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Ministry of Agriculture & Land Reclamation
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Reform Design and Implementation

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وزارة الزراعة واستصلاح الأراضي
الوكالة الأمريكية للتنمية الدولية
مشروع إصلاح السياسات الزراعية
وحدة تصميم وتنفيذ السياسات

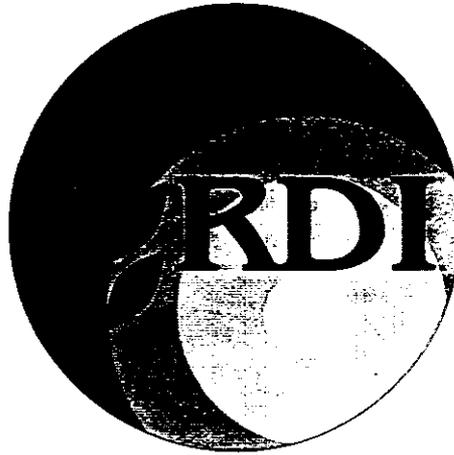
Ministry of Agriculture and Land Reclamation

AGRICULTURE POLICY REFORM PROGRAM

Reform Design and Implementation Unit (RDI)

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Reform Design and Implementation Unit

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RDI REPORTS

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RDI Acronyms List

<i>ACRONYM</i>	<i>DESCRIPTION</i>
AC	Agricultural Census
ACDI	Agricultural Cooperative Development Institute
AERI	Agriculture Engineering Research Institute
AHD	Aswan High Dam
AIC	Agricultural and Irrigation Committee of the People's Assembly
ALCOTEXA	Alexandria Cotton Exporters Association
APRP	Agricultural Policy Reform Program
ARC	Agriculture Research Center
ATUT	Agricultural Technology Utilization & Transfer Program
AY	Agricultural Year Locator (October 1 st to September 30 th of the following year)
BOD	Board of Directors
CAGA	Central Administration for Governorates Affairs
CAPMAS	Central Agency for Public Mobilization & Statistics
CAPQ	Central Administration for Plant Quarantine, MALR
CASC	Central Administration for Seed Certification
CASP	Central Administration for Seed Production
CAWD	Central Administration for Water Distribution
CBE	Central Bank of Egypt
CIDA	Canadian International Development Agency
CIF	Cost, Freight and Insurance
CIPE	Center for International Private Enterprise
CMA	Capital Market Authority
Co.	Company
CODEX	Code of Food Standards developed by an international commission in 1962
COP	Chief of Party
CSPP	Egyptian-German Cotton Sector Promotion Program
CTS	Cargill Technical Services
DA	Development Associates, Inc.
DAI/B	Development Alternatives, Inc./Bethesda
DEPRA	Development Economic Policy Reform Analysis
EAO	Egyptian Agriculture Organization

<i>ACRONYM</i>	<i>DESCRIPTION</i>
EEA	Egyptian Exporters Association/ExpoLink
EEPC	Egyptian Export Promotion Center
ELS	Extra Long Staple Cotton
EMIPAC	Egyptian Marketing Agricultural Company
ERSAP	Economic Reform and Structural Adjustment Program
ESAS	Egyptian Seed Association
ESAs	Employee Shareholder's Association
ESOPs	Employees Stock Ownership Program
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FDIs	Foreign Direct Investments
Fed.	Feddan = 4200 square meter
FIHC	Food Industries Holding company
FOB	Free on Board
FSR	Food Security Research Unit
FY	Fiscal Year
GA	General Assembly
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GOE	Government of Egypt
GTZ	German Technical Assistance Agency
HC	Holding Company
HEIA	Horticultural Export Improvement Association
IDA	International Development Association
IFC	International Financial Cooperation
IPPC	International Plant Protection Convention
IPO	Initial Public Offering
IIMI	International Irrigation Management Institute
IR	Intermediate Results
ITC	International Trade Center
JETRO	Japan Export Trade Organization
Kg.	Kilogram
Kt.	Kentar
Libra	Pound of 0.45359 kilogram, also abbreviated as lb.

<i>ACRONYM</i>	<i>DESCRIPTION</i>
LE	Egyptian Pound
LK	Lint Kentar of cotton, 50 kgs.
LOE	Level of Effort
LS	Long Staple cotton
MALR	Ministry of Agriculture & Land Reclamation
MENA	Middle East North Africa
MEIC	Ministry of Economy & International Cooperation
MIMW	Ministry of Industry & Mineral Wealth
MT	Metric Ton
MOF	Ministry of Finance
MoTS	Ministry of Trade & Supply
MPE	Ministry of Public Enterprises
MPWWR	Ministry of Public Works & Water Resources
MLS	Medium-Long Staple cotton
MVE	Monitoring, Verification & Evaluation Unit
NARS	National Agriculture Research Center
NBE	National Bank of Egypt
NCF	National Consulting Firm
NFPA	National Food Processor Association
NGO	Non-Governmental Organization
O & M	Operation & Maintenance
OSAF	Office for Studies And Finance
OVR	Office of Variety Testing & Registration
PA	People's Assembly
PBDAC	Principal Bank for Development and Agricultural Credit
PEO	Public Enterprise Office
P&L	Privatization & Liberalization
PIDP	Partnership In Development Project
PMU	Project Management Unit
PPC	Program Planning Committee
PRA	Participatory Rapid Appraisal
PU	Purdue University
PVP	Plant Variety Protection
RETD	Real Estate Tax Department

<i>ACRONYM</i>	<i>DESCRIPTION</i>
RDI	Reform, Design & Implementation Unit
ROW	Rest of the World
SCC	Sugar Crops Council
SCRI	Sugar Crops Research Institute
SIIC	Sugar and Integrated Industries Company
SK	Seed Kentar of cotton (157.5 kgs.)
SPC	Seed Privatization Committee
SS	Short Staple cotton
STTA	Short Term Technical Assistance
SWG	Sugarcane Working Group
TA	Technical Assistance
TAMIS	Technical & Administrative Management Information System
TAT	Technical Assistance Team
TF	Task Forces
TO	Training Officer
TOR	Terms of Reference
TNA	Training Needs Assessment
TRG	Training Resources Group
TSG	The Services Group
UIT	Unified Income Tax
UMD	University of Maryland
USAID	United States Agency for International Development
US\$	United States Dollar
USPMA	U.S. Produce Marketing Association
USDA	U.S. Department of Agriculture
VAT	Value Added Tax
WB	World Bank
WTO	World Trade Organization
WUA	Water User Association

EXECUTIVE SUMMARY

The Sugar Cane Working Group (SCWG), composed of members from the Ministry of Agriculture and Land Reclamation (MALR), the Ministry of Public Works and Water Resources (MPWWR), the Sugar Cane Council, the Sugar Company, and the Agricultural Policy Reform Program (APRP) identified the adoption of improved irrigation techniques by sugarcane producers as a method of obtaining significant water savings in Upper Egypt as a part of its Tranche 2 activities. This was the result of work done to meet a Tranche 2 policy benchmark, which was included in Memorandum of Understanding between the Government of Egypt (GOE) and United States Agency for International Development (USAID).

The APRP MOU for Tranche 3 included a follow-up benchmark to implement a pilot program in improved irrigation on sugar cane. The SCWG thus planned and carried out a program to install gated pipe irrigation systems on sugar cane lands in Upper Egypt. The program includes training of both extension personnel and farmers. Local water engineers were introduced to water measurement and monitoring requirements and trained to collect and report the appropriate data. The Water Communication Unit of the MPWWR and GreenCOM (a unit of APRP) produced a 15 minute video to promote gated pipe irrigation in sugar cane. The video will be used for the expansion of the program in months and years to come.

The gated pipe systems have been installed on farms in the Luxor and Qena Governorates totaling more than 500 feddans. Water measurement and monitoring devices, including weirs and on-farm pump totalizing meters, have been installed. Telemetry equipment will be installed before August 15, and alternative devices will be used until then. Productivity gains for each farmer will be measured and monitored by the sugar companies, in part to involve the farmers in sharing the cost of the installation of the systems.

1. INTRODUCTION

1.1 Overview.

The Agricultural Policy Reform Program (APRP) works to support GOE efforts to design and implement new policies to privatize and liberalize the agricultural economy of Egypt. Five ministries participate in APRP: the Ministry of Agriculture and Land Reclamation (MALR), the lead ministry; the Ministry of Public Works and Water Resources (MPWWR); the Ministry of Trade and Supply (MTS), the Ministry of Public Enterprises (MPE); and the Ministry of International Economic Cooperation (MIEC). Technical assistance teams assist these ministries to bring about the policy reforms needed to establish a market driven economy controlled by private decision makers. APRP is funded by the United States Agency for International Development (USAID).

The MPWWR and MALR work together in several areas to promote improved water conservation and management. The goal of this joint work is to reduce the amount of water applied to agricultural production while maintaining high productivity levels and improving farm incomes. The two most notable areas of cooperation are in improving irrigation and productivity in rice and sugar cane. The two ministries, with assistance from two units of APRP, the Reform Design and Implementation Unit (RDI), and the Water Policy Reform Activity (WPRA) have established two working groups to develop and implement new policy to reduce water consumed on these two crops.

1.2. Purpose of the Report

Representatives of the Government of Egypt (GOE) and USAID signed a Memorandum of Understanding on September 27, 1998. The MOU contains mutually agreed policy reform benchmarks for the APRP Tranche III period (1 July 1998 – 30 June 1999).

Benchmark C.5., Sugarcane Water Use Policies, states:

The GOE (MPWWR and MALR jointly) will designate two areas of private commercial sugarcane growers and promote improved sugarcane water management efficiency in Upper Egypt.

Satisfactory achievement of the benchmark requires the accomplishment of the following verification indicator:

- I) Improved irrigation technologies installed, including LASER leveling and gated pipe delivery systems;
- II) Water application monitoring program established; and
- III) Training provided to farmers in the use of improved irrigation methods in two pilot sugarcane areas in Upper Egypt.

The purpose of this report is to address the verification indicator by presenting the activities and accomplishments associated with Benchmark C.5..

1.3. Background

As Egypt expands irrigated agriculture to new lands, the pressure on its fixed supply of water from the Nile River (High Aswan Dam releases of 55.5 billion cubic meters [bcm]) increases. In an effort to improve water use in existing irrigated agriculture while preserving the productivity and incomes of present farm families, the Government of Egypt (GOE) has embarked on programs which encourage water savings. Two basic strategies for water saving from crops have been explored: crop substitution and improved irrigation techniques.

Sugarcane cultivation uses the most water of any crop in Upper Egypt – a minimum of 3.6 billion cubic meters of water is applied to about 300,000 feddan of sugar cane, of which about 2.6 billion is consumed by the plant. Each feddan consumes approximately 8,000 cubic meters (m³) of water, and water applied often exceeds 12,000 m³ per feddan. In the areas in which sugarcane is irrigated from gravity systems (generally in the Aswan area) water application may exceed 16,000 m³ per feddan.

As one of the two most water-consuming crops, the MALR and the MPWWR have great incentive to find feasible means of reducing water consumed by sugar cane. The MALR has experimented in the past ten years with various on-farm irrigation techniques, and has determined that the potential for applied water savings is significant. In experimental plots,

improved on-farm irrigation efficiency has been shown to reduce water application to approximately 9,000 m³ per feddan, or a total reduction of applied water exceeding 1.0 billion m³ (bcm)/year. The reduction of water consumed could reach ten percent., or 800 cubic meters per feddan.

The sugarcane processing sector is an extremely important economic sector in Egypt, with high value added and employment. For this reason, the GOE is reluctant to reduce current levels of sugar cane production. In addition to relatively small reductions in water consumed through improved irrigation, reducing sugarcane water consumption could be accomplished through increases in productivity in order to offset potential reductions in cultivated area.

The Sugar Crops Research Institute (SCRI) and the Agricultural Mechanization Institute (AMI), of the Agricultural Research Center (ARC), have conducted several years of experiments on improved on-farm irrigation systems in sugar cane. The center of the SCRI and AMI experiments, using a system known as gated-pipes, has been Luxor and Qena Governorates, though some experimentation has occurred in Miniya and Aswan. Satisfactory results in terms of yield increases and reductions in water applications, led the two institutes to conduct on-farm trials in collaboration with Nag Hammadi and Armant sugar factories and the sugar council. These on-farm trials were conducted in several locations in Upper Egypt in 1997 and 1998. Farmers who participated in the on-farm trials gave favorable feedback due to significant yield increases resulting from implementation of the improved irrigation system, and applications of water were reduced significantly.

Based on the applied research conducted through 1998, the MALR, SIIC, and MPWWR identified 12 benefits from the widespread application of this system:

1. Increased yields between 10 and 25 percent;
2. Reduction in water applied by more than 10 percent up to 25 percent;
3. Improved water quality as less water is applied to the fields;
4. Improved efficiency of water use;

5. Improved drainage efficiency;
6. Improved efficiency of fertilizer;
7. Improved labor efficiency;
8. Reduced incidence of belharzia because farmers reduce their contact with water;
9. Improved weed control;
10. Energy savings from reduced pumping;
11. Increased productive area of land by 10 percent;

To date, there has not been a larger scale test of the water savings and production enhancement on commercial (private) farms. This is primarily due to investment costs involved in installation. Benchmark C5 calls for a pilot test to determine on a large scale the productivity gains and water reductions that can be achieved by wide spread adoption of this new method of irrigation.

1.4. Organization of the Report

This report is organized into three remaining chapters. Chapter 2 describes Tranche 3 activities of the Sugar Cane Working Group in developing the pilot program. Chapter 3 describes the implementation of the pilot program to date, including the location and size of the pilot areas, and the specific details of the gated pipe system. Chapter 4 contains the summary and recommendations.

2. SUGAR CANE WORKING GROUP ACTIVITIES

In mid-1998, officials from the MPWWR and the MALR formed the Sugar Cane Working Group (SCWG) under APRP's sponsorship. The SCWG had two objectives, to be done in two phases: Phase I (Tranche 2) activities focused on the determination of policy options available to reduce the amount of water applied to sugar cane; and Phase II (Tranches 3 and 4) activities are charged with assisting the MALR and the MPWWR to implement the most feasible policy option.

The policy options developed in Phase I (found in RDI report No. 33, *Egypt's Sugar Cane Policy and Strategy for Water Management*) are as follows:

1. Limit sugar cane areas to meet the requirements of existing factories through: a) restricting cultivation to factory zones; b) reducing sugar cane area through productivity increases; and c) initiation of a public awareness campaign.
2. Improve on-farm water efficiency and sugar cane productivity through: a) improved irrigation techniques (gated pipes); b) improved productivity through plant breeding programs; and c) MALR and MPWWR implementation of a pilot area to apply improved irrigation methods and LASER land leveling.
3. Importing sugar to reduce cane area.

At the beginning of Phase II, the SCWG received directions from the Ministry of Agriculture and Land Reform, with concurrence of the Ministry of Public Works and Water Resources, to implement policy options 1 and 2. In late 1998, under the Tranche 3 C.5 Benchmark, the SCWG embarked on a large scale pilot program to extend the gated pipe on-farm irrigation system to farmers in Luxor and Qena and to measure and monitor water applied to sugar cane in order to determine the water savings which result from these improved system.

The SCWG Phase II pilot program was designed as the first step to full implementation of the government policy to install gated pipes on all sugar cane lands within 5 years. The following steps were identified as necessary for the implementation of the pilot program:

1. Introduce program to local agriculture and irrigation officials through field trips and workshops;
2. Site selection;
3. Training of trainers;
4. Training of farmers;
5. Training of District Engineers;

6. Formulation of a budget and ministerial approval to obtain tranche funds for implementation;
7. Installation of the gated pipe systems;
8. Installation of the water measuring and monitoring devices;
9. Data collection and analysis;

3. SUGAR CANE PILOT PROGRAM

The SCWG and the associated agencies, institutes, and companies began the establishment of the pilot program in October, 1998.

3.1. Introduction of the program to local agriculture and irrigation officials. Field trips and workshops

In late 1998, the SCWG conducted several field trips in Luxor and Qena Governorates to inspect experimental fields and to discuss with local officials in the Agriculture and Irrigation Directorates about the need for the pilot program. These trips included visits to the Qena Governor's office, as well as, numerous visits to the managers of sugar factories in the region.

In November 1998, the SCWG sponsored a planning workshop in Luxor. At this workshop, attended by more than 50 officials from Agriculture, Irrigation, Sugar Factories and the Sugar Council, members of the SCWG discussed in detail the components of the proposed pilot program. Those components included

- i) soil and agriculture;
- ii) on-farm irrigation;
- iii) canal water management; and
- iv) monitoring of water use and economics.

In addition, the workshop focused on the proposed training plans in agriculture and in irrigation.

In December, 1998, a workshop was held for about 25 MPWWR regional and local staff to describe the program and to discuss the specifics of water measurement and monitoring. Attendees included the SCWG and personnel from the MALR, Sugar Cane Council and Sugar Companies.

3.2. Site selection.

Following the November and December workshops, members of the SCWG made several trips to Luxor to select program sites, accompanied by local MALR and MPWWR personnel. The selection of canals and specific sites was based on both a broad distribution of farmers (size of farms in particular) willing to participate in the program, the potential for expansion of areas on the specific canals, and the ease of installation of measuring and recording devices on the canals. Sites were selected in the Armant and Luxor areas in Luxor Governorate, and near Nag Hammady and Isna in Qena Governorate. Over 450 feddan of sugar cane lands were selected for the program. The following table indicates each canal and the area on the canal which is being converted to gated pipe irrigation.

Canal	District	Area
El Dabeya	Armante	37
		43
Dowa El Nile	Armante	14
		18
Dowa El Nile	Armante	22
		8
		12
Ramsis	Armante	27
Koom Shafee	El Wakf	38
Hagar Komir	East Isna	30
Koom El Biga	Naga Hammadi	40
El Makadma 2	Qena	42
West El Karnak	Luxor	20
El Hoosha	Luxor	28
El Maala	Luxor	25
El Seka El Hadid	Dishna	35
		35
TOTAL		475

Please note that the irrigation infrastructure installed can accommodate an area up to 650 feddan. The acreage will be expanded in years to come as ratoons are replaced with first plantings.

3.3. Training of trainers

Dr. Ahmed El-Behery, RDI consultant and member of SCWG, and Dr. Amr Moussa, RDI consultant, planned and implemented two five-day training of trainers programs in Luxor. Twenty-five extension agents participated in the first program, and 28 participated in the second. All participants were from Luxor and Qena areas. The training included the following topics: irrigation design, materials selection, agronomy, soils, fertilizer application, land leveling, and monitoring and evaluation. All trainees made field visits to a site in Armant where gated pipe irrigation was installed. Governorate and district personnel from the MPWWR also attended these workshops.

In addition to lectures in the topics mentioned above, each training program included two days of sessions for the participants to practice giving lectures on the topics covered in the previous three days. The participants also developed training materials for farmers.

3.4. Training of farmers

Dr. Ahmed El-Behery, with the support of the SCWG as well as officials in Qena and Luxor, planned and implemented eight one-day training programs for sugar cane growers. The growers were from villages included in the implementation program.

1. El Dabaia	Luxor	100 participants
2. El Odisat	Luxor	120 participants
3. El Tode	Luxor	85 participants
4. El Ashi	Luxor	90 participants
5. Nag Hammadii	Qena	150 participants
6. Nag Hammadi	Qena	130 participants
7. El Shaghab	Qena	110 participants
8. El Komar	Isna	90 participants

Trainers who participated in the training of trainers course gave lectures on general agricultural production techniques and installation, maintenance, and repair of the gated pipes irrigation system. In addition, local officials representing the MALR and MPWWR in Luxor and Qena, the Sugar Crops Research Institute, the Agriculture Engineering Research Institute, and the sugar factories in Armant and Nag Hammadi attended the sessions. These officials explained to the farmers how the program would be implemented, including the pay-back scheme (see point 3.6), and the timing for implementation. Trainers and officials also answered farmers' questions. RDI Unit report No. 68 contains a complete summary of the training of extension personnel and farmers.

The Water Communication Unit and GreenCOM produced a video which explains the benefits of the improved irrigation system. The video includes a general introduction to gated pipe, including LASER leveling, installation of pipes and pumps, and operation of the system. Farmers who participated in earlier experiments describe their experiences with the system. The video will be used in the expansion of the program in Luxor and Qena as well as to other areas in Upper Egypt..

3.5. Training of District Engineers

The MPWWR Central Directorate for Distribution, the Under Secretary for the MPWWR in the Qena Governorate, and other staff participated in the training of the District Engineers with respect to water measurement using the totalizing meters and canal-level measurement and monitoring. After completion of the weirs and installation of the telemetry equipment, further on-the-job training of the District Engineers is anticipated.

3.6. Formulation of a budget and ministerial approval to obtain tranche funds for implementation

The SCWG developed a budget to request tranche funds for implementation of the pilot program in late 1998 and early 1999. The budget, built for 1000 feddans, was for purchase of pipes and pumps, construction and installation, and MALR management. The

budget, over LE 2.25 million, was presented to and approved by the Minister of Agriculture in early 1999, and the funds were disbursed in early June 1999. This is the first time tranche funds have been allocated explicitly to development projects under the APRP. The Sugar Council, the NGO which represents the interests of sugar cane producers and sugar processors, is also contributing over LE 1.05 million to the costs of the materials and installation. This constitutes the farmers contribution to this program.

The implementation program includes a mechanism to recover materials costs from farmers. Farmers who participate in the sugar cane program are obliged to pay 25 percent of the value of the increase in yield which they obtain after the installation of the system. This amount is to be deducted from the sugar factories' payments for purchase of sugar cane.

In addition, the MPWWR provided two types of water measurement devices: totaling meters to be installed on each pump and a system of weirs to measure flows in the canals. Telemetric equipment for the weirs and for other measurement points were obtained as well. Because the pilot areas are small relative to the size of the areas served by a single branch canal, the totaling meters will provide measures of on-farm application of water. As the program spreads, however, measurements at the canal level will be significant indicators of water savings.

3.7. Installation of the gated pipe systems

Prior to installation of the gated pipe systems, tender documents were developed and issued on February 28, 1999. The process of selecting firms for the installation of the systems followed standard bidding procedures of the GOE. The two firms selected at the beginning of April to install the systems were Green Valley Company and Bico for Engineering Works. On-farm construction began in April. The SCWG visited sites on April 14 and 15 to assess progress. All construction was completed by May 15. Planting and irrigation began as expected, although in some sites, the first irrigation in April was by flood.

3.8. Installation of the water measuring and monitoring devices

By the end of May, all totalizing meters had been installed at the improved sites to ensure that the necessary water measurement and monitoring can begin with the first irrigations of the new crop. Weirs had been completed on one canal and partially completed on the three other canals. All weir construction will be completed by the end of May. Telemetry equipment will be installed by no later than 15 August 1999. During the interim period, automatic level recorders can be used to measure canal flows.

3.9. Data collection and analysis

The MPWWR Central Directorate for Water Distribution is implementing a program for water data collection. District Engineers will report water measurements to the Central Directorate Office every two weeks, where the data will be entered into a database. Analysis will be completed after the first full ratoon.

Agricultural data, specifically yield data, will be collected by the Sugar Company at the time of harvest. These yields will be compared to past yields on the same farms and yields on similar farms in the same area. Yield increases will be calculated and the repayment (25% of increased yield) will be collected by the Sugar Company in payment for the investment costs. However, because of late planting in some areas the yield increases may not be realized in the first year, but it is assured for the ratoon crops.

4. SUMMARY AND RECOMMENDATIONS

The pilot program developed by the SCWG for the adoption of improved irrigation for sugarcane cultivation, in particular gated pipe systems, is in place. Programs for water measurement and monitoring have been established. Farmers have agreed to repay a portion of the investment costs through retention of a percentage of increases in production which result from the system. These increases will be monitored by the sugar companies. An information

dissemination and public awareness package has been developed. Programs for training local trainers and farmers have been prepared and tested, and are available for future use.

The remaining tasks for the pilot project are the ongoing water and productivity monitoring. At the end of the first year's planted crop (February and March, 2000), a review of the pilot projects should be completed, including an analysis of problems encountered, possible solutions, and overall evaluation of the success of the pilot. At that time, any changes in the program which will increase its efficiency and efficacy can be identified and implemented.

During the summer of 1999, the SCWG intends to hold several town meetings in Qena and Luxor to begin the process of disseminating the improved irrigation to other farmers in more villages. To facilitate this process, the SCWG hopes to establish a revolving fund with the Sugar Council to provide the necessary investment funds to farmers. The operational details of the revolving fund have yet to be worked out.

We propose cooperation between four ministries, MALR, MPWWR, Ministry of Health, and the Ministry of Environment, to extend the program to other crops. Some work has been done in the delta to use this system on orchards. It can be extended to other parts of the delta and Upper Egypt on crops such as banana, maize, cotton, and other row crops.