrange for preparation and implementation of maintenance schedules and guidelines for all seed processing plants.
- (2) Assist processing plant personnel in solving problems and improving management relating to maintenance.
- (3) Compile maintenance/repair manuals for all equipment installed in existing plants, combine these into comprehensive maintenance and repair manuals for all plants/equipment and for general operations. Request translation into Arabic and supply to plants.
- (4) Request a short-term consultant for one month to (a) conduct a 1-week training course on seed processing equipment maintenance, (b) visit seed plants and advise on maintenance problems, and (c) prepare a manual on maintenance to be translated into Arabic and published by CAS.

Justification: Improved maintenance is required to permit efficient operation of processing plants to handle increased amounts of seed and/or reduce operating time/cost, and to supply seed at the required time.

Expected Products:

- (1) Proper maintenance of processing equipment.
- (2) Improved equipment operation.
- (3) Reduced downtime.
- (4) A longer useful life for equipment.

g. Seed certification.

- (1) For officers who are in charge of the four location offices, request training at the MS level in seed technology, with emphasis on quality control.
- (2) Identify and request a short-term consultant for one month to conduct a 2-week training course in seed field inspection for seed certification personnel. Two courses are planned: the first during FY 1987-88 and the second during FY 1988-89. Written notes should be compiled into a manual, translated into Arabic, and published by CAS.
- (3) Request permission to send a high level team of seed program managers to observe organization and management of seed

program components in countries with effective components (Pakistan, India, Sri Lanka, Thailand, USA, Brazil).

- (4) Recommend and, if approved, assist in establishing an appropriate Egyptian National Seed Technology curriculum at one of the regional universities within the country. Degrees should be offered at the BSc, MSc and PhD level. The following steps might be involved:
 - (a) Select the involved university and obtain approval for it to offer this new curriculum.
 - (b) Identify four younger faculty members at the university and arrange to send them for a PhD in Seed Technology, each one specializing in a different area.
 - (c) Identify and request the facilities, equipment and supplies required to establish and operate the Seed Technology curriculum and supervise the installation of equipment at the university, preferably where it can also be used by the ARC.
 - (d) Plan and help establish core Seed Technology courses and supporting courses of the curriculum, required for the Seed Technology Curriculum offering.
 - (e) Plan and assist in preparation of syllabi, texts, and laboratory manuals for the Seed Technology courses.
 - (f) Request short-term consultants to assist with the above, and assist in the first offering of the Seed Technology courses.
- (5) Cooperate with the NARP Library and Information System Unit in strengthening the seed-related materials in a suitable reference library.
- (6) Assist in establishing and publishing a journal or regular publication which disseminates research and practical seed-related information.
- (7) Request MS level training for ten CAS local officers (one from each office) in Seed Technology. On their return, they should train and guide other staff.

Justification: Improving seed certification is a specific objective under the NARP.

Expected Products: Improved certification services resulting in better seed quality, lower per-unit costs, and higher crop yields.

h. Seed packaging.

- (1) Identify recommended and actual farmer planting rates and seed package weights used and modify as required to provide the seed needed for common unit areas (e.g., 1 feddan) with minimum seed cost and waste.
- (2) Visit all seed processing centers and identify and evaluate packaging equipment as to condition, suitability, and efficiency for the identified needs. Request to procure/replace/repair equipment and supplies as required.
- (3) Compile manuals for operating/maintaining packaging equipment and arrange for translation into Arabic and distribution to the concerned processing centers.
- (4) Evaluate procedures for handling seed and bags into, through, and from packaging operations and improve where possible. Request purchases of forklifts and pallets, bulk bins, etc., if needed.
- (5) Identify packaging materials available in Egypt and those used by processing centers and recommend changes in materials and sizes where this will reduce costs, facilitate handling, improve labeling, or protect seed better.
- (6) Evaluate labeling and lot-numbering procedures and recommend upgrading where possible to improve seed identity, reduce operating costs, and minimize seed contamination and losses.
- (7) Assist in improving efficiency and economy of packaging operations.

Justification: Improved packaging operations are essential to the objectives of improved seed supply to farmers and efficient operation of seed plants.

Expected Products:

- (1) Improved efficiency in packaging operations.
- (2) Better use and maintenance of packaging equipment.
- (3) Improved seed packages that are adapted to farmer needs.

i. Seed storage.

- (1) Evaluate all seed storage facilities in terms of capacity adequate for the needs, structures and equipment capable of providing required storage conditions, and efficiency of building design, layout, and

placement. Request and assist with implementation of improvements where needed.

- (2) Evaluate storage and handling methods, storage layout, storage management, identification of stored seed lots, storage location identification, and storage, delivery and stock reporting and records for unprocessed and processed seed. Recommend improvements as required.

Justification: Adequate safe storage at various points is essential to supply improved seed to farmers and improve operating efficiency of seed plants.

Expected Products:

- (1) Improved seed storage facilities.
- (2) Improved storage conditions.
- (3) Reduced loss of seed.
- (4) Improved seed quality.
- (5) Standardized technically sound designs for future storage construction.

j. Seed research.

- (1) Help to organize seed research so it is closely linked with seed operations and can focus its efforts on finding research solutions to problems encountered under Egyptian conditions. It should function as a technical research and support unit, with policy and program aimed at helping develop a cost effective supply of high quality seed.
- (2) Assist establishment of a system throughout all CAS offices, plants and stations of reporting all management and technical problems encountered at monthly intervals. Management problems will be referred to the planning unit for recommended actions. Technical problems will be referred to the research unit to recommend solutions and/or conduct research to identify solutions.
- (3) Identify, request and help supervise installation of equipment required to conduct relevant problem solving and basic research under Egyptian conditions.
- (4) Request training for one person at the PhD level and one person at the MS level to conduct seed research.

- (5) Identify and request a short-term consultant for one month to help organize research operations, guide staff in planning/conducting/reporting research and help plan initial research projects.
- (6) Assist in research identification, planning, implementation, reporting and transfer to operations.

Justification: Many local problems of seed supply require research under Egyptian conditions.

Expected Products:

- (1) Research results under Egyptian conditions which can help resolve operational problems.
- (2) An established seed research facility with trained staff and an ongoing program.

k. Government - private sector cooperation.

- (1) Assist in identifying and contacting foreign seed firms to suggest investment in Egypt, both to supply improved seed to Egyptian farmers and to increase farm income by producing seed for export.
- (2) Evaluate current systems and recommend improvements as possible in government infrastructure support (e.g., Breeder and Foundation seed, seed testing, training, technical assistance, etc.) to private sector seed operations.
- (3) Assist in establishing a formal government definition of the roles of government and the private sector in seed supply.
- (4) Work with local manufacturers/agents/suppliers to encourage increases in equipment, spare parts and supplies required by the seed industry. Encourage government procurement through these operations.
- (5) Identify credit sources for private sector capital investment and operations in the seed industry. Recommend improvements to match other countries in credit availability, rates and collateral requirements.
- (6) Promote establishment of a special unit in the CAS main office to promote private sector development and cooperation.
- (7) Request permission for the CAS senior officer to attend USA seed trade conventions and speak on investment opportunities in Egypt.

Justification: Emphasis on increased private sector seed activities is a major objective of the NARP.

Expected Products:

- (1) Private sector participation in seed supply.
- (2) Increased cooperation between the government and the private sector in seed-related areas.
- (3) An established system to promote government and private sector cooperation.

(Note: A substantial number of activities are proposed to start after the Seed Specialist completes his assignment. These have been deleted here. They are particularly important in relation to seed certification and storage and cover all activities in relation to Breeder and Foundation seed, marketing infrastructure, and marketing/distribution operations).

NARP IMPLEMENTATION - RESEARCH SUPPORT

1. GRANT PROGRAM

STRATEGY

Increased coordination is needed between universities and other non-ARC research institutions in Egypt, and ARC researchers, to make use of their respective talents and facilities in solving top priority research topics relating to improved agricultural productivity. Increased funding provided to non-ARC research institutions in Egypt by NARP under the Grants Program will assist in providing operating funds for high priority research programs, selected improvements in equipment and facilities and needed in-country and out-of-country training and personal contacts. As a result, students should be better prepared to meet career needs as agricultural researchers. Emphasis on research at the regional universities, and coordination provided through NARP, will provide increased integration of interdisciplinary research within agronomic zones, to better meet the needs of farmers within each area.

The NARP Grant Program has three main objectives:

- To fund research by Egyptian institutions outside of ARC to supplement ARC's ongoing research relating to improved technologies for farmers.
- To encourage increased interdisciplinary research, adaptive or applied work, on-farm trials where applicable, and relevant economic and sociological evaluations. Each institution will be encouraged to concentrate on one nearby region and to emphasize an integrated approach to all major crop and livestock activities of local farmers.
- To improve the ability of universities to conduct high quality research in relevant disciplines and to provide improved training to BSc, MSc and PhD students in these areas, as funds allow.

Several clienteles will be addressed through the grant program:

- Regional universities and other non-ARC agricultural research institutions in Egypt.
- Researchers in ARC.
- Farmers in specified agro-economic areas.
- Collaborating USA universities and International Agricultural Research Centers (IARCs).

Research topics from Egyptian universities and other local research institutions were solicited by letter. These were reviewed by members of the Grants Program Working Group to determine whether they relate to NARP objectives, duplicate prior or ongoing research, deal with economically important constraints, are completable within the NARP timeframe, etc. Recommended topics were submitted to the NARP Director General for approval. These were reviewed by TA staff, the NARC and the NARP Steering Committee. Full research proposals, based on a standard format in a provided manual, were requested for approved topics. These were reviewed in a similar way. Special efforts were directed toward soliciting research from the private sector to fill gaps not covered by the initial proposals.

Action groups concerned with supporting the Grant Program are;

1. The Grants Program Working Group.
2. Involved Coordinators, Principal Investigators, and their staffs, for approved projects.
3. Related researchers in ARC, US universities and the IARCs.

The Grant Program can produce:

- A substantial body of research, which supplements that at ARC, to meet NARP objectives.
- Improved research and training capabilities within collaborating Egyptian institutions.
- Integrated research (at nearby institutions) relating to major constraints facing farmers from all important agricultural regions in Egypt.
- A coordinated and collaborative agricultural research community.

ACTIVITY SETS

a. Help identify research activities that complement the ARC research plan in each of 10 zones, with emphasis on interdisciplinary research needs, and indicate where each type of research should be conducted.

- (1) Identify agronomic zones for use by the NARP and prepare a map.
- (2) Prepare a worksheet and solicit priority research topics from the ARC Institutes.

- (3) Agree on research topic classification codes.
- (4) Apply codes to each item provided by the Institutes for entry on a computer.
- (5) Summarize and review listings and identify those for non-ARC researchers.
- (6) Request approval from high-level review committees.
- (7) Agree on a computer format and prepare a final list of priority items by zones.

Justification: This list is required to make sure that each type of research institution will perform or cooperate in research that supplements rather than duplicates ARC research and that deals with high priority topics.

Expected Products: A list of approved research priorities as seen by the ARC for Egyptian and American universities, private sector Egyptian research institutions and IARCs for each of 10 agronomic zones.

b. Establish policies and procedures to implement an effective and efficient grant program.

- (1) Prepare and publish a research proposal manual for use by non-ARC Egyptian institutions. This Manual may also be adapted for use in the ARC.
- (2) Draft remaining documents and evaluation and monitoring procedures for non-ARC Egyptian institutions.
- (3) In cooperation with other NARP staff, develop standard forms and computer routines to monitor non-ARC Egyptian institutions.
- (4) Review procedures as required to increase efficiency.

Justification: Experience under the EMCIP indicates that few researchers in Egypt know how to prepare detailed and comprehensive research proposals. A manual of grant research for the NARP will show exactly what is needed to allow proper evaluation of the research proposals and also will present in detail the format for required project reports. A uniform numerical scorecard is suggested for proposal evaluation by the involved panel of experts. Procedures to be used by the NARP staff in administering the Program will be developed, including accounting and computer routines.

Expected Products: A Grant Research Proposal Manual, including

details and accounting forms for required reports, a Project Proposal Scorecard, contracts, and procedures monitoring, reviews and evaluations. Printed forms and computer procedures will be developed as required.

c. Implement a Grant Program that will benefit the Egyptian agricultural research community.

- (1) Solicit research topics from each Egyptian non-ARC research institution and evaluate these by panels of experts.
- (2) Obtain approval for those recommended by the Grant Program Working Group.
- (3) Request full proposals for approved topics and evaluate these.
- (4) Agree on projects to be funded.
- (5) Prepare and sign contracts for approved projects.
- (6) Prepare strengthening grants for each involved institution.
- (7) Reduce budgets if they exceed current operational expenses. This may permit funding of additional approved projects.

Justification: The University Grants Program under the EMCIP was highly successful in bringing ARC and university agricultural researchers together. Top quality scientists at the universities need operating funds for research, and for specialized equipment, funds to consult with related scientists in developed countries, and some guidance in focusing their research on needs of farmers in nearby areas and in making economic evaluations in terms of effects of proposed innovations on net family income. More research in such areas will mean better PhDs, who are the researchers of the future.

Expected Products: A group of research projects that are well planned and carefully evaluated by panels of experts and that deal with high priority research topics as determined by the ARC, to be carried out by universities and private sector research groups in Egypt in specified zones. Some will involve collaborative research with ARC staff. Emphasis will be on adaptive interdisciplinary research involving on-farm trials and socioeconomic evaluations where applicable.

d. Monitor, review and evaluate the Grant Program by use of expert panels and make any needed Program adjustments.

- (1) Conduct semiannual site visits to Projects. These will be made during Oct.-Dec. and Apr.-May of each fiscal year.

- (2) Review Project monthly financial reports.
- (3) Evaluate detailed annual project workplans due in January of each year.
- (4) Evaluate project annual reports due in August of each year.
- (5) Monitor expenditures for approved nonoperational items. Operational expenditures are reviewed under item (2) above.
- (6) Evaluate project final reports.
- (7) Evaluate collaborator final reports.
- (8) Adjust budgets and procedures as needed.

Justification: Site visits will assure that planned activities are underway and are being conducted in a satisfactory way. If receipted operational expenses are under budget, future operational budgets can be promptly adjusted downward and funds released to others who can use them. Review of annual workplans and reports will help assure that new research methods introduced under the NARP are being used properly. Monitoring of non-operational project expenditures will assure that these funds are being spent for approved items and that all USAID regulations are met.

Expected Products: Twice a year site visits will be made by the TA and the NARP Giza staff, monthly financial reports will be reviewed and summaries sent to USAID, annual project workplans and project annual reports will be evaluated, and needed documentation for nonoperational project expenses will be obtained and expenditures will be monitored.

4. Disseminate research results.

- (1) Publish annual summaries. These likely will be issued in the last quarter of each calendar year following evaluation of the annual reports and will be coordinated with the annual meetings referred to in item (2) below.
- (2) Plan and conduct annual meetings to present findings and future plans.
- (3) Prepare a program final report based on project final reports.

Justification: The major aim of research is to produce useful results. Some results eventually find their way into scientific journals, but usually with a long time lag. Since the major emphasis within the NARP is on applied or adaptive research, it is important to disseminate proved results promptly. A final program report, based on project final reports, will

summarize the total program.

Expected Products: Annual meetings will be held to present research findings and to discuss future plans, either for the Grant Program alone or in conjunction with similar meetings for the ARC. Findings from annual reports will be summarized, with emphasis on those that are ready for on-farm trials or that have been so tested and for which economic evaluations suggest they are ready for distribution to farmers.

2. LIBRARY AND INFORMATION SERVICES (LIS)

STRATEGY

The flow of information into Egypt's agricultural research system must be improved significantly to enhance the quality and efficiency of research activities. Information resources (books, journals etc) in libraries, and the management of these resources, have not had adequate financial and organizational support. Cooperation and the sharing of scarce resources between libraries and information centers has not been coordinated properly. Information resources and services for the producers have to be provided through agricultural extension workers and through the system of libraries in the governorates. New technologies for tapping remote information and databanks, and for organizing local resources, have to be incorporated into the library-information system, and education and training of the staff of the system has to be upgraded in the new information technologies, in providing services and in management skills.

Present libraries within the MOA/ARC have to be reorganized and a substantial financial investment made for journals, books, audiovisuals, furniture, equipment, physical facilities, and staff trained in modern library techniques. A new central library will be established on MOA grounds in Dokki, to serve as the Egyptian National Agricultural Library, and to manage all library resources and personnel. Information services utilizing these sources will be provided from the central facility and through satellite service centers located conveniently to users across Egypt. The Egyptian National Agricultural Library will coordinate a network of libraries, resource centers and information centers for the most effective and efficient dissemination of information and knowledge. Management training is an essential requirement for effective information services.

Groups responsible for decision making and execution are an advisory board to be recommended for the Egyptian National Agricultural Library and Information Network; management and staff of the Egyptian National Agricultural Library (ENAL), comprised of present library workers within MOA/ARC and new staff on all levels; EDICA.

ARC researchers, selected administrators and staffs of cooperating institutions and organizations will be the main users of these services.

Centralized management of all library resources was agreed upon by the ARC Research Journal Committee and the Library and Information Systems Working Group. Centralized control and coordination guards against duplicating scarce resources, such as research journals and books. An up-to-date computer-based catalog and circulations system will keep track of the location of items, so that they can be shifted and reassigned to various locations according to the changing information needs of the client population. Expediency and feasibility were main considerations in selecting the site for the Egyptian National Agricultural Library (ENAL). Before finding the present site, centralization was planned from two sites in the Cairo area. After one floor in an existing building was found and approved for the central

research library an additional floor was approved, thus creating a more comprehensive agricultural library at one location in Egypt, to incorporate a historical collection and a popular collection.

The rationale for designating EDICA as the unit in the network which will provide database searches was that trained and experienced staff can instantly begin to provide literature search services to research groups. With more funding and more cooperation within the agricultural sector, and between various sectors, everyone can have convenient access to current and appropriate agricultural information in Egypt.

The computer system for collection management will be selected with great care to assure that a user-friendly, well maintained and appropriately integrated library system will be used.

The Library and Information System Working Group is comprised of four representatives of the present diverse library and information system, three administrators of the MOA/ARC, and two researchers with considerable expertise or interest in library and information systems. Through this group a large segment of the user population will be represented, and staffs of the present libraries will be activated and organized for implementing the plans.

A chief administrator will be appointed and middle managers and new staff will be hired. A new type of information worker, the literature scientist, will be trained to serve research groups in depth. Services to extension workers are planned, with the involvement of extension and MOA coordinators.

Within the present NARP organization, cooperation with the Training Working Group, with the Grants Program Working Group, and with the Research Station Management Working Group will be essential.

The central ENAL facility will function with a modern and efficient computer catalog and circulation system to track library resources in satellite locations. At least 30,000 items will be added to the collection and there will be copying and facsimile equipment. Production of research publications and popular versions of research results will be facilitated through a network of word processors, resulting in at least 30 new printed or audiovisual products for farmers. Staff of the library system and researchers will be trained to work with library and information technologies through a training program of in-country, in-service, and postgraduate training. Training is projected for at least 30 staff members and 2,000 users.

ACTIVITY SETS

a. Develop the collection.

- (1) Develop a preliminary procurement order for bulk purchase to meet research program priorities.
- (2) Contact vendors.

- (3) Help recommend collection development policies and procedures, including gifts and exchange procedures, discarding, and remote storage of older materials.
- (4) Help with procurement of journals and books.
- (5) Initiate long-term journal acquisitions by various methods for a continuing(sustainable) system.
- (6) Help receive and announce new acquisitions.
- (7) Advise on continuing procedures and prepare a model procedure manual.

Justification: The carriers of information for basic and applied/adaptive research are, in great part, the literature of agricultural and of basic biological/agricultural specialty fields. Researchers and extension workers must have access to collections of journals, books, and reports close to where they work in satellite libraries and in a central resource center library. Collection development in the NARP will provide materials to a central library, and access through libraries/reading rooms of the ARC Institutes, and through two regional libraries (at Sakha and Sids) for the experiment stations and extension.

Expected Products:

- (1) Receipt of at least 30,000 items (monographs, technical reports, journal issues) to improve the resources for disseminating technical information on new research and agricultural practices. This number does not include extension materials and audiovisual software.
- (2) Preparation of a model procedure manual.
- (3) Binding of at least 2,000 journal volumes.

b. Design a technical information service system.

- (1) Collect information on resources, needs, and services.
- (2) Present recommendations on the structure of an effective and efficient delivery service system.
- (3) Assess the feasibility of using state-of-the art computer and communications technology.
- (4) Help develop procurement plans for equipment : software, copies, facsimile and furnishings.

- (5) Develop recommendations for staffing and staff training, to implement the system.
- (6) Help develop a policy and procedures manual and initiate staff training.
- (7) Test, evaluate and refine the services on the basis of experience and user feedback.

Justification: A library and information service for all Egypt's agriculture needs to be centralized, yet has to provide effective access to information for everyone regardless of location.

Expected Products: The most feasible and cost effective system for a sustainable agricultural technical information service for Egypt's researchers and other workers in agriculture.

c. Reorganize administrative aspects of the library and information system.

- (1) Collect needed information on strengths and bottlenecks.
- (2) Help develop, submit and discuss recommendations for changes.
- (3) Request Ministerial approval for a specific plan.
- (4) Provide leadership in implementing the agreed upon plan.

Justification: A long-term library and information system needs to be developed to allow continuing growth of collections, keeping up with information technology for cost-effective technical information flow, obtaining up-to-date training and accomodating increased use of the LIS component by adding personnel and resources. Improved administrative and fiscal management is needed to permit this.

Expected Products: An effective and sustainable organizational and fiscal structure for the flow of technical agricultural information across Egypt. This includes new policy and budget, a new management structure, staffing, staff incentives based on performance , ongoing staff training, and access to transportation and communication resources.

d. Design and develop an automated catalog and locator system.

- (1) Help assess usefulness of the present collections, and define the subset, which should be listed in a computer catalog.

- (2) Help implement an intermediate experimental catalog and locator system for a core collection.
- (3) Provide leadership in developing specifications for the most appropriate hardware and software system.
- (4) Test, refine and help implement the system.
- (5) Train staff in its use.
- (6) Help institute an ongoing system of entering new acquisitions and converting the useful part of the older collection into a machine-readable cataloging format.

Justification: Within the LIS, books and journals available in the system must flow efficiently from the library to the user and then must be promptly returned after needed information has been obtained. In a distribution network of many libraries, these items must be quickly located and made available. A computer system eliminates the need for searching multiple files, but pilot tests are needed to make sure that the system is functioning properly

Expected Products:

- (1) A functioning circulation system in which items in the ARC complex collections are quickly identified and can be provided for users.
- (2) A database of the current usable books with information on their location.
- (3) A management information system for tracking the use of library materials.

Provide leadership in developing an information service for extension staff.

- (1) Survey the information needs of extension staff.
- (2) Inventory, collect and prepare a database of information packages and audiovisuals.
- (3) Assist with a newsletter for extension
- (4) Establish a research/resource center, drawing on a variety of information sources (published and internal expertise).
- (5) Assess needs for and request audiovisual and production equipment.

- (6) Facilitate training and degree programs in agricultural communications.

Justification: Technology transfer in developing countries can be accomplished in a number of ways. Here it is recommended that extension communications be handled first as an information retrieval task. Over the life of the NARP, audiovisual studios and meeting/conference/lecture facilities may be needed. In the immediate future, emphasis will be placed on establishing collections, a database, a clearing house research/resource center, and start of a newsletter.

Expected Products: Creation of an information base for technical writers, popular writers, and audiovisual specialists for developing materials for extension workers, and directly for the farmers.

f. Train library and information specialist staff.

- (1) Assess training needs and coordinate with the NARP training plan timing for specified types of programs on all levels.
- (2) Help arrange for and contribute to training in basic library techniques and procedures.
- (3) Take leadership in training on computer use.
- (4) Help with training in use and creation of bibliographic tools in libraries.
- (5) Advise on and help select trainees, and request training in formal degree programs, short courses, and study tours.
- (6) Help with management training for key staff and advise on supervisory training in-country.

Justification: Without education and training of the staff the collections and equipment will decay and services will not be provided. Training is needed on every level for the ARC and MOA library workers, information specialists and managers. Basic training is required in English and on library and computer skills for most staff, with management training for all administrators.

Expected Products: Educated and up-to-date professional staff to manage a modern library-information system, staffed by trained specialists, paraprofessionals and competent technicians.

g. Advise on construction

- (1) Advise on suitability of existing buildings for a central library facility.
- (2) Advise on needed upgrading of existing facilities.
- (3) Assist with finding a location for the central National Library of the ARC
- (4) Assist with plans for construction, including refurbishing, space planning, selection of furniture and furnishings.

Justification: Present buildings are inadequate for active library use and for electronic/AV media use. In the ARC Institutes, staff work space, exit protection and climate control are basic needs. Reading display/browsing space and appropriate furniture and equipment are needed.

Expected Products: A decision on a best location, plan and costing for the central library, desired regional libraries and upgrading the environment of the ARC reading rooms.

h. Help develop proactive programs for library and information services users.

- (1) Provide leadership for and facilitate workshops and seminars on the use of information services (USAID-DIS,EDICA, etc).
- (2) Assist with developing acquisitions lists, newsletters and displays.
- (3) Assist with producing "current contents" lists of incoming library materials.
- (4) Help in experiments with electronic mail.
- (5) Help with workshops and presentations on library use.
- (6) Advise on media and public relations tools developed for user education.

Justification: Unlike a conventional passive library, the LIS of the NARP will maximize the utilization of knowledge acquired for use by researchers. Various methods of outreach will be employed, and continuing user education programs will be part of the staff's responsibilities.

Expected Products: Timely utilization of the collections, databases and services by users, resulting in efficient transfer of information.

i. Help create the Egyptian National Library and Information Network (ENALIN).

- (1) Recommend a national library and information network for Egypt.
- (2) Coordinate contacts for visits to IARCs by the ARC staff.
- (3) Help initiate publication exchanges with IARCs and other key research centers.
- (4) Recommend the strengthening of university libraries as part of the design for the network.
- (5) Experiment with electronic mail.
- (6) Advise on the role of the ENALIN in the international network of agricultural libraries and information centers.

Justification: IARCs have much information that could be of value to researchers in Egypt. Activities covered here will provide access to published and unpublished data.

Expected Products: Information flow through direct contact with researchers, exchange of information prior to publication, direct publication exchange. These procedures will foster joint conferences and invitational travel and therefore promote a situation of "being in the center" of knowledge generation.

j. Commodity procurement.

- (1) Prepare the LIS Commodity Procurement Plan.
- (2) Prepare lists for AID direct procurement and local procurement.
- (3) Draft contents for procurement agents.
- (4) Advise on the distribution of commodities to units within the Library and Information Network.
- (5) Advise on site preparation, setup, troubleshooting and training for equipment.

Justification: To bring library materials, furniture, equipment and supplies into the system, AID procurement procedures must be followed.

Commodities must be adequately described, a procurement plan and lists formatted, and arrival of equipment monitored.

Expected Products: A commodity procurement plan, commodity lists, and arrival of a large volume of appropriate commodities in usable condition.

k. Take leadership in creating a computer network of writers and editors of ARC publications.

- (1) Advise on acquiring a user friendly word processing computer in each ARC institute and regional library.
- (2) Arrange for training researchers in word processing, and for the training of library workers and other staff in providing assistance to computer users.
- (3) Assist in creating a central backup office of trainers and troubleshooting, which will perform ongoing training and support (possibly coordinates with the ARC Central Statistical Laboratory).
- (4) Assist with developing a full text database on a central computer where ongoing work can be edited, finished or reformatted for research publications or use by extension staff.
- (5) Assist with the organization and listing of ARC publications and recommend suitable methods of distribution.

Justification: This activity will make it easier for researchers to put their thoughts out in a form which is simple to edit, and rephrase as needed for prompt publication.

Expected Products:

- (1) Rapid availability of research results for publishing in scientific or popular language.
- (2) Intermediate "working papers" for internal use and for editing.
- (3) Publications as a means of exchange for research journals.

3. TRAINING PROGRAM

STRATEGY

Manpower development and training in the agriculture sector is critical. Egypt's future will depend on having highly organized programs with trained managers, scientists and technicians who can develop and implement improved technology. Technological constraints in Egyptian agriculture are greater than those operating in most developing countries because relatively high levels of productivity have already been achieved in Egypt. Agricultural programs which are concerned with developing means to increase food and feed production must:

- Develop new basic research
- Explore emerging technologies
- Adapt technologies developed elsewhere for use in Egypt
- Utilize suitable developed technology not yet adopted by farmers.

Academic training is essential when staff lack knowledge about new technology or when researchers need upgrading to replace senior level staff. Sometimes a shortage of staff occurs in the different disciplines because senior level staff are retiring or working in other countries. In several instances, institutes have been recently established and their staff need to be trained. It is also necessary to broaden the experience of staff in different disciplines if most of them have been trained only in Egypt. Short term technological training is especially needed when staff must up-date their knowledge in specific areas and learn how to operate or use special equipment. Since technology is increasing at a rapid rate, it is also necessary for scientists to interact with others to exchange information or to review certain experiments in progress in other countries.

The principal objective is to provide flexible training opportunities for qualified Egyptian agricultural managers, scientists, research staff, and support staff from the public and private sector. Opportunities will center on basic, strategic, applied or adaptive research methods and techniques, and management systems development. Individuals and groups will obtain:

- New knowledge or skills
- Supplemental training
- Training that will restructure their present research methods.

Better coordination and management of research is needed between and among agriculturally oriented agencies to avoid duplication. The agencies and institutions concerned with agricultural programs, research and training within Egypt are:

- Ministry of Agriculture and Land Reclamation
- Agriculture Research Center
- Fifteen Egyptian Universities with faculties of agriculture
- National Research Centre
- Desert Research Institute
- National Academy of Scientific Research and Technology
- Ministry of Irrigation, Water Research Center
- Private sector which conducts research

Training will be conducted and integrated with institutions outside Egypt as follows:

- US universities, governmental agencies or private agencies
- International agricultural research centers
- Third country universities or institutions

Institutes and departments within the MOA will be contacted to determine their needs in training and to justify the requested training. Government of Egypt and US regulations will be followed in determining the types of training to be conducted. Training will be provided in the form of out-of country PhD, degrees, postdoctoral, short term, observational and invitational tours, and in-country programs. Areas of priorities listed, but not limited to, are;

- Research planning
- Research management
- Research techniques and methods
- Information systems management
- Data collection/analysis
- Seed technology
- Agricultural mechanization

The Training Working Group will advise the NARP Director General on policies and procedures and the Training Unit staff will work with research unit directors to coordinate training inside and outside of Egypt. Staff will work directly with USAID and an American contractor in sending trainees outside of Egypt for the PhD degree, postdoctoral and short term training.

Expected products of this program are a master training plan, a training manual, an MOA training unit, and many trained Egyptians from farmers, to graduate degree participants, to postdoctoral level staff.

ACTIVITY SETS

a. Assist Training Committee to review goals and objectives of MOA agricultural programs and training needs.

- (1) Review plans that outline projected program goals and training needs developed by ARC and NARP committees, computer lists regarding projected agricultural research activities, MOA and ARC five year plans and regulations, NARP Project Paper, regulations from USAID and training requests from Working Groups.
- (2) Develop a computer list of current ARC staff, their jobs, degree levels and length of service.
- (3) Compile projected training needs for ARC staff.
- (4) Schedule numbers, types and levels of training required by 1992.

Justification: Many documents exist that outline projected MOA and ARC program goals for agricultural components, and related needs for training during the next 6 years. These plans should be reviewed and summarized to serve as the rationale for training requests.

Expected Products: A summary of various documents prepared by MOA and AID will serve as a basis to implement training programs. The result will be trained cadre of research scientists and support staff. These staff will be able to effectively manage and operate within the agricultural research system.

b. Assist Training Committee to prepare a master training plan.

- (1) Interact with other NARP technical assistance staff to review training needed within their areas of activity.
- (2) Produce a training plan that responds to needs identified by ARC and technical assistance staff.
- (3) Meet with MOA and USAID to obtain approval of the training plan.

Justification: A training plan is needed to help in the planning and implementation of the training and manpower development process. It will serve as a document by which all training programs covered under

NARP in academic, nonacademic, and in-country areas can be implemented.

Expected Products: A cadre of trained research and support staff to manage and conduct research in the agricultural system.

c. Assist Training Committee to implement the training program.

- (1) Help prepare a manual that includes detailed plans, forms and guidelines for processing academic and nonacademic participants within MOA-USAID regulations.
- (2) Implement English testing and training programs.
- (3) Liaison with an out-of-country contractor.
- (4) Implement procedures for out-of-country training.
- (5) Design and implement in-country training activities.
- (6) Assist with evaluation to determine whether specified output goals were achieved; monitor ongoing training and followup activities after trainees return to duties.
- (7) Interact with other NARP components to develop in-country training responsive to their program needs.

Justification: To strengthen staff involved in management, research and research-support services.

Expected Products: The following numbers of training opportunities are estimated:

Graduate degree programs	76
Post doctoral training	200
Preservice training	1,500
In-country training	40,000
Observational and invitational tours	200
Farmers through short courses	20,000

d. Use computers to develop implementation, evaluation and monitoring of systems.

- (1) Assess areas of training that can be improved by use of computers.
- (2) Use a consultant to help design the systems needed, and to design the necessary computer programs for each area.
- (3) Request equipment needed.

- (4) Train staff to input and analyze data.
- (5) Integrate use of computers in entire manpower and training development process.

Justification: Large numbers of participants will be involved in the training and manpower development process. This involves complex record keeping to implement, evaluate and monitor the system. The use of computers will greatly assist the process.

Expected Products: An improved system that permits the MOA to manage complex and large manpower training programs by more efficient processes.

e. Assist Training Committee to develop a NARP Training Unit.

- (1) Assess availability of existing in-country training sites and associated staff.
- (2) Develop a manpower and facilities plan. Staff will work with the Training Committee, training advisor, USAID and the GOE to implement and integrate continuous training programs into the agricultural research system.
- (3) Assist staff to implement the training program, adjusting procedures as needed.
- (4) Monitor progress of the unit throughout the NARP.

Justification: Training should to be an integral activity of the agricultural research system. Because of the large demand for training within all elements of the MOA, a distinct and efficient training unit is needed.

Expected Products: GOE staff will be able to manage all categories of training.

f. Integrate training unit activities with other MOA and NARP components.

- (1) Help define and assess current training communications and organizational levels within the MOA.
- (2) Help develop a plan to integrate a training component into the whole MOA system if the present system is not efficient and effective.

- (3) Gain approval for the plan.
- (4) Assist with implementation of the approved plan.

Justification: There is a continuous change in staff and a need for new knowledge among the present staff. This points out the necessity for providing continuous training at all levels. Research unit directors, MOA managers and other units in the agricultural system must work with training staff to design programs to upgrade the research and support staff. Above all, the institutes need to develop systematized approaches that allow for development of training plans responsive to Egypt's needs in agricultural research manpower.

Expected Products: Training will be an integral part of a system to improve the management and operation of agricultural research development in Egypt.

g. Establish a monitoring and evaluation plan.

- (1) Prepare monthly, quarterly and annual reports of program activities and an annual plan-of-work for the MOA, USAID and CID.
- (2) Develop a detailed evaluation and monitoring system throughout the training and manpower development process.
- (3) Develop training for staff, to use and analyze computerized data needed in the evaluation and monitoring process.

Justification: Continuous evaluation is required to see that training programs meet their objectives. Reporting is necessary to justify MOA and USAID expenditures. A plan is needed for evaluating and monitoring every training activity.

Expected Products: A training system that can be adjusted through monitoring and evaluation to respond effectively to continuously changing circumstances.

ANNEX B

CID TA Life of Project Schedules

NARP LIFE-OF-PROJECT ACTIVITIES*

B. NARP IMPLEMENTATION-MANAGEMENT	7/86			7/87			7/88			7/89			7/90			7/91			7/92			7/93				
	6/87			6/88			6/89			6/90			6/91			6/92			6/93			10/93				
	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
d. National research system structure																										
1. Assess national research system				X	X	X																				
2. Help conduct workshop on this system and its improvement							0																			
3. Recommend adjustments for research system							0	0	0	0																
4. Reassess national research system											0	0	0	0												
5. Recommend further adjustment to the research system											0	0	0	0												
6. Monitor, evaluate accomplishments														0	0	0	0									
e. Personnel development																										
1. Assess ARC research staff; request TDY for system evaluation							X	X		0	0	0	0													
2. Identify improvements for system									0	0	0	0	0													
3. Propose improvements for system									0	0																
4. Monitor improvements in system										0	0	0	0													
5. Adjust policies as needed													0	0	0	0	0	0								
f. National/international linkages																										
1. Identify needed research linkages				X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0							
2. Recommend needed research linkages				X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
3. Monitor and evaluate new research linkages								0	0	0	0	0	0	0	0	0	0	0	0	0						
4. Recommend adjustments as needed to improve the res. system								0	0	0	0	0	0	0	0	0	0	0	0							
g. CID technical assistance coordination																										
1. Assess TA team roles	X	X		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
2. Counsel with TA team	X	X		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
3. Direct TA and support staffs	X	X		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
4. Assess need for TDY support				X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
5. Request/direct TDY support	X	X		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						
6. Evaluate staff performance	X	X		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0						

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93			
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
f. Communication system improvement																																
1. Help identify communications requirements, constraints					X	X																										
2. Assist in obtaining communications expert, TDY					X	X																										
3. Help review recommendations							X																									
4. Assist with implementation of recommendations as possible									0	0	0	0																				
g. Enhanced staff productivity																																
1. Help evaluate staff support infrastructure					X																											
2. Assist in determining housing needs					X																											
3. Help develop specifications for remodeling					X																											
4. Assist in evaluating utility systems					X																											
5. Assist in construction design and scheduling					X	X	X		0	0	0	0																				
6. Help ensure adequate transportation for schools					X	X	X																									
7. Assist in upgrading station health program					X	X	X		0																							
8. Advise on improving meeting rooms, cultural facilities					X	X	X		0	0	0	0																				
h. Livestock research infrastructure																																
1. Review present infrastructure					X																											
2. Review and establish research objectives					X	X																										
3. Assist in commodity procurement					X	X																										
4. Assist in design of improved animal housing					X																											
5. Assist in design of other construction							X	X																								
6. Help receive and install equipment							X	X																								
7. Help train technicians					X	X	X																									
8. Assist in planned maintenance for equipment and facilities							X	X	0	0	0	0	0	0	0	0	0	0	0	0												
9. Review research, start second phase							X		0	0	0	0	0	0	0	0	0	0	0	0												

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93			
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2. Identify and assist in training staff					X																											
3. Assist in conducting an OFRD survey					X	X																										
4. Assist in analyzing and interpreting survey data						X																										
b. Expand OFRD/develop FSR/Extension (C1,2,4,5,6;D1,3)					X	X																										
1. Select target zones					X	X																										
2. Prioritize research activities						X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
3. Assemble research technology information						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4. Develop and implement a training plan					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
5. Develop, test training materials							X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
6. Implement plans by solving farmer problems													0	0	0	0	0	0	0	0	0	0	0	0								
7. Monitor progress, conduct studies					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
8. Plan for transfer of pilot results to other zones						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
9. Request TDY to assist with training repeatedly					X	X			0	0			0	0			0	0			0	0										
c. Identify constraints to new technology (C1,2,4,5,6;D1,3)																																
1. Determine inputs, procedures required to identify constraints						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
2. Develop interdisciplinary involvement						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
3. Assist in training staff						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4. Monitor and modify procedures						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
d. Assist with procurement (C1,2,4)																																
1. Review existing facilities, commodities						X																										
2. Review NARP procurement committee list						X																										
3. Request TDY to recommend modifications						X																										
4. Request these modifications						X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93							
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
8. Initiate drawing, drafting procedures					X	X	X	X																												
9. Provide O-J training to machinery development staff					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
10. Recommend AMRI staff for short-term training abroad							X	X	0	0	0	0	0	0																						
11. Assist development of extension/marketing/socioeconomic studies									0	0			0	0	0	0	0	0	0	0																
c. Technology generation																																				
1. Plan research of farmer mechanization needs						X	X	X	0	0	0	0	0	0																						
2. Help develop multicrop thresher						X	X		0	0	0	0	0	0	0	0																				
3. Help develop a grain crop harvester						X	X		0	0	0	0	0	0	0	0																				
4. Assist manufacturers develop machines for small farms																				0	0	0	0	0												
5. Help train engineers and staff in machinery design					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
6. Assist AMRI to improve machinery design capability					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
7. Assist AMRI in machinery research planning					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
d. Technology transfer																																				
1. Become familiar with in-country manufacturers					X	X	X	X																												
2. Develop an import prototype list					X	X	X	X	0	0																										
3. Assist imported machinery evaluation									0	0			0	0	0	0	0																			
4. Encourage local manufacture of AMRI machinery					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
5. Assist testing and demonstration of local commercial prototypes													0	0	0	0																				
6. Assist preparation of AMRI machinery engineering drawings									0	0			0	0	0	0																				
7. Encourage publication of leaflets, manuals of AMRI machinery													0	0	0	0																				
8. Develop major national, international institution contacts					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																
9. Invite distinguished researchers for lectures					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0																

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93			
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
e. International linkages																																
1. Improve AMRI subscriptions of professional journals					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
2. Disseminate information to Egyptian researchers					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
3. Obtain information abroad for Egyptian researchers					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4. Disseminate information on training abroad					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
5. Disseminate information on new research relevant for Egypt					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
6. Arrange seminars by international researchers					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
7. Promote linkages by Egypt. Soc. Ag. Eng. with other countries					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
f. Mechanization policies																																
1. Review, analyze government mechanization policies					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
2. Hold discussions on policy issues					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
3. Encourage policy discussions at professional meetings					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4. Increase awareness of policy shortcomings					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
5. INTEGRATED CROP PROTECTION (ICP)																																
a. Working group activities																																
1. Define activities, meetings					X																											
2. Assist in selecting crop-ICP problems for study						X																										
3. Request ARC research unit heads to appoint ICP problem study teams							X																									
4. Help establish ARC ICP research and development programs							X	X																								
5. Monitor ICP activities							X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
6. Develop linkages with non-ARC groups					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
7. Request ARC staff to provide training to ICP extension specialists									0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93							
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
b. On-station testing (C2,4)																																				
1. Establish staff priorities for crops-ICP packages					X	X			0	0	0	0	0	0	0	0	0	0	0	0																
2. Clarify old, new tactics; develop test protocols						X	X		0	0	0	0	0	0	0	0	0	0	0	0																
3. Prepare logistical support for tests							X		0	0	0	0	0	0	0	0	0	0	0	0																
4. Initiate tests and collect data									0	0	0	0	0	0	0	0	0	0	0	0																
5. Interpret data and prepare reports										0	0		0	0	0	0	0	0	0	0																
6. Test activities recommended further													0	0	0	0	0	0	0	0																
c. ICP on-farm demonstrations (C2,3)																																				
1. Assist study teams in selecting demonstrations (C2,3)							X																													
2. Encourage ICP personnel to interact with demonstrations section							X																													
3. Review demonstration results, plan adjusted programs									0	0	0	0	0	0	0	0	0	0	0	0																
4. Review results by ICP for use in research planning									0	0			0	0	0	0	0	0	0	0																
5. Use ICP personnel to assist extension communications													0	0	0	0	0	0	0	0																
d. Activities of Central Pesticides Laboratory																																				
1. Develop safe formulations					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																
2. Improve existing formulations					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																
3. Develop safer application procedures					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																
4. Recommend low hazard pesticides					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																
5. Determine pesticide residues					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																
e. Literature searches																																				
1. Establish groups by discipline or crop					X																															
2. Arrange for groups to prioritize searches (D2)					X	X																														
3. Ask relevant scientists to review search material							X																													
4. Review updated printouts							X	X	0	0	0	0	0	0	0	0	0	0	0	0																

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93											
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
f. Improve ICP institutions																																								
1. Review with directors the three ARC ICP institutes					X	X																																		
2. Determine training needs with the directors						X	X																																	
3. Determine commodity needs with directors							X																																	
4. List constraints, develop solutions								X	0	0	0	0	0	0	0	0	0	0	0	0																				
5. Enhance cooperative linkages					X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0																				
g. Agrometeorology (C1,2)																																								
1. Describe data collection needs					X																																			
2. Combine with overall ARC needs						X																																		
3. Request TDY agrometeorology expert						X																																		
4. Request NARP to execute recommended programs							X	X	0	0																														
h. Computer modeling (B2;C4)																																								
1. Describe functional outputs desired by ICP researchers						X																																		
2. Combine computer needs with rest of ARC						X	X																																	
3. Request TDY experts							X	X																																
4. Help ICP staff to execute recommended actions							X	X	X	X	X																													
i. Pest identification/monitoring centers																																								
1. Define needs						X																																		
2. Request equipment						X	X																																	
3. Request and train staff							X	X																																
4. Link to headquarters								X	0	0	0	0	0	0	0	0	0	0	0	0																				

NARP LIFE-OF-PROJECT ACTIVITIES

C. NARP IMPLEMENTATION-METHODOLOGY	7/86				7/87				7/88				7/89				7/90				7/91				7/92				7/93							
	6/87				6/88				6/89				6/90				6/91				6/92				6/93				10/93							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
j. Crop losses assessment																																				
1. Study crop loss literature					X																															
2. Assist an ICP panel to develop loss assessment protocols						X	X																													
3. Work with ICP research units to designate field staff required								0																												
4. Help ICP crop loss panel to conduct, evaluate, modify protocols								0	0	0	0	0																								
5. Assist ICP research units to develop systematic reporting system												0	0	0																						
6. Work with ICP research units to institutionalize annual reports													0	0	0	0																				
k. Extension support																																				
1. Assist ICP working group to select ICP programs for extension												0	0	0	0	0	0	0	0	0																
2. Work with ICP groups and extension to determine assistance needs												0	0	0	0	0	0	0	0	0																
3. Help ICP research units to provide materials to extension																0	0	0	0	0																
4. Encourage ARC researchers to train subject matter specialists								X	X	0	0	0	0	0	0	0	0	0	0	0																
5. Assist researchers and specialists to develop economic thresholds								X	0	0	0	0	0	0	0	0	0	0	0	0																
l. Quarantine policies, practices																																				
1. Review quarantine literature												0																								
2. Visit quarantine individuals/agencies												0	0	0																						
3. Prepare report with recommendations																0																				

NARP IMPLEMENTATION-METHODOLOGY	7/86			7/87			7/88			7/89			7/90			7/91			7/92			7/93						
	6/87			6/88			6/89			6/90			6/91			6/92			6/93			10/93						
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5. Analyze and improve records													0	0	0	0												
6. Implement quality management and monitoring													0	0	0	0												
7. Improve dust control									0	0	0	0	0	0	0	0												
8. Improve handling and cleaning by growers					X	X	X	X																				
9. Reduce mechanical injury to seed									0	0	0	0	0	0	0	0												
10. Improve lot-forming to reduce costs and losses													0	0	0	0	0	0	0	0								
11. Improve field/lot numbering system													0	0	0	0	0	0	0	0								
12. Identify and request clean-up equipment									0	0	0	0	0	0	0	0	0	0	0	0								
13. Request academic training for plant personnel						X	X		0	0	0	0	0	0	0	0												
14. Train personnel in pre-processing tests						X	X		0	0	0	0	0	0	0	0												
15. Compile comprehensive plant manuals						X	X		0	0	0	0	0	0	0	0												
16. Regularly visit and train operators and plant managers					X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0								
17. Request training for internal quality control									0	0	0	0	0	0	0	0												
18. Request training for specified operations improvement													0	0	0	0												
19. Request training in seed production and processing						X	X	X	0	0	0	0	0	0	0	0	0	0	0	0								
20. Assist in improving efficiency and resolving problems									X	0	0	0	0	0	0	0												
21. Request training at USDA Seed Technology Course									X	0	0	0	0	0	0	0												
f. Equipment maintenance																												
1. Develop maintenance schedules and guidelines													0	0	0	0												
2. Assist in maintenance management						X	X		0	0	0	0	0	0	0	0												
3. Compile maintenance and repair manuals						X	X		0	0	0	0	0	0	0	0												
4. Request training in maintenance													0	0	0	0												
g. Seed certification																												
1. Request academic training in seed technology						X	X		0	0	0	0	0	0	0	0												
2. Request training in field inspections						X	X		0	0	0	0	0	0	0	0												
3. Request an observational tour for managers						X	X		0	0	0	0																
4. Recommend a university seed technology curriculum									0	0	0	0	0	0	0	0												
5. Assist in establishing a seed library									0	0	0	0	0	0	0	0												
6. Assist in establishing a journal for seed publications									0	0	0	0	0	0	0	0												
7. Request academic training for local station managers									0	0	0	0	0	0	0	0												
h. Seed packaging																												
1. Adjust packages to farmer needs													0	0	0	0												
2. Request improvement of packaging equipment									0	0	0	0	0	0	0	0												
3. Compile operating maintenance manuals									0	0	0	0	0	0	0	0												
4. Evaluate and request improvement of handling methods													0	0	0	0												
5. Advise on improved packaging materials													0	0	0	0												
6. Recommend improved labeling and numbering procedures																	0	0										
7. Assist in improving operating efficiency and economy									0	0	0	0	0	0	0	0												

NARP IMPLEMENTATION-METHODOLOGY	7/86 6/87				7/87 6/88				7/88 6/89				7/89 6/90				7/90 6/91				7/91 6/92				7/92 6/93				7/93 10/93			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
i. Seed storage																																
1. Evaluate and assist with improvement of storage facilities									0	0	0	0	0	0	0	0																
2. Recommend improved handling and storage methods									0	0	0	0	0	0	0	0																
j. Seed research																																
1. Help organize to address industry needs									0	0	0	0	0	0	0	0																
2. Establish a problem reporting system for research and management									0	0	0	0	0	0	0	0																
3. Request needed research equipment									0	0	0	0	0	0	0	0																
4. Request academic training						X	X		0	0	0	0	0	0	0	0																
5. Request consultant to organize research operations and planning									0	0	0	0	0	0																		
6. Assist in problem identification and research planning									0	0	0	0	0	0	0	0																
k. Government/private sector cooperation																																
1. Assist in contacting foreign seed firms									0	0	0	0	0	0	0	0																
2. Recommend improved government infrastructural support													0	0	0	0																
3. Assist in defining government/private sector roles													0	0	0	0																
4. Encourage local commodity firms to provide equipment and spare parts supplies													0	0	0	0																
5. Recommend improved credit for seed industry													0	0	0	0																
6. Promote a CAS private-sector office						X	X		0	0	0	0	0	0																		
7. Request CAS officer to attend USA conventions						X	X		0	0	0	0	0	0	0	0																

ANNEX C

CID TECHNICAL ADVISOR SCOPES OF WORK

NARP IMPLEMENTATION-MANAGEMENT

Chief of Party

The Chief of Party's primary focus will be to provide advice on how to improve overall research management in the MOA. He will provide advice to the Director General of the NARP to assist in the development of a system of research policy determination and planning and in the establishment of procedures to effectively manage agricultural research. The overall objective of this assistance will be to improve the capability of senior research management in the MOA to carry out its responsibilities.

The advice provided by the Chief of Party will focus on, but not be limited to, improving the research management capability of the MOA with respect to:

- Establishing research policies that assure the setting of priorities as a means of allocating resources.
- Assisting in the development of research project policies and procedures for the various research units within the MOA/ARC.
- Allocating resources to carry out a decentralized research program through the various research institutes, other units of the ARC, and other organizations within the total research community.
- Staff management policies and procedures.
- Establishing a research staff development program.
- Providing for necessary physical research facilities and equipment.
- Coordinating the development of linkages between the MOA's research program and that of other Egyptian, US, and international agricultural research institutions.
- Developing policies and procedures that provide for the allocation of resources to the highest priority research activities.
- Improving the systems for collecting and disseminating agricultural research information.

Other required activities:

- Providing supervision and management of the CID/NARP technical assistance team and their activities associated with the NARP.
- Responsibility for all field operations required to fulfill the terms of the CID/NARP contract.
- Liaison with USAID, in cooperation with the NARP Director General.
- Developing and coordinating in-country operating policies and procedures with the CID/NARP Project Director at New Mexico State University, and occasionally with the CID/Tucson office.
- Responsibility for management of use of local fund accounts and other local project resources.

Administrative Services Advisor

The primary focus of the Administrative Services position is to provide advice and assistance to the MOA/ARC in the improvement of management and its utilization of existing resources. This assistance, as per the CID technical assistance contract, will consist of interactions with the ARC's senior management, to develop ways to streamline the ARC, and to support project administrative financial procedures. This assistance will focus on, but not be limited to:

- Analysis of the present administrative and financial procedures.
- Identification of constraints to efficient financial management.
- Recommendation of options to improve administrative efficiency while retaining adequate financial control.
- Introduction of new or improved administrative and financial/budgeting systems as required, e.g., accounting, Management Information Systems (MIS), and employee performance evaluation.
- Training of personnel in application of new procedures/systems.
- Providing advice and problem solving related to administrative and financial management.

Other required activities:

- Provide assistance to the NARP procurement committee in development of, and implementing, the overall procurement plan.
- Management responsibility for the TA support staff in the areas of motor pool management, expediting, budgets, procurement, inventory control, computerization, and some aspects of personnel management. Provide major liaison with the NARP executive office.

NARP IMPLEMENTATION - METHODOLOGY

Interdisciplinary Research Advisor

An interdisciplinary approach to agricultural research brings together physical, biological and social scientists to address specific problems encountered by producers. A research team must clearly identify a specific problem and methods of implementing research to resolve it.

Overall role and responsibility is to assist and advise the Egyptian research community in developing methods and techniques of managing interdisciplinary research activities. This will be an attempt to institutionalize an approach that will effectively serve all Agricultural Research Institutes within the ARC.

The assistance of the advisor will focus on, but not be limited to, developing the capability of Egyptian scientists to use a team approach and to collaborate with related research efforts outside their institutes or units by:

- Developing procedures to assist in institutionalizing interdisciplinary research in the ARC.
- Adapting the methods and techniques of interdisciplinary research to the ARC context.
- Training scientists to use these methods and techniques.
- Advising research project teams on implementation of the approach.
- Resolving implementation problems that occur when teams use these methods and techniques.
- Monitoring, evaluating and assisting in adjusting research projects being conducted by an interdisciplinary approach.
- Introducing mechanisms, e.g. microcomputer technology, that will facilitate interdisciplinary work.
- Communicating the results of experimentation.
- Strengthening research/extension linkages.

Other required activities:

Leadership in TA aspects of basic research and biotechnology, research linkages with IARCs and CRISPS, the ARC Statistical Laboratory, and the research project system to be introduced into the ARC by the NARP. A supporting role in TA coordination of research on field crops.

Research Station Management Advisor

Advise in directing the research programs conducted on 31 ARC research stations located throughout Egypt. Assess the present organizational structure and operational procedures used in research stations. Based on these assessments, and in cooperation with counterparts, recommend improvements and assist in establishing them.

Efforts to improve effective coordination and collaboration will focus on:

- Establishing and maintaining effective communication links among research station directors, regional research committees, personnel of research institutes and the ARC administration.
- Establishing and maintaining linkages with those who transfer research results to farmers.
- Establishing and maintaining linkages among agricultural research station managers and colleagues.

Assistance on internal management improvement systems will focus on, but not be limited to:

- Developing and preparing operating plans and annual budgets.
- Improving implementation of plans.
- Monitoring implementation and progress toward station and research objectives.
- Improving scheduling of activities and resources to support research programs.
- Improving processes for maintaining facilities and equipment.
- Assisting in infrastructure improvements such as buildings, remodeling, land leveling, roads, etc.
- Assisting in procuring commodities needed for various research programs.
- Developing inventory control mechanisms for station equipment and supplies.
- Managing and motivating personnel.
- Determining the critical training needs of station staff.

Other required activities:

Leadership in TA aspects of field crop and livestock research coordination and a supporting role in agrometeorology, construction and facilities development and budgets, procurement and inventory under the NARP.

On-Farm Research and Demonstrations

The objective of the On-Farm Research and Demonstrations (OFRD) component is to assist in the development of a management system prototype that will provide maximum participatory involvement of research, extension, universities, female and male farmers and their families, and the public and private sectors to insure a continuous flow of responsive agricultural knowledge and technology. The desired outcome is that this knowledge and technology will optimize productivity and insure maximum net farm income.

Technical assistance for this component will focus on, but not be limited to:

- Documenting present experiences.
- Developing guidelines and procedures for carrying out field research.
- Developing pertinent training materials.
- Providing advice and problem-solving skills to the ARC field researchers.
- Developing a systems model that will enhance expanded OFRD and provide management support for at least 5,000 on-farm trials.

Other required activities:

Serve as Deputy Chief of Party/Technical.

Leadership in TA aspects of organization of the NARP conferences and seminars, increased use of farming systems research and agricultural economics within the ARC, and technology relating to new lands. A supporting role in budgets, procurement and inventory.

Agricultural Mechanization Advisor

The Agricultural Mechanization Advisor will assist the ARC to improve, refine and coordinate the Agricultural Mechanization Research System in Egypt.

The assistance will focus on, but not be limited to:

- Assisting in setting up a Machinery Design and Development facility at the Agricultural Mechanization Research Institute.
- Developing capabilities of Egyptian Institutions in the development of appropriate farm machines to suit small farm and local manufacturing needs.
- Assisting in developing some critically needed farm machines for small farm use.
- Assisting in mechanization research being conducted by various institutions in the country.
- Recommending research priorities in the mechanization area.
- Advising on policies regarding mechanization

Other required activities:

Leadership, in cooperation with other TA staff, in the functional areas of facilities development/construction and private sector research/development. A supportive role for new lands technology, the TA motor pool, and budgets, procurement and inventory.

Integrated Pest Management Advisor

The central objective is to assist the ARC integrated pest management (IPM) institutions to develop a countrywide system. This can be achieved by developing interinstitutional linkages with universities and other non-Ministry organizations. This assistance will focus on, but not be limited to:

- Facilitating coordination among relevant crop protection organizations.
- Providing advice on crop protection policies.
- Assisting in the development of a crop loss assessment system covering preplanting through postharvest storage. This system can also serve for developing economic damage thresholds and for monitoring progress in pest management.
- Reviewing plant quarantine policies and practices in order to suggest improvements.
- Encouraging the development of IPM packages of practices, centering on major crops but also responding to the needs of specialty crops.

Other required activities:

Leadership, in cooperation with other TA staff, to improve Egypt's agrometeorology system, TA coordination of research on horticultural crops and postharvest technology, development of visual aids. A supporting role will consist of editing of the NARP quarterly and annual reports and other publications as requested.

Seed Technology Advisor

The NARP seed component is designed to strengthen and develop the seed supply system through efficient operation of existing facilities. It recognizes that more facilities and infrastructure are urgently needed, and seeks to lay the groundwork and plan for near future installation of improved facilities and infrastructure in an efficient, least cost manner. It will assist seed activities within the ARC, MOA, Central Agency for Seed, Egyptian Agricultural Authority, and the Principal Bank for Development and Agricultural Credit, recognizing that the private sector is assuming a larger share of seed production and marketing.

Assistance will focus on, but not be limited to:

- Developing the capability of ARC employees to operate seed processing plants efficiently.
- Providing technical assistance on production of Breeder and Foundation seed for field and horticultural crops.
- Advising the MOA on policies relating to the seed industry.
- Providing advice to improve the seed registration and certification process.
- Advising on marketing (storage, packaging, etc.) of improved seed.
- Facilitating coordination among the various public and private sector entities involved in the seed industry.

Other required activities:

Leadership on TA activities relating to soil and water management and the ARC Food and Feed Laboratory. A supporting role for research on horticultural crops, postharvest technology, private sector research and development, and budgets, procurement and inventory.

NARP IMPLEMENTATION-RESEARCH SUPPORT

Research Studies Coordinator

The Research Grant Program is to foster greater collaboration between ARC researchers and others doing similar research, such as Egyptian and American universities. The Coordinator will help to develop mechanisms needed to award grants for research, to monitor use of funds, and to make the results available to the research community.

The assistance will focus on, but not be limited to:

- Establishing a system to publicize the grant program so as to attract proposals from the total agricultural research community.
- Developing procedures to evaluate research proposals, to ensure that research funded coincides with Egyptian research priorities.
- Developing a system to process grant proposals equitably.
- Training staff to implement the grant program efficiently.
- Developing procedures to evaluate grant research activities.
- Developing a mechanism to disseminate research findings effectively.

Other required activities:

Leadership responsibility for editing NARP reports and publications, unless delegated to others, and in TA aspects of data collection/management, particularly in relation to liaison with the Data Collection segment of the NARP. A supportive role in relation to TA aspects of research linkages in addition to those covered by the Grant Program, to the ARC Statistics Laboratory, and to increased use within the ARC of farming systems research and agricultural economics.

Library and Information Science Specialist

The chief purpose of the library/information service will be to provide information that supports the work of the staff of the Ministry of Agriculture and others working in agriculture in Egypt. It should be the central unit of a network of agricultural libraries and technical information centers in Egypt. It should be an active information service rather than a passive type of organization.

This will be accomplished by means of, but not limited to:

- Establishing a computer-based library catalog and locator system.
- Training library personnel to use the system.
- Advising on collection development and long-term policies and procedures.
- Advising on plans for construction and equipment.
- Initiating active interchanges of information and publications with international agricultural research centers and technical information sources.
- Assisting with developing proactive services by the library-information system.
- Planning coordination with the research publications program in the ARC.
- Planning coordination with the extension media production program.
- Participating in plans and activities relating to the formation of the National Agricultural Library network.
- Advising on plans for the National Agricultural Library.

Other required activities:

Documentation and management of internal project information, including data collection, where required. Leadership responsibility for the NARP newsletter, computer systems for the TA staff and advice in this area within the NARP generally. Advise on the NARP construction and facilities development to the extent that library and information services are involved. Play a supporting role on budgets, procurement and inventory.

Training and Manpower Development Advisor

Developing human resources is critical to improving the management and operation of the agricultural research system in Egypt. Because of this, substantial project funds are available for training.

Based on the project paper, the technical assistance contract, and decisions with Egyptian management and American staff, the assistance on training and manpower development will focus on, but not be limited to:

- Assisting in documenting goals and objectives of training in the MOA agricultural program.
- Developing and implementing a needs assessment for the training plan.
- Developing a Master Training Plan that describes the number of people to be trained in all levels, selection criteria for participants, detailed objectives for each level of training, and recommendations for preferred training methods and procedures.
- Assisting in implementation of long-term academic training, out-of-country short-term training, invitational travel and in-country pre-service and in-service training.
- Developing a computerized system that will help in planning, implementing and evaluating training and manpower development activities.
- Assisting the Manpower Development and Training Unit to implement the training plan.
- Developing an adequate system where training will be a continuous and integral part of the whole agricultural program.

Other required activities:

- Serve as Deputy Chief of Party/Manpower Development and Training.
- Provide leadership in TA activities relating to the role of Egyptian women and other family members in agricultural development, supervision of the CID secretarial staff (including training on computers). A supportive role in TA activities on the NARP newsletter, visual aids, organization of the NARP conferences and seminars, and the increased use of farming systems research within the ARC.

ANNEX D

MOA-USAID Budget

National Agricultural Research Project

BUDGET

\$000

	USAID			GOE Contri- bution	Project Total AID & GOE
	\$	LE \$ Equiv.	Total \$		
Technical Assistance					
a. Short - Term	5,300	0	5,300	400	5,700
b. Long - Term	9,400	0	9,400	700	10,100
Subtotal	14,700	0	14,700	1,100	15,800
Training					
a. Nondegree	4,500	12,296	16,796	1,200	17,996
b. Degree					
1) M.S., Ph .D.	6,000	492	6,492	500	6,992
2) Postdoctoral	2,500	492	2,992	300	3,292
Subtotal	13,000	13,280	26,280	2,000	28,280
Construction					
a. Laboratories	0	4,919	4,919	300	5,219
b. Farm Structures	0	307	307	60	367
c. Station Housing	0	800	800	1,000	1,800
d. Nat'l Research Library	0	922	922	280	1,202
e. Seed Facilities	0	307	307	60	367
Subtotal	0	7,255	7,255	1,700	8,955
Commodities					
a. Lab Equip. & Supplies	10,500	0	10,500	450	10,950
b. Farm Equipment	2,500	0	2,500	250	2,750
c. Nat'l Research Library	2,000	615	2,615	125	2,740
d. Seed Processing Equip.	500	0	500	25	525
e. Data Services	1,000	0	1,000	25	1,025
f. Vehicles	5,100	0	5,100	450	5,550
g. Administration	2,400	0	2,400	25	2,425
h. Demonstration Package	1,000	430	1,430	350	1,780
Subtotal	25,000	1,045	26,045	1,700	27,745
Services					
a. Salaries	0	0	0	62,000	62,000
b. Travel	1,100	0	1,100	400	1,500
c. Administration	0	615	615	500	1,115
d. Maintenance	0	1,353	1,353	125	1,478
e. Printing	0	307	307	25	332
f. Media	500	307	807	250	1,057
g. Research Grants Prog.	7,000	9,222	16,222	250	16,472
h. Research Support Prog.	0	22,800	22,800	5,700	28,500
i. Land Preparation	0	615	615	50	665
Subtotal	8,600	35,219	43,819	69,300	113,119
Evaluation & Audit					
a. Evaluation	500	0	500	100	600
b. Audit	100	0	100	0	100
Subtotal	600	0	600	100	700
Contingencies	6,800	4,501	11,301	4,100	15,401
TOTAL	68,700	61,300	130,000	80,000	210,000

ANNEX E
MOA-CID Contract Budget

TECHNICAL ASSISTANCE CONTRACT BUDGET

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	TOTAL
IN-COUNTRY EXPENDITURES	\$ 377,175	349,957	362,335	352,292	419,252	338,989	\$ 2,200,000
U. S. EXPENDITURES	<u>2,294,007</u>	<u>2,155,054</u>	<u>2,180,026</u>	<u>1,551,446</u>	<u>1,152,663</u>	<u>926,804</u>	<u>10,260,000</u>
TOTAL	\$ <u>2,671,182</u>	<u>2,505,011</u>	<u>2,542,361</u>	<u>1,903,738</u>	<u>1,571,915</u>	<u>1,265,793</u>	\$ <u>12,460,000</u>

ANNEX F

Distribution List

DISTRIBUTION**NO.**

6	Dr. Ahmed Momtaz	Director General, NARP
1	Dr. Robert Witters	Chief of Party, CID/NARP TA Team
1	Dr. Yehia Hassan	Chairman, Foreign Agricultural Projects Committee
1	Dr. A. Shehata	Director, ARC
1	Dr. M. Sattour	Deputy Director, ARC
1	Dr. Abdallah Nassib	Director, Field Crops Research Institute
1	Dr. Samir Moustafa	Director, Cotton Research Institute
1	Dr. Ahmed Nour	Director, Sugar Crops Research Institute
1	Dr. Kamla Mansour	Director, Horticulture Research Institute
1	Dr. Moustafa Hathout	Director, Animal Production Research Institute
1	Dr. Hosny El-Sawah	Director, Animal Health Research Institute
1	Dr. Sayed A. Salama	Director, Veterinary Serum & Vaccine Research Institut3
1	Dr. M. Sabry Tawfik	Director, Animal Reproduction Research Institute
1	Dr. Ahmed El-Sehriq	Director, Agricultural Mechanization Research Institute
1	Dr. Youssef A. Hamdi	Director, Soils and Water Research Institute
1	Dr. Taha El-Sharkawi	Director, PLant Pathology Research Institute
1	Dr. Ahmed Khattab	Director, Plant Protection Research Institute
1	Dr. Mohamed Sharaf	Director, Agricultural Economics Research Institute
1	Dr. Ahmed El-Rafei	Director, Agricultural Extension and Rural Development Research Institute
1	Dr. Zakaria El-Attal	Director, Central Agricultural Pesticides Lab
1	Dr. Ahmed Abdel Halim	Director, Central Laboratory for Statistics
1	Dr. Akila Salleh	Director, Central Lab for Food and Feed
1	Dr. Ismail Darrag	Director, Agricultural Research Stations
1	Eng. Ali Nashaat	Secretary General, ARC
1	Dr. Abdurabbo Ismail	Director, Specialized Extension, ARC
1	Dr. Alaa Eldin Z. Bondok	Head, Central Administration for Minister's Office, MOA
1	Dr. Adel El-Beltagi	Head, Central Administration for Minister's Office, MOLR
1	Acc. Kamal Reda	Head, Financial and Administrative Affairs Sector, MOA
1	Eng. Adel Ezzi	Chairman, Agriculture Development and Credit Bank
1	Dr. Abdel Salam Gomaa	Head, Central Administration for Seeds, MOA
1	Dr. Yassin Osman	Head, Central Administration for Pest Control, MOA

1	Eng. Mohamed Dessouki	Head, Central Administration for Agricultural Foreign Relations, MOA
1	Dr. A. Moneim Barakat	Head, Central Administration for Animal Health, MOA
1	Eng. Mahmoud Nour	Supervisor, Central Administration for Planning, MOA
1	Eng. Abdel-Razik Badawy	Head, Central Administration for Animal Production, MOA
1	Eng. Fouad Abo-Hedb	Chairman, West Nobarria Company
1	Dr. Ibrahim Antar	NARC Member
1	Dr. Ahmed Abdel-Rahim	Technical Trusteeship for Research Institutes, ARC
1	Dr. Mahmoud El-Barkouki	NARC Member
1	Dr. Bakir Oteifa	Chairman, Grant Program Working Group
1	Eng. Aly Salem	Chairman, Construction Working Group
1	Dr. Hassan Khedr	Chairman, Data Collection Working Group
1	Dr. Yeldez M. Ishaq	NARP News
1	Dr. Mohsen El-Didi	NARP News
1	Eng. Aly Abo-Gazia	Chairman, Horticulture Crops Exporters Union
1	Mr. Cory Wengreen	Administrative Services Advisor
1	Dr. Willis McCuiston	Interdisciplinary Research Advisor
1	Dr. Ralph Finkner	Research Station Management Advisor
1	Dr. Gordon Beckstrand	On-Farm Research and Demonstration Advisor
1	Dr. Amir Khan	Agricultural Mechanization Advisor
1	Dr. Robert Harwood	Integrated Crop Protection Advisor
1	Dr. Bill Gregg	Seed Technology Advisor
1	Prof. Richard Foote	Research Studies Coordinator
1	Dr. Susan Emerson	Library and Information Services Specialist
1	Ms. Coleen Brown	Training and Manpower Development Advisor
6	Mr. John Foti	AID/NARP Project Officer
2	Dr. H. Matteson	CID/NARP Project Director, NMSU
2	Dr. Earl Kellogg	CID Executive Director
20	ARC Libraries	Director General Office