PD-ABL-853

SDSU

ANNUAL TECHNICAL REPORT

Integrated Agricultural Development Project MARYUT Agroindustrial Complex in the Western Desert of Egypt

September 30, 1990 - September 30, 1991

Submitted to the
Agency for International Development

Submitted by the
San Diego State University Foundation

In cooperation with the
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Please address all comments or inquires to

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This Annual Technical Report of the initial activities of the *Integrated Agricultural Development Project: Maryut Agroindustrial Complex in the Western Desert of Egypt* was prepared by the San Diego State University Foundation utilizing input from individuals from the Arab Republic of Egypt, the State of Israel and the United States of America.

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THE TECHNICAL PROGRAM

The Integrated Agricultural Development Project: Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut Project), supported by the Agency for International Development is made up of three areas of intensive agriculture: vegetables, fruit trees and ornamentals. Scientists from the Arab Republic of Egypt and the State of Israel are being assisted by their colleagues in the United States in this trilateral cooperative research project.

MARYUT SITES

Research sites for the Maryut Project are:

Arab Republic of Egypt

Maryut Research and Development Site. Plastic houses, open-field trials, production and demonstration of vegetables, fruit trees and ornamentals. Support buildings for administration, research, training and equipment storage.

State of Israel

a. Volcani Institute: ornamental research.

b. Hebrew University: ornamental research.

c. Institute for Applied Sciences, Ben Gurion University of the Negev: ornamental research; post-harvest research.

d. Ministry of Agriculture: marketing studies.

PROGRESS IN COMPARISON WITH GOALS AND OBJECTIVE

The initial work plan, as approved by the Agency for International Development, Bureau for Europe and Near East, was presented in our original proposal. Progress in comparison with this work plan and in comparison to the goals and objectives described in our original proposal, has been excellent for Year 2 of the Maryut Project.

TECHNICAL PROGRAM PROGRESS

The Maryut Project is designed to expand cooperative scientific and technical efforts among participants in Egypt, Israel and the United States. Through this Regional Cooperation Program, scientists from the three countries are addressing issues of the utmost priority in Egypt and Israel involving the agricultural development of newly-reclaimed lands in Egypt's Western Desert.

The work plan for Year 2 has been accomplished through the joint efforts of Maryut Project participants in Egypt and Israel, who have been assisted by their American team members.

MARYUT SITE PROGRESS IN COMPARISON WITH GOALS AND OBJECTIVES

The overall technical program for Maryut was presented in detail in the Maryut Program proposal (pages 4-1 through 4-24). Based on this general plan, the Trilateral Maryut Technical Committee met in Cairo in September 1990, and developed a detailed work plan for the 1990-91 season. Research activities carried out in both countries followed in detail the committee's plan. The goals and objectives of the plan are:

- to cooperatively test and develop technologies, species, cultivars and methodology for intensive agricultural production in Egypt's Western Desert that will meet the constraints and utilize the advantages of available soil, water and climate and human resources;

- to jointly formulate production techniques and post-harvest treatment of outputs aimed at high-quality products that will serve as a basis for future exportation of competitive quality products from Egypt and Israel to Middle East and European countries;

- to work in conjunction to produce high-quality nursery stock of fruit trees, vegetables, ornamentals and landscaping plants as a means for dissemination of the research results;

- to assist in the development of an agroindustry for the newly-reclaimed lands;

- to develop the Maryut site to serve as a center for training and extension for the new farming communities which will be established in the vicinity of the Maryut site.

The research and development unit at the Maryut site concentrates upon adaptive research, i.e., the adaptation of crops and technologies which have been developed elsewhere in Egypt and in other countries to meet and suit the conditions within the newly-reclaimed lands. When appropriate, the unit also works on adapting technologies which require relatively little investment in time and resources to develop.

WORK PLAN

Technical program activities in specific topics: Figure 1, gives the global layout of the Maryut site in relation to the technical activities which were carried during the 1991 season.

CROPS

Vegetables

1. Tomatoes

Varietal Tests Open Field: Three determinant cultivars were planted on two dates (November and December 1990). The cultivar Orit gave the highest yield (10 kg/m2) in comparison with the Ben Shefer and HA1. Two cultivars tolerant to the Tomato Yellow Leaf Curled Virus (TYLCV) were planted in October 1990. TY-20 yielded 7 kg/m2 and TY-15 yielded 5 kg/m2. Other cultivars planted in the region at this time of the year did not yield at all due to TYLCV injection. This finding was one of the highlights of this year's program. If these results will repeat during the 1991-92 season, then Maryut will be able to offer the region virus tolerant cultivars for out-of doors Summer and Fall months.

Seven indeterminate tomato cultivars were compared inside walk-through tunnels. The cultivar FA-144 gave highest yields with a good quality fruit. Cultivars BR-160 and FA-175 are also promising. Cherry tomato cultivars were also compared with cultivar FA-191 giving highest yields with good quality.

The above seven cultivars were planted in short (30 m long) and in long (80 m long) tunnels. In six out of seven cases the cultivars showed higher yields in the short tunnels.

2. Cucumbers

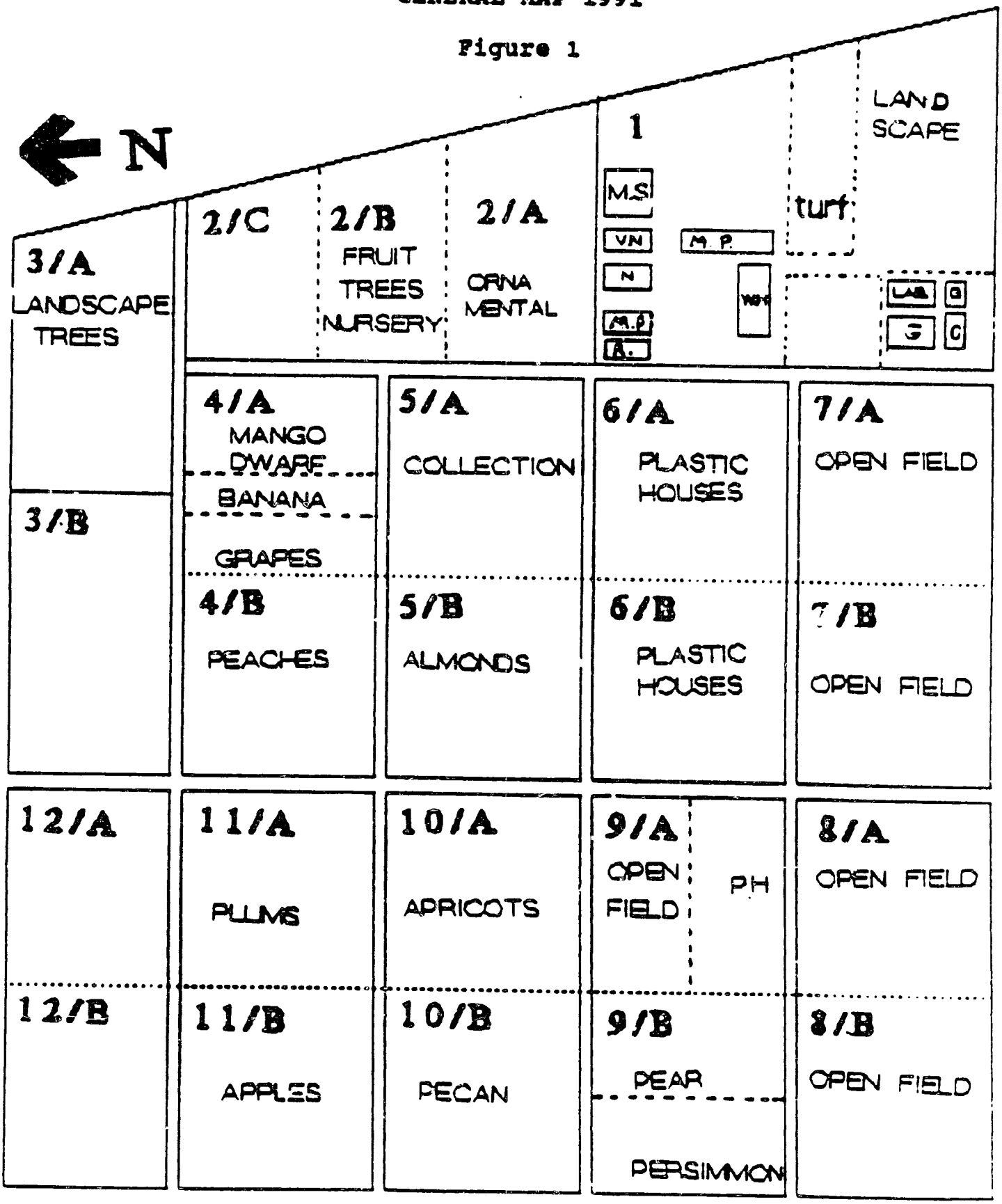
All trials with cucumbers were carried-out in greenhouses.

Varietal Trials: Eight varieties were compared for yield and quality. Cultivar No. 723 was best followed by No. 70 and No. 425A. Single row planted cucumbers (0.85 plants/m2); (1.1 plants/m2) were compared with double-rowed planted cucumbers. Single rows gave higher yields. The effect of irrigation by buried drop lines (at 15 cm and 25 cm depth) was compared with that of surface-laid drippers at two rates of discharge (2 and 4 liters/hr). Best results were obtained with drippers buried at a depth of 25 cm having a discharge rate of 4 liters/hr.

Effects of tunnel length on cucumber yield was tested in the Winter and in the Spring. In Winter, higher yields were obtained in the long greenhouses, and in the Spring, in the short greenhouses.

MARYUT PROJECT
GENERAL MAP 1991

Figure 1



3. **Melons**

Varietal Trial: Seven cultivars were compared. The cultivars Makdimon, Galia C-8 and Makdimom-1 C-8 gave highest results (about 6 kg/m2).

Effect of Manure: The effect of various types of manure and rates of application and spreading method on melon yield was studied. Highest yields were achieved with chicken manure at a rate of 6 liter/m2 buried immediately underneath the plant row.

4. **Eggplants**

Experiments with eggplants included a varietal trial in greenhouses and a comparison between short and long greenhouses. Eggplant yields were very low due to poor fruit set. Therefore, yield data have not been collected.

5. **Peppers**

Varietal Test: Nine pepper cultivars were compared. Highest yields were achieved with cultivar 9055, Gideon and 840. The cultivar Maor has fruit most suitable for local markets.

6. **Squash**

Squash was planted in open field trials on November 11. Highest yields were achieved with the Barequet cultivar. Squash was planted in March 1991. Highest yields were again achieved with the Barequet cultivar (ca 3 kg/m2).

Post Harvest Studies: Post harvest studies were conducted with tomato, cucumbers, melons and eggplants. In all cases, fruit size, fruit weight, firmness and post harvest weight loss were measured. In addition, the effect of wrapping eggplant fruit with polyethylene film was also studied. There were large variations between cultivars for each specific species. For example, weekly water loss varied in cucumbers between 14% and 38% of original weight, in melons between 7% and 14%, in tomatoes between 6% and 24%, and in eggplants between 12% and 50%. Wrapping eggplant fruit reduced weekly weight loss in all species to about 6% per week.

Fruit Trees

The following were carried out: The estimation of annual operational costs, pruning according to species and cultivars, planting of new species and cultivars and replacement of missing plants. The fruit tree trials are divided into two areas:

a. Relatively large plots were species mostly known to do well in the experimental area were planted. For each species a few cultivars were planted. These plots will be used in the future for varietal and agromanagement trials.

b. An introduction plot with new species and cultivars previously unknown to the area is being planted. This is the introduction plot.

Table 1 summarizes the tree species and number of cultivars per species planted in each of the two plots.

Table 1. Species and Number of Cultivars Planted at Maryut.

EXPERIMENTAL PLOT		INTRODUCTION PLOT	
Tree Species	Number of Cultivars	Tree Species	Number of Cultivars
Almonds	6	Charov	1
Pears	4	Anona	2
Persimmons	2	Loquat	2
Peaches	11	Figs	5
Plums	4	Opuntia	1
Apricots	4	Zyziphus (Ber)	2
Apple	6	Rambotan	1
Pecan	6	Lichi	1
Grapes	4	Longan	1
Dwarf Mango	4	Carambola	1
Bananas	1	Sapodilla	1
		Guava	1
		Apples	4
		Peaches	4
		Plums	4
		Apricots	3
		Grapes	1
		Almonds	1

21 species 9 cultivars

Ornamentals

The plan for planting a demonstration desert garden at the Maryut site is under way (see Table 2). Twenty selected species of desert landscaping plants were introduced to the nursery and will be planted in demonstration plots. A detailed plan for a desert garden was drawn by Dr. Warren Jones, a leading desert landscape architect from the University of Arizona.

Table 2

Landscape	Plot of landscape trees was planted in replication; in each replication, nine trees were planted. Varieties: Eucalyptus Torwood, Eucalyptus Torquata, Cercidium Floridium and Prosopis Juliflora)
Flowering and Decorative Branches	Plants were planted in rows.
Flowering Branches	Eucalyptus Torquata and Eucalyptus Torwood.
Decorative Branches	Melaleuca huegeli; M. eliptica; M. nesophila; M. coccinea; M. diosmifolia; M. lanceolata.
Floriculture Production	One small house produced 10,000 roses and flowers.
Annual Flowers	Small plot of three annuals were planted for observation. Anenome: Ranunculus and Achilea; grew good, looks promising. Ranunculus: The same as Anenome adopted very well. Achilea: Grew very slow and uniform.
Turf	Four varieties of turf here planted by sowing and seedlings. Planted Kikuyu: Very strong, stays green all year. 8/15/91 Paspalum Plitatulum: Recently planted. 6/25/91 Paspalum Plicatulum: Recently planted. 6/26/91 Mix Varieties: Looks good and promising. 4/14/91
Propagation	The mother plants houses were planted with Ficus Hawaii (100 plants), Ficus Benjamina (302 plants), Singonium (150 plants) and Photos (98 plants). Planting Date: 4/18/90. Crotons planted on 5/25/91. Four sand beds. Total Plants: 156.

NURSERY ACTIVITIES

Fruit Tree Nursery

apple

A fruit tree nursery has been established. Presently there are about 3,000 rootstocks of Nemared and Nemaguard peaches cultivars, 5,2000 rootstocks of Hashabi, 17m/106 and Mac 9 apple cultivars and 1,700 rootstocks of plums. All rootstocks are being grafted with selected cultivars or multiplied for future rootstock production.

Vegetables

A nursery was established for production of high quality vegetable cultivars needed for the trials at the site. Last year the nursery produced some 70,000 seedlings of vegetables and annual flowers.

Ornamentals

Equipment for the rooting of pot plants including hot-bed humidifier and irrigation control has been purchased. Following the multiplication of a "mother" plantation of selected pot and foliage plants, the nursery will start producing rooted cuttings for commercial producers of pot plants in the region.

Israel

- A survey of Australian native plants for ornamental and desert landscaping use has been in progress.

There is a great potential in Australia native flora for development as either the new ornamentals or landscaping plants. Most of the Australian continent is arid, thus the Australian flora is especially suitable for production under the desert conditions of the Middle East. A scientist from the Ben Gurion University has spent a year in various research institutes and Botanical gardens in Australia to evaluate the potential of a large range of the native flora. Propagation material from about 600 species was selected and sent to Israel. This material will be evaluated in parallel, both at the Maryut site in Egypt and in the Negev Desert of Israel to select a large range of new ornamentals for out-of-doors production (mostly as fillers, flowering branches and decorative branches), as well as for new desert landscaping plants.

- Native annual plants of Israel as a source for environmental landscaping.

This research is examining the botanical and horticultural characteristics of Israel's annual flora in order to develop them as a source of environmental study. The work in 1991 can be divided into two aspects: seed collection and evaluation of germination capacity of the collected species; and trials related to the mass production of flower seeds from selected species.

Seeds of 160 different annual species belonging to 32 different botanical families were collected during the Winter of 1990-91. The germination rate of 60 species was studied under uniform and controlled conditions.

The effect of fertilization rate, treatment with gibberellic acid, seeding density, and time of seed collection were all studies in relation to seed production in the field. Experiments were carried out to find methods for increasing germination rate of Lupinus species. Most studies were carried out with flowers from the following genii: Papaver, Maresia, Senecio, Anthemis, Silence and Lupinus.

- Development of Leucospermum rootstock tolerant to high pH.

The selected rootstock of "Ora" which tolerates high pH on the soil was planted in the field together with a number of commercial cultivars. These cultivars were planted either on their own roots or on Ora rootstock. All cultivars which were planted on their own roots have died, however, those planted on the pH tolerant "Ora" rootstock grow well in soil having a pH of 8.20. Various trials were conducted in order to come out with the true test method of grafting. Additional species of the Proteacae were planted in the experimental field for further selection of a new pH tolerant rootstocks.

- Development of new cut flowers for Winter harvesting in the Negev.

Present work is being conducted with two flower species which naturally bloom in the late Spring and Summer. These are: *Eryngium planum* and *Lobelia fulgens*. If their flowering period could be changed to the winter season then they could become important cut flowers for exportation to Europe.

For *Eryngium planum*, the following treatments were tried: cooling of the seedlings, varying growing temperature regimes, varying planting dates, planting under plastic tunnels and chemical treatments.

The only treatment that induced early flowering was GA_3. Apparently *Eryngium planum* required low temperatures throughout the growing period. With plants developed from roots, long cooling periods and planting in late fall enhanced early flowering.

With *Lobelia fulgens*, short Winter days delayed flowering but doubled with the number of flowering nodes. In the Summer, experiments with short days had an opposite effect, that of enhancement of flowering with a reduction of the number of flower buds.

- Development of simple and reliable techniques to estimate the taste quality of table tomatoes.

The in vitro estimation of taste quality of vegetables and fruit is an important aspect in quality control. Various chemical components of the tomato cultivar Fa 121 were determined simultaneously with organoleptic tests of the fruits. Best correlation was found between the concentration of glucose and the taste of fruit from the cultivar Fa 121 (which is the main export cultivar in Israel). These results were repeated during two years of experimentation. In 1991 trials have commenced with melons. To date it appears that sweetness is hopefully

correlated with an overall taste and trials are being carried out to identify sweetness determinations in the melon fruit.

- Marketing and economic feasibility studies for agricultural production.

In 1991 a study was conducted on marketing and economic potential of tomatoes growing under cover. The production is mainly oriented for export.

A summary of the research activities undertaken during the second year of the project includes a study of marketing and economic potential of tomatoes growing under protected environment (various types of greenhouses). The production is mainly oriented for export.

The principal target of the study consists of net profit evaluation based on an optimization model. This model integrates tomatoes varieties, growth regions (represented by soil quality) and energy components (heating).

The model was applied to a farm sample selected from various ecological regions. A comparison of economic performance was accomplished between the results obtained on a regional basis and those based on a national average costs and benefits calculations.

A special emphasis was given to a sensitivity analysis which was related to the most important variables, such as prices, fuel costs, yields and export volume.

At the present stage the data compiled from the farm sample are computed and the results will be evaluated during the next study phase.

<u>Training</u>

About 30 engineers at the site -- most are graduates of various universities -- are being trained according to plan on various aspects such as fertilization, spraying, etc. These "students" are then put in charge of specific experiments to monitor and record all aspects. Some have undergone an intensive course at Dokki (Winter 1990-91). These engineers will become a core for the Maryut region extension service.

PROCUREMENT

Procurement for the period September 30, 1990 - September 30, 1991, is included in Appendix 2.

PERSONNEL CHANGES

No personnel changes are reported during this period.

COOPERATION

The Integrated Agricultural Development Project (Maryut) has two equally important goals: 1) to promote intensive agricultural production in the arid lands of Egypt and Israel through the introduction of the most up-to-date technologies and cultivars; 2) to strengthen and expand cooperative scientific exchange among Egyptian, Israeli and United States participants. The San Diego State University Foundation, contract administrator for the Maryut Project, has initiated a number of mechanisms to foster cooperative efforts. These mechanisms are an integral part of the management practices of the project and are a key to its technical success.

TRAVEL

Regional and international travel is detailed in Appendix 1. Highlights of cooperative activities are outlined below.

TECHNICAL PANEL

The major mechanism for cooperation among Maryut participants are the meetings of the Technical Panel, a 22-member group of scientists from Egypt, Israel and the United States (see page 19). ? = list of commodities procured

pg 13

The initial meeting was held in May 1989, when members of this group outlined the parameters for the establishment of the Maryut site and reviewed initial plans for the first phases of the project. The fourth Technical Panel meeting was held in Alexandria, Egypt, July 12-14, 1991.

The Technical Panel meetings not only serve as a mechanism for cooperative efforts between Egyptian and Israeli scientist, but also are a major tool for the participation of scientists from the United States who provide experience and expertise to the formulation of research plans, while offering state-of-the-art knowledge in their specific area of expertise.

The meetings of the Technical Panel have been held in Egypt and have included a site visit to Maryut as a principal part of the meeting.

VISITATION: MANAGEMENT AND SCIENTISTS

In addition to the Technical Panel meetings, another important avenue for fostering cooperation are the on-site visitations between Egyptian and Israeli scientists. These visitations provide for the exchange of research ideas and results and are important platforms for both formal and informal discussions regarding problems and progress in specific research topics. An integral part of this segment are the regular visits to Egypt and Maryut site by Israeli Coordinator, Dr. Dov Pasternak.

Another critical segment that exemplifies cooperation is the on-site participation of Mr. Itzhak Ayalon, the Israeli Technical Advisor who resides in Egypt in order to fulfill his daily assignment at the project site.

TECHNICAL EXCHANGE

The Maryut Project has been designed to adapt and develop new technologies and varieties that are tested at research sites in Egypt and in Israel. Successful varieties and technologies are being exchanged on a regular and ongoing basis. In addition, plants, as well as equipment and supplies, are being procured from Israel as a planned part of the program.

ON-SITE TRAINING AND DEMONSTRATION

Because of its strategic location in Egypt's "New Lands" -- a 400,000 feddan area under reclamation and being populated by numerous farmers, including new university graduates -- the Maryut site has become a natural center for on-site training and demonstration. To date, three "field days," or open-house activities for area farmers have been held. These activities allow for on-site demonstration of Maryut research and development products, as well as informal discussions between project staff and area farmers. Maryut staff have also prepared and distributed instructional leaflets to inform local farmers about new crops and techniques.

Local farmers are aware that the activities at the Maryut site are a result of cooperative research among Egyptian, Israeli and United States staff and it is intended that the application of the results from this project will underscore the value of such peaceful, scientific cooperation to a large segment of the population.

STEERING COMMITTEE MEETINGS

Steering Committee meetings provide the mechanism for crucial scientific and technical planning and direction for the project, as well as foster and expand important personal interchange among those individuals who are responsible for the success and achievement of the project.

The Steering Committee held its fourth meeting in Valencia, Spain, May 1, 1991. The committee reviewed and approved research programs in both Egypt and Israel, reviewed budget allocations for specific technical programs, and discussed cooperative activities. Because Spain is the largest producer and exporter of out-of-season crops for the European Market, an important part of the Steering Committee meeting was a tour of production houses. This field trip took place on May 2 and 3, 1991. The group was hosted by the Pascual Hermanos Company of Valencia, which is the largest private producer and exporter of out-of-season vegetables in Spain, the Ministry of Agriculture of Spain, and the Almeria Horticultural Research Station. This exposure was instrumental in planning future directions for research in the Maryut program.

NEWSLETTER AND OTHER PUBLICATIONS

Regular publications provide the means for the dissemination of project research, results and cooperative activities. Such publication also serve as an informal record of the project for its participants and as an information tool for those interested in Regional Cooperation Programs. The Spring 1991 Newsletter is included as Appendix 3 to this report and services as an example of the project's informal publications.

what language besides English? How many to date?

TRAVEL: INTERNATIONAL

Steering Committee

The Steering Committee meetings provide the mechanism for scientific and technical planning and overall direction for the Maryut Projects. One meeting was held in this report period.

Steering Committee Meeting: Valencia, Spain (May 1, 1991)

Members in Attendance: Dr. Adel El-Beltagy, Dr. Mahmoud Mahfouz, and Mr. Mohamed Dessouki (Arab Republic of Egypt); Dr. Samuel Pohoryles, Dr. Yitzhak Abt, Dr. Irit Rylski (State of Israel); Mr. Harry Albers, Dr. Albert Johnson, and Mr. Bertram Wolf (United States of America).

Others Attending: Dr. Dov Pasternak (State of Israel); Dr. Awad Hussein and Ms. Itiat El-Menshawy (Arab Republic of Egypt); Dr. Mohamed El-Assal, Ms. Frea Sladek, Ms. Davene Gibson, and Mr. Tim Hushen (United States of America).

Technical Panel

The meetings of the Technical Panel provide the major mechanism for cooperation among Egyptian, Israeli and United States scientists involved in the Maryut Projects.

Meeting: Alexandria, Egypt/Maryut Site (July 12-14, 1991)

Members in Attendance: Dr. Adel El-Beltagy, Dr. Awad Hussein, Dr. Abdel Ghany El-Gindy, Dr. Zaki El-Sawi, Dr. Assem Shaltout, Dr. Dia Hassanein, Dr. Essam Shehata, Dr. Abd El Aziz Sheta, Dr. Mahmoud Hafez, Dr. Mohamed Hashim, Ms. Atiat El-Menshawy, Mr. Hisham El-Said (Arab Republic of Egypt); Dr. Dov Pasternak, Dr. Dov Sitton, Dr. Benjamin Gamliel, Dr. Yaacov Ben Yaacov, Dr. Ben Ami Bravdo and Mr. Itzhak Ayalon (State of Israel); and Dr. Adel Kader, Dr. Michael Reid, Dr. Richard Jones and Dr. Merle Jensen (United States of America).

Others Attending: Mr. Lee Voth, Mr. Roger Sherman, Dr. Mohamed El-Assal and Mr. David Moore (United States of America).

TRAVEL: REGIONAL

In addition to Steering Committee and Technical Panel Meetings, scientific exchanges, or visitations between Maryut participants have occurred during the report period. These are:

Israeli to Egypt (December 9-11, 1990)

Dr. Dov Pasternak, Dr. Irit Rylski, and Mr. Yoel DeMalach.

Israeli to Egypt (August 20-23, 1991)

Dr. Dov Pasternak

Israeli to Egypt (September 25-27, 1991)

Dr. Arieh Szeskin

Egyptians to Israel (October 2-9, 1991) -Next FY

Dr. Mohamed Hashim, Dr. Dia Hassanein, Dr. Abdel Ghany El-Gindy and Dr. Abd El Aziz Sheta; Messrs. Mohamed Moustafa and Esam Abdallah.

INTERFACE WITH OTHER PROJECTS

Maryut Project management recognizes the need and USAID's request for interface with other regional and bilateral activities and will strive for an effective interface when it is applicable and practical, and serves the needs of the Maryut Project.

Other interface -- the application of cooperative research results by area farmers -- remains as a major objective for the Maryut Project.

TRUE COLLABORATION AMONG PARTICIPANTS

The Maryut Project enjoys the strong support of the Governments of Egypt and Israel and its research goals are in direct concert with the developmental goals of these two countries. This support assists in a high level of cooperation among participants.

Maryut participants from Egypt, Israel and the United States work together as a team in two of the major organizational structures that are primarily responsible for the project's success. These organizational structures are the Steering Committee and the Technical Panel. Another example of the levels of collaboration in the Maryut Project is Messier. Itzak Ayalon, an Israeli who resides in Alexandria (Egypt), in order to fulfill his day-to-day responsibilities as Technical Advisor at the Maryut sits. Other examples of collaboration are highlighted in this section as well as in the section entitled, "Work Plan". (See also the heading in this section entitled "Travel: Regional"). The San Diego State University Foundation, as contract administrator, will strive to assure that this high level of collaboration and cooperation continues among Egyptian, Israeli and United States Maryut Project participants.

Technology Exchange Participating Between Countries

The Maryut Project is designed to develop and adapt new technologies and varieties through research and development activities at the Maryut site in Egypt and research sites in Israel. Successful techniques and varieties are being exchanged on a regular basis among participants in the three program countries.

PROBLEMS AND ACTIONS BEING TAKEN TO ADDRESS THEM

The Regional Cooperation Programs involve individuals from three distinct cultures whose sensitivities, social organizations, and even national priorities may differ. Within this setting, coordination, management and even cooperation may often require finesse and imagination to attain program goals.

Maintaining and building viable, authentic and lasting professional and personal relationships between and among the program participants is a related issue. To build and maintain this viability -- a key in the Regional Cooperation Programs -- emphasis has been placed by Maryut Program management upon the quality of these contacts among scientists and administrators from the three countries. The mechanisms of cooperation include scientist-to-scientist visitations, the meetings of the Technical Panel and the Steering Committee meetings, which are structured to provide both formal and informal interaction among program participants. In this manner, project scientists and administrators have grown to know one another professionally and personally building the trust necessary for a true cooperative "team" effort.

APPENDICES

Appendix 1. Regional and International Travel Details.

Appendix 2. Procurement for the Period
September 30, 1990 - September 30, 1991.

Appendix 3. Spring 1991 Newsletter.

APPENDIX 1

Regional and International Travel Details

EL-MENSHAWY, A.	5/1/91
GO TRAVEL	3/30/91
GO TRAVEL	4/15/91
HUSSEIN, A.	5/1/91
GO TRAVEL	4/12/91
MANFOUZ, M.	4/30/91
EL-BELTAGY, A.	4/30/91
GO TRAVEL	4/12/91
DESSOUKI, M.	4/30/91
GO TRAVEL	4/16/91
HALLACH & CO. INC.	5/7/91
ARIZONA MOTEL	5/14/91
ARIZONA MOTEL	8/9/91
MOUSTAFA, M.	6/16/91
MOUSTAFA, M.	7/8/91
MOUSTAFA, M.	7/8/91

EL-MENSHAWY, A.	$718.00	VALENCIA, SPAIN	5/1/91	PER DIEM / CALAR II-MARYUT STEERING COMMITTE MTGS.
EL-MENSHAWY, A.	$540.00	VALENCIA/ALMERIA	4/30/91	LODGING (PAID BY PROJECT)
EL-MENSHAWY, A.	$618.00	CAIRO/VALENCIA	5/1/91	HALF AIRFARE/CALAR II-MARYUT STEERING COMMITTEE MTGS
HUSSEIN, A.	$1,234.00	CAIRO/VALENCIA	5/1/91	AIR TICKET / MARYUT STEERING COMMITTEE MEETING
HUSSEIN, A.	$245.00	VALENCIA, SPAIN	4/30/91	PER DIEM / MARYUT STEERING COMMITTEE MEETING
HUSSEIN, A.	$422.00	VALENCIA/ALMERIA	4/30/91	LODGING (PAID BY PROJECT)
MANFOUZ, M.	$1,777.00	CAIRO/VALENCIA	4/12/91	AIR TICKET / MARYUT STEERING COMMITTEE MEETING
MANFOUZ, M.	$454.00	VALENCIA, SPAIN	4/30/91	PER DIEM / MARYUT STEERING COMMITTEE MEETING
MANFOUZ, M.	$540.00	VALENCIA/ALMERIA	4/30/91	LODGING (PAID BY PROJECT)
MANFOUZ, M.	$600.00	VALENCIA, SPAIN	4/30/91	*
EL-BELTAGY, A.	$450.00	VALENCIA/ALMERIA	4/30/91	PER DIEM / CALAR II-MARYUT STEERING COMMITTEE MTGS.
EL-BELTAGY, A.	$540.00	VALENCIA/ALMERIA	4/30/91	LODGING (PAID BY PROJECT)
EL-BELTAGY, A.	$889.00	CAIRO/VALENCIA	4/30/91	HALF AIRFARE/CALAR II-MARYUT STEERING COMMITTEE MTGS
DESSOUKI, M.	$450.00	VALENCIA, SPAIN	4/30/91	PER DIEM / CALAR II-MARYUT STEERING COMMITTEE MTGS.
DESSOUKI, M.	$540.00	VALENCIA/ALMERIA	4/30/91	LODGING (PAID BY PROJECT)
DESSOUKI, M.	$889.00	CAIRO/VALENCIA	4/30/91	HALF AIRFARE/CALAR II-MARYUT STEERING COMMITTEE MTGS
DESSOUKI, M.	$600.00	VALENCIA, SPAIN	4/30/91	*
MOUSTAFA, M.	$1,432.00	CAIRO/PHOENIX	6/15/91	AIR TICKET / SCIENTIFIC VISITATION, CASA GRANDE, AZ
MOUSTAFA, M.	$201.00	CASA GRANDE, AZ	6/15/91	HEALTH INSURANCE
MOUSTAFA, M.	$538.00	CASA GRANDE, AZ	6/15/91	ONE MONTH LODGING
MOUSTAFA, M.	$538.00	CASA GRANDE	7/16/91	ONE MONTH LODGING
MOUSTAFA, M.	$837.00	CASA GRANDE	6/15/91	PER DIEM FOR ONE MONTH
MOUSTAFA, M.	$612.00	ALBUQUERQUE, NM	6/23/91	REGISTRATION FEE, LODGING, ETC./INTERNATIONAL CONFER OF AGRICULTURAL ENGINEERS
MOUSTAFA, M.	$843.00	CASA GRANDE, AZ	7/16/91	PER DIEM FOR ONE MONTH (TO AUG. 16TH)

* Consulting Fees

STEERING COMMITTEE MTG.	9/24/90	$886.00	EL-MENSHAWY, A.	$64.00	CAIRO	9/24/90	PER DIEM / STEERING COMMITTEE MEETING
			EL-BELTAGY, A.	$74.00	CAIRO	9/24/90	PER DIEM / STEERING COMMITTEE MEETING
			DESSOUKI, M.	$74.00	CAIRO	9/24/90	PER DIEM / STEERING COMMITTEE MEETING
			MAHFOUZ, M.	$74.00	CAIRO	9/24/90	PER DIEM / STEERING COMMITTEE MEETING
				$600.00			*
GO TRAVEL	11/30/90	$425.00	ALY, MORDI ATTA	$425.00	CAIRO/ABU DHABI	7/90	AIR TICKET/CONF.ON HIGH SALINITY-TOLERANT PLANTS,
ALY, MORDI ATTA	12/7/90	$1,405.00	ALY, MORDI ATTA	$1,405.00	ABU DHABI, MERERITES		PER DIEM/CONF.ON HIGH SALINITY-TOLERANT PLANTS
GO TRAVEL	2/28/91	$6,760.00	HASHIM, M.	$1,690.00	CAIRO/USA	3/10/91	HALF OF AIR TICKET / OTHER HALF CALAR II
			EL-DOWENY, H.	$1,690.00			ATTENDING MEETING IN RALEIGH, NC AND
			HASSANEIN, D.	$1,690.00			VISITING THE UNIVERSITIES OF CORNELL, ARIZONA,
			MAZIED, H.	$1,690.00			CALIF./DAVIS AND VISITING WITH FARM ADVISORS
HERTZ CAR RENTAL	2/28/91	$117.00	HASHIM, M.	$117.00	ARIZONA	3/20/91	CAR RENTAL/VISITING MARACOBA RANCH
HERTZ CAR RENTAL	2/28/91	$299.00	HASHIM, M.	$299.00	SAN DIEGO/DAVIS	3/22/91	CAR RENTAL/VISITING FARM ADVISORS AND NURSERIES

* Consulting Fees

			EL-DOWENY, H.	$496.00	USA	3/10/91	PER DIEM / US VISITATION
			HASSANEIN, D.	$496.00	USA	3/10/91	PER DIEM / US VISITATION
			MAZIED, H.	$496.00	USA	3/10/91	PER DIEM / US VISITATION
HASHIM, M.	3/91	$2,804.00	HASHIM, M.	$370.00	USA	3/91	MISCELLANEOUS EXPENSES I.E.GASOLINE, PHONE, ETC.
			HASHIM, M.	$2,434.00	USA	3/91	PER DIEM / SCIENTIFIC VISITATIONS
EL-DOWENY, H.	3/91	$2,064.00	EL-DOWENY, H.	$2,064.00	USA	3/91	PER DIEM / SCIENTIFIC VISITATIONS
HASSANEIN, D.	3/91	$2,064.00	HASSANEIN, D.	$2,064.00	USA	3/91	PER DIEM / SCIENTIFIC VISITATIONS
MAZIED, H.	3/91	$2,064.00	MAZIED, H.	$2,064.00	USA	3/91	PER DIEM / SCIENTIFIC VISITATIONS

APPENDIX 2

Procurement for the period
September 30, 1990 - September 30, 1991

	1/91	Wescor Scientific Products	1-Chlorophyll Meter SPAD-502	$1,200.00
136312			Shipping charge	$4.00
			Sales Tax	$84.00
	1/91	Minolta	1-Chroma Meter CR-200	$4,850.00
			3 ea. 4 Zone jumper cables	$6.00
			20 ea. RA Irrometer 12"	$1,100.00
			10 ea. RA Irrometer 24"	$575.00
			5 ea. RA Irrometer 48"	$314.00
			10 ea. Watermark Sensor 5'	$120.00
			Shipping Charge	$17.00
	1/91	CID, Inc.	CI-350 Lab Gas Analyzer	$4,920.00
136904			Shipping Charge	$30.00
			CI-301 Gas Analyzer	$5,880.00
			Shipping Charge	$30.00
	1/91	EG & G Chandler Engineering	1-Gas Chromatograph/Series 400	$14,500.00
136905			Transformer Installation	$300.00
			Shipping Charge	$500.00
	1/91	Turfco Manufacturing, Inc.	Pipe Piper 230A 12" depth	$11,650.00
136908			Lost Motion device	$24.00
			3/4"-1 1/2" Poly Grip	$56.00
			Expanding collet grip for 1" PVC	$102.00
			Expanding collet grip for 1 1/4"PVC	$102.00
			Set wrench for collet grips	$16.00
			Point for blade 2-1/4" diameter	$43.00
			Blade - 12" depth	$78.00
			Shipping Charge	$387.00
	1/91	P.K. Morgan Instruments, Inc.	P-100 Temperature Logger	$1,950.00
136910			P-102 Temperature Probe Sensor	$495.00
			C-100 Leaf Area Meter	$3,950.00
	2/91	Agricultural Supply, Inc.	3 ea. Lakos 30 mesh screen	$4,065.00
137036			3 ea. Flange Adapter 4-10"	$468.00
			1 ea. PC242SS 18 Mesh/Lakos	$1,725.00
			1 ea. Flange Adapter 10-12"	$305.00
			Shipping Charge	$40.00
	3/91	Inter. Fruit World, Agropress Ltd.	2 ea. Fruit World Maps	$100.00

			1 ea. Hanna Digital Therm.#EITH	$30.00
			1 ea. Hanna Digital Therm.#ERCOLE	$34.00
			Shipping Charge	$4.00
	2/91	Linde Gases of Southern Calif.	1-Gas Detector	$340.00
136729			1-Spare Parts Kit	$25.00
			1-Ozone .025-3 tube	$49.00
			1-Ammona low range tube	$40.00
			1-Carbon Monox Low Range tube	$40.00
			1-Ethylene tube (50-800 ppm)	$46.00
			1-Sulfur Dioxide High Range tube	$46.00
			1-Sulfur Dioxide Med. Range tube	$46.00
			1-Sulfur Dioxide Low Range tube	$43.00
			1-Sulfur Dioxide SG4 5La	$40.00
			1-Ethylene Low Range tube	$46.00
			Shipping Charge	$7.00
	2/91	Cole-Parmer Instrument Company	1 ea. LCD Hugrometer	$290.00
136730			1 ea. 9V Battery 4/pack	$9.00
			2 ea. Thermohygrographs	$1,060.00
			5 ea. Chart Paper #CN-8368-10	$62.00
			5 ea. Chart Paper #CN-8368-20	$62.00
			5 ea. Blue Pens #CN-8368-75	$70.00
			5 ea. Red Pens #CN-8368-80	$70.00
			Shipping Cost	$21.00
	2/91	Wescor Scientific Products	1-Th-65 Thermocouple Thermometer	$695.00
136737			Shipping Charge	$3.00
	2/91	Superior Controls Co., Inc.	2 ea. Sterling 18/Stat Controller	$734.00
136742			2 ea. Sterling Pedestal	$204.00
			Shipping Charge	$14.00
	2/91	Hydro Scape Products	2 ea. Nelson 8425 Controllers	$130.00
136768			60 ea. 1" Globe Valve #7911	$988.00
			18 ea. 1 1/2" Globe Valve #7937	$693.00
			18 ea. 1 1/2" Globe Valve #7938	$941.00
	2/91	Soil Measurement Systems	1 ea. Tensicorder	$3,725.00
136825			Shipping Charge	$22.00
	1/91	Tew Manufacturing Corp.	Tomato Packing Line	$13,255.00
136902			2 ea. Pails of wax	$140.00
			Boxing & Crate Charge	$510.00
			Shipping Charge	$2,040.00
	1/91	Irrometer Company Inc.	10 ea. RA Irrometer 12"	$550.00
136903			10 ea. RA Irrometer 18"	$563.00
			5 ea. RA Irrometer 36"	$300.00
			10 ea. Watermark Sensor 10'	$140.00

138888

EQUIPMENT	1/91	ECHO (Video series)	1-Intro. to Tropical Fruit	$50.00
136671			1-I-Mangos/ II-Papaya, Coconut	$50.00
			1-I-Banana, Jackfruit/II-C.Campbell	$50.00
			Shipping Charge	$2.00
	1/91	United Fresh Fruit/Veg. Assoc.	1-A Fresh Look at Fruits	$40.00
136672			1-A Fresh Look at Vegetables	$40.00
			Shipping Charge	$8.00
	1/91	Visual Media	1-Postharvest Cooling of Hort Crops	$52.00
136673			1-Posthar Care & Handling-Flowers	$51.00
			1-Main Trans Temp. in Trucks/perish	$45.00
			1-Packaging Horticultural Crops	$52.00
			State Tax	$14.00
	2/91	McCormick's Fruit Tech. Co.	1-ATC1 Refractor	$210.00
136727			1-FT-0-500 Tester	$155.00
			1-FT-0211 Fruit Tester	$135.00
			1-FT-3-27 Fruit Tester	$135.00
132638	11/90	Aztec Book Store	1-Crop Loss Assessment & Pest Mgmt.	$28.00
135613			1-Apple and Pear Diseases	$20.00
			1-Citrus Diseases, 1988 Edit.	$20.00
			1-Grape Diseases, 1988 Edit.	$20.00
			1-Rose Diseases, 1983 Edit.	$20.00
			1-Genetic Basis/Bio.Mech./Plant Dis	$24.00
			State Tax	$9.00
01-177287			Reference P.O.# 127280	
	11/90	Dr. Awad Hussein	Reimb for purchase of seedlings	$972.00
	12/90	AGRI SUN NURSERY	1,000 Red Globe Grapes	$1,446.00
136126			Inc.Export Doc, Air freight	

139086	6/91	International Moving Service	Shipping/Equip & Supplies to Maryut	$10,114.00
140978	7/91	International Moving Service	Air Freight-Equip & Supplies	$725.00
136311	5/91	May 23, 1991 Shipment/Egypt/Maryut	Shipping/Handling/Insurance	$10,114.00
137928	4/91	Idea Man	100 Baseball Caps	$268.00
138500	4/91	National Academy Press	Alternative Agricluture/paperbound	$40.00
			Understanding Agriculture	$26.00
			State Tax	$5.00
			Shipping Charge	$3.00
	4/91	Unipub - For El-Beltagy	S/North Partnership/Higher Ed in Ag	$56.00

APPENDIX 3

Spring 1991 Newsletter

MARYUT: An Integrated Agroindustrial Complex in Egypt's Western Desert

A Program Funded by the Agency for International Development/Bureau for Europe and Near East
Administered by San Diego State University Foundation, San Diego, California 92182
In Cooperation with the Albert Einstein Peace Prize Foundation, Chicago, Illinois 60044

NEWSLETTER Spring 1991

Technical Panel Meets to Review Progress and Plan for Year Two

The Maryut Project Technical Panel met September 2-6, 1990 to review progress at the site and to discuss and develop plans for the 1990-1991 season. Meetings occurred in Cairo, Alexandria and at the Maryut site.

Research in Progress

Project Director Dr. Awad Hussein presented an outline of progress at the Maryut site. This has included the construction of plastic houses, as well as the provision for running water from a temporary reservoir to serve the residency/laboratory. Scientific progress was as follows:

Fruit Trees

Soil preparation and the irrigation and drainage network were completed in the fruit tree section. Planting was accomplished to assure a water depth of not less than two meters. The main fruit trees are: grapes, peaches, plums, apricot, olives, apple, pears, persimmons and others which include loquat, papaya, annona, dwarf mango, sapota, opuntia, and carob. Each of the major fruit tree crops was planted on approximately two feddan.

The fruit tree nursery activities began with two main rootstocks of apple seedlings, Mac9 and MM106. Some 1,000 seedlings of Mac9 and 5,000 seedlings of MM106 were planted. Half of each number were used for stool layering to establish a "bank" for future plantings. The remaining half was used as rootstock for budding. Cultivars included: Jonathan, Orleans, Anna, Granny Smith, Dorset Golden, and Stark Addina. The selection of cultivars for budding was based on both the relative economical value and the expected successful performance.

Worker in plastic tunnel inspects crops.

Other crops planted, along with their rootstocks, were: pear: Betulaflaefolia (four varieties); almond: Nemagurd, Lovel (six varieties); nectarin: Nemagurd (five varieties), pecan: Pecan (six varieties), persimmon: lotus (two varieties), peach: Nemagurd (three varieties), plum: Almond (seven varieties), and apricot: Apricot (three varieties).

Planting dates for all fruit tree crops ranged from March 16 to May 17, 1990.

Dr. Awad Hussein stressed that careful agromanagement techniques were being implemented in the fruit tree section, especially in the irrigation and fertilization regimes, drainage and water table, as well as tree training. He added that the collection of data and the careful observation of growing seedlings are essential for the agromanagement practices being applied at the Maryut site.

Vegetable Crops

Two separate areas of activity were reported in the Vegetable Crop section. These were: protected agriculture which includes both long (9x59m) and short (9x29m) tunnels, and open field production, with the use of low tunnels during the cold season. Comparisons of different technologies were carried out to provide studies of the technical and economical feasibility of production in the Western Desert.

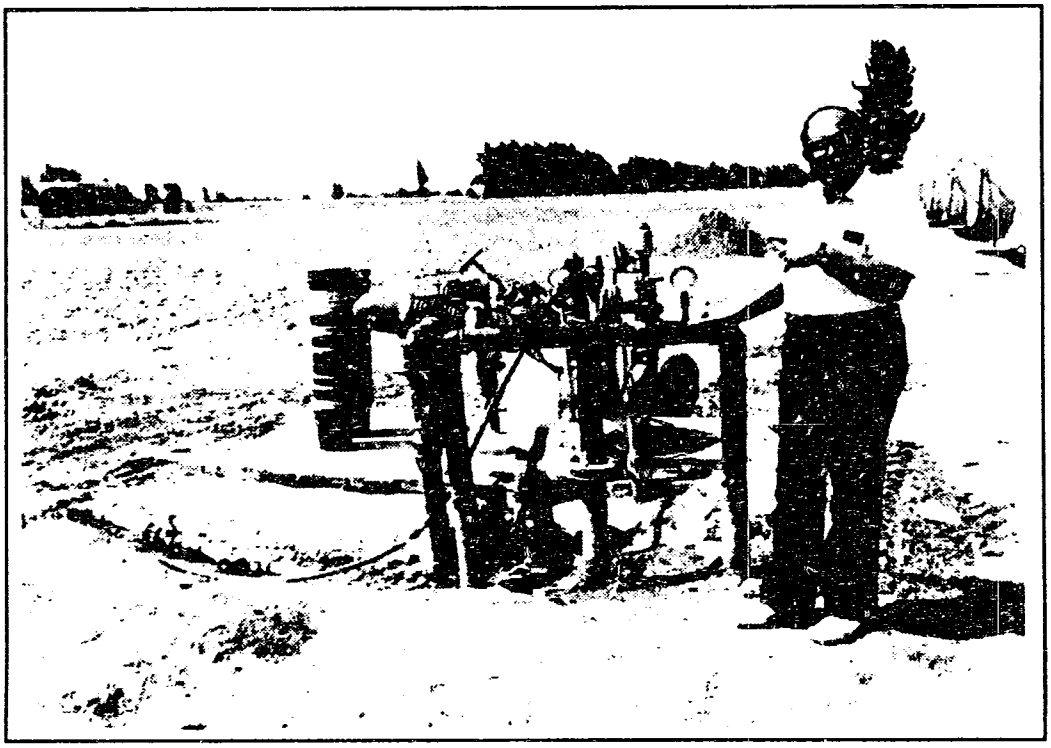
Maryut scientists concentrated upon the use of different varieties to compare performance, adaptability, productivity and marketability; evaluation of the long and short houses; comparisons of mulch versus no mulch with respect to weed control and water conservation; type and colors of plastic coverings used; effect of planting dates on the productivity and performance of different cultivars; planting density and plant training; irrigation and fertilization regimes; pest management; and varietal tests that ranged from flowering dates through storage under unrefrigerated conditions.

The main vegetable crops planted were: cantaloupe, squash, eggplants, tomato, cucumber, pepper, sweet corn and watermelon. Indoor and open field trials were conducted in addition to commercial production tests.

Ornamental Plants and Landscaping

An important part of the ornamental activities during the first season at Maryut has been the production in Israel of materials for ornamental plantings and low-maintenance cut flowers for foliage. These plants are being utilized in the landscaping area at Maryut and in a specialized planting to determine their utility for cut flower and foliage production.

About 500 different rose varieties were received and were planted in two plastic houses prepared as sand culture sites. Previously-grown plants such as Bird of Paradise were transplanted into pots with a medium of a mixture of peatmoss and soil. All ornamental planting sites were prepared for disease and weed control.



MARYUT Project Director, Dr. Awad Hussein, demonstrates open field irrigation system.

Facilities Preparation

Through the Maryut Project, the existing Laboratory building is equipped to provide proper facilities for plant, soil and water analysis. Plant analysis included study of the nutritional status as well as the evaluation of the physical and chemical properties of the fruit. Soil and water analysis is used to monitor physical and chemical properties to help develop optimum soil and irrigation management. The laboratory also provides facilities to analyze and evaluate the organic materia utilized and in the future may also provide such services to farmers in the new lands

Working facilities—offices and meeting rooms—as well as quarters for on-site personnel have also been prepared. The library has been stocked with written and visual reference materials and furnishings

In general, activities at the Maryut site have progressed according to the over-all plan set forth in the original proposal and in the detailed activities plans as agreed upon by the Steering Committee and the Technical Consultant Panel at the beginning of the project.

Technical Panel Co-Chairman, Dr. Dov Pasternak, presented an overview of Maryut Project research in Israel, which involves studies of ornamental crops, fruit and vegetables, and market research for Maryut products.

Technical Consultant Panel Makes Recommendations for Year Two at Maryut

Following its review of progress at the Maryut site, the trilateral Technical Consultant Panel met to outline and defin the work plan for the Maryut Project for its second year. The Panel organized into small specialized groups to address specific planning topics. The results were presented to the entire group for consensus.

The discussions addressed the following topics:

Research Plan

Soil

Based upon the experience of the first season and the recommendations of the initial soil survey report, organic manure application is considered to be one of the most important practises in improving the physical and chemical properties of the Maryut soils.

The work plan for the second season includes a detailed quantitative evaluation of the effects of different manure applications. Measurements were accomplished on: Bulk density in subsequent layers of the profile; penetrometer resistance relating to soil strength; root distribution and system performance; infiltration rate and aggregate stability; and the availability of nutrients.

The Panel agreed that measurements will be done in two greenhouses using two different types of manures, three application rates and two methods of application. The studies will include the comparisons of using chicken manure in the sand culture greenhouse against untreated greenhouse soils; and close interaction with the salinity management team with respect to soil salinity and its effects on plant growth. Irrigation levels and leaching are among the soil management practices studied.

Irrigation Management

Concentration will be upon studies of suitable irrigation methods and technologies which not only save water but which also reduce costs. Two irrigation methods will be studied: sprinkler irrigation—a portable hand system—and micro-irrigation using drip and microspray.

Technical and economical evaluation of each of the two methods will take into consideration the prevalent conditions in Egypt's Western Desert. On-farm management practises as well as technological research will be a part of the studies.

Vegetable Crops

Seven crops planted in the greenhouses are: cucumber, tomato, melons, pepper, eggplant, squash, and french beans. Planting dates for these crops are from September 1990 to early May 1991.

Open field vegetable trials will include tomatoes, cucumbers, melons, sweet corn, artichoke and lettuce. Selected varietal trials will occur in low tunnels.

Emphasis continues upon crops and cultivars as well as growing techniques that are thought to be adaptable to the needs of farmers in Egypt's Western Desert.

Fruit Trees

For the second year, Maryut staff will be studying apple cultivars for the comparison of growth habit, bud opening percentages, and time of bud opening of cultivars grafted onto different root-stocks. Also under study will be a comparison of different pear and persimmon cultivars with respect to vegetative growth, percentage of bud opening, and chilling requirements.

In cooperation with project water and soil specialists, different water regimes and fertilizer levels will be compared for crops under study. Another area for investigation in year two is an evaluation of different budding levels for selected cultivars and rootstocks.

The work plan includes completion of the planting of species and varieties on the basis of the work plan outlined for year one, but with some minor changes based upon experience at the site. The introduction of a selection of varieties as bud wood and grafting these species onto available local rootstocks will also be undertaken, as will the use of local bud from Maryut area orchards.

All grape materials are available and will be planted as they are released from quarantine. A number of required grape cultivars will be obtained from the local market; others may be imported from the United States. Also planned is the importation of Elliot pear and peach-almond hybrid from the United States.

The fruit tree research and development team has adopted preliminary criteria for the evaluation of quality attributes of new genotypes and will be testing this plan in year two. Under development is a study of extension materials for the new farmers in the Western Desert.

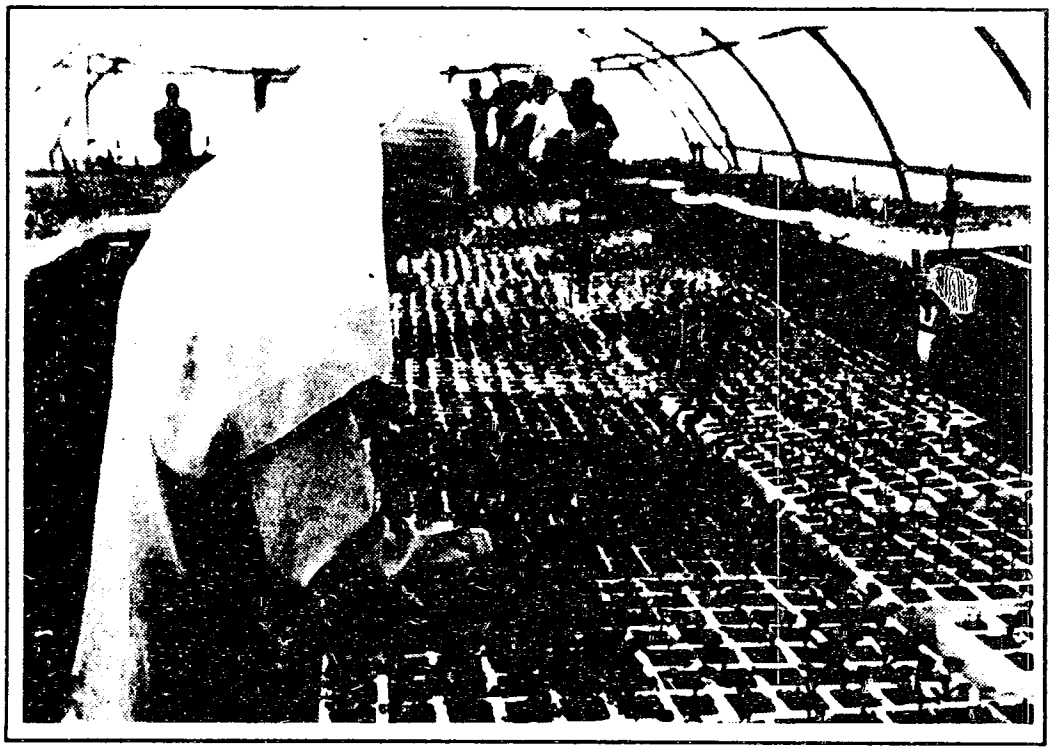
Technical Panel Meeting participants during their MARYUT site visit in September 1990.

Ornamentals

Delays in the acquisition of plant material and in site preparation, as well as a concentration on vegetable production and fruit tree establishment led to a slow start for the ornamental section.

An important part of the first year research and development, however, was the production in Israel, of materials for ornamental plantings and of low

maintenance cut flowers and foliage. These materials will be used in the landscape area and in a specialized planting to determine their utility for cut flower and foliage production. In addition, a number of rose cultivars from tissue culture, and therefore with their own roots, were planted in a plastic house. Although not in the original work plan, these plants will be managed throughout the second year to determine performance and suitability for production at Maryut. The trial will also provide project scientists with experience in growing roses in a desert environment.



Plantings being prepared by MARYUT worker.

Action points for the forthcoming studies in ornamentals are: soil and site preparation completed; irrigation drip lines completed; plant materials released from quarantine, obtained from the United States and planted by late October; and informal evaluations of progress performed by Maryut staff at four intervals throughout year two.

Landscaping

A comprehensive list of plants that are adapted to desert conditions was evaluated, amended and adopted by the Panel. In year two, these plants will be used to demonstrate landscaping possibilities to new settlers in the Western Desert. A demonstration area will be established along the Cairo-Alexandria roadside in order to: investigate the adaptation of specific plants to the Maryut microenvironment; demonstrate the range from which landscaping, windbreak and border plants can be chosen; and provide a pleasing roadside for the project.

Also included is a demonstration of landscapes appropriate to typical farm and village housing in the Western Desert.

A third item will be to develop extension materials to inform area farmers about landscaping approaches and plants to utilize in such approaches.

The plant materials for the demonstration areas will come from Israel, and the Egyptian team will determine which of the plant materials can be readily imported without major quarantine requirements. Working with their Egyptian colleagues, the Israelis will obtain the necessary phytosanitary certificates and arrange shipment when site preparation is complete.

Desert annual plants from both the United States and Israel will also be sown in the demonstration areas to enhance the display as well as to evaluate these species in the Egypt's desert environment.

Floricultural Production

Activities in this segment will utilize Egyptian and overseas expertise in demonstrating modern techniques for the production of existing ornamental crops, as well as to demonstrate the production and market potential for a group of newer crops. In the second year, Maryut scientists will test in-soil cultivation and the use of sand-culture techniques, using liquid feed without circulation and drip irrigation.

Because of the importance of roses in Egyptian floriculture, plans call for the utilization of one short greenhouse for this crop. Sand culture will be utilized. Other crops will include Alstromeria Solidaster, Long-stemmed Ranunculus, Tuberose, Liatris, Lisianthus, and Spray chrysanthemums.

Screen House Production

Maryut staff will demonstrate the production of a number of ornamentals grown in native soil, and testing proper lighting conditions for producing optimum crops. These crops, which produce cut flowers or cut foliage, will be grown at three light intensities. For cut flower testing, Bird of Paradise and Calla Lily will be produced; cut foliage plants will include Variegated Euonymus, Large-leaved Ruscus and Bronze New Zealand Flax.

Potted Flowering and Foliage Plants

The Work Plan calls for demonstration of the latest methods for producing potted plants, incorporating Egyptian expertise in concert with local market requirements, while exploring potential sources of the components of artificial media as well as overseas developments in engineering. The goal will be to produce these crops efficiently and in a cost-effective manner in the Western Desert.

The range of crops suggested by the Panel to investigate different propagation strategies includes: Large-leaved Pothos, Spathyphylum, Monstera, and one flowering plant, such as Guinea Impatiens.

Turf

Turf cultivars selected in Egypt, Israel and the United States as being suited to desert conditions will be planted in a research/ demonstration area. Selected turf varieties are: *Paspalum vaginatum*, Bermuda grass, Improved Bermuda, Buffalo grass, *Zoysia Japonica*, Durban grass, St. Augustin grass, Hybrid Bermuda, and *Zoysia matrella*. Overall quality is monitored weekly and evaluated at regular intervals.

Flowering and Foliage Branches

The Panel agreed that a range of desert-adapted ornamental shrubs and trees with branches suitable for foliage and flowers will be grown and evaluated at the Maryut site. Topics studied include adaptability to soils and water in the Western Desert, productivity, and the acceptability as a market product in Egypt and in the European market.

Extension Activities

To apply the results of the work being accomplished at Maryut, the Panel discussed the following action items: Illustrated leaflets prepared to inform new desert farmers about vegetable crops and their optimum production; preparation of crops for market; and simple marketing instructions.

Research Plan in Israel

The Technical Consultant Panel agreed upon a range of activities to be accomplished in Israel in year two which include:

Marketing

The tomato and melon marketing surveys for Europe will be completed, and an analysis of costs for tomato production in greenhouses will be finalized.

Post-Harvest Activities

Two areas for action for post-harvest activities are: a determination of simple and replicable chemical indicators of fruit flavor quality for tomato cultivars FA111 and FA114. The second area will be to study simple but reliable chemical indicators of the fruit quality in Galia melons.

New Cut Flowers for Winter Markets

Concentration will be upon research to force flower *Eryngium plannum* and *Limonium caspia* during winter months. Small plot production will be accomplished for the following: Circium Japonicum, *Lobelia fulgens* and *Lyturium salicaria*.

Development of Woody Plants for Cut Flowers

Grafting studies of several commercial cultivars of Leucodendron and other members of the Proteaceae family will be conducted on the high PH tolerant "Orof" rootstock. The Israeli team will also sow grafted plants in various soil types and environments.

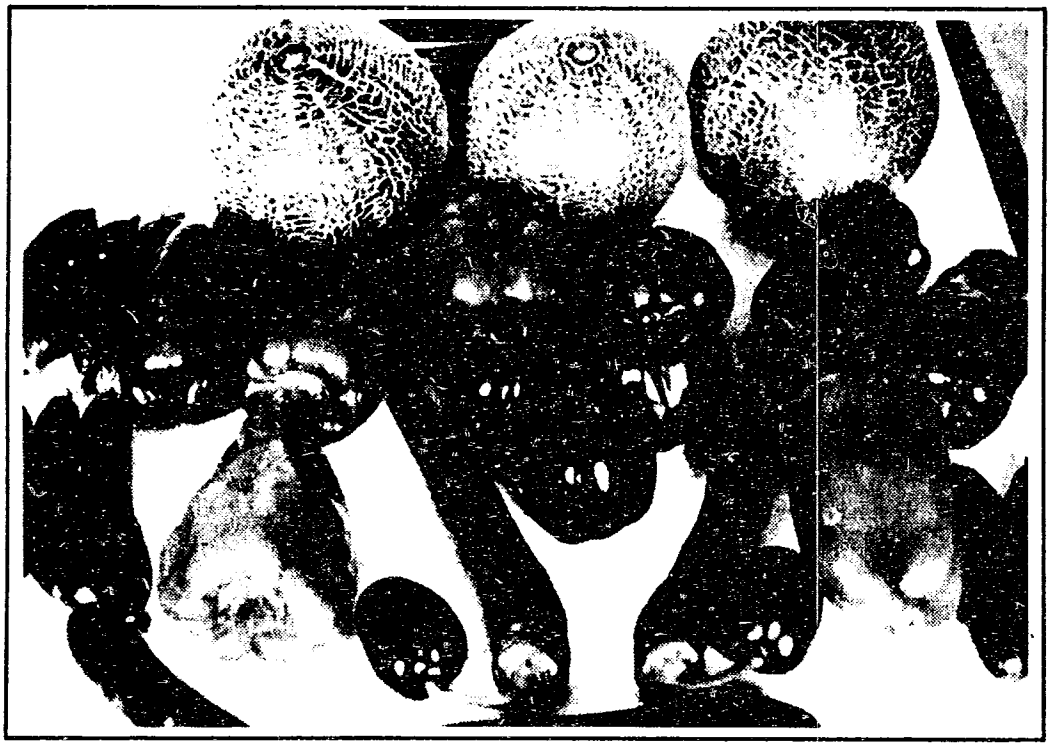
Environmental Landscaping With Native Annuals

Studies will be conducted on commercial seed production of native annuals, which will involve sowing dates, agro-manangement, harvesting technologies, and germination requirements. The production of artificial carpets of seed mixes; the selection of appropriate cotton cloth and the effects of seed coating with nutrient assessments of the visual effects will also be undertaken in Israel.

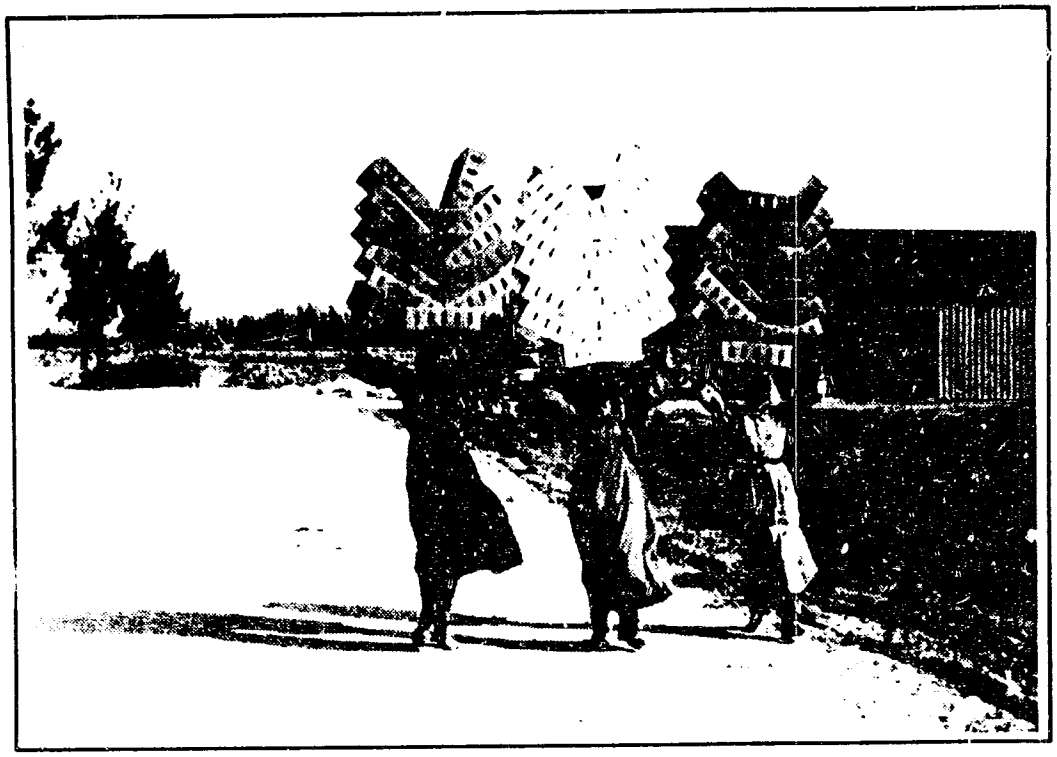
Eucalyptis for Flowering and Decorative Branches

Irrigation trials includes the effects of three levels of water application on quality and quantity of flowering branches. Grafting trials address selected clones and the optimum type of bed wood and size of rootstock. The rooting of selected clones and the pretreatment of cutting, rooting media, effects of hormonal treatment and environmental conditions will be addressed. Tissue culture propagation on Eucalyptus will also be accomplished in year two.

The Technical Consultant Panel stressed that to achieve the goals and objectives of the Maryut Project a strong commitment in manpower and substantial financial resources are needed. Several scientists stressed that nowhere else was there a project of the scope and size of Maryut, and that the project is fast becoming a landmark in adaptive research. In summary, Project Director Dr. Awad Hussein stated, "The team spirit at Maryut is high...and our success can be shared by the entire team."



A selection of crops grown at the MARYUT site.



Marketing studies include shipping and packaging. These cartons will be used to ship MARYUT products to markets within Egypt.

Steering Committee Meets

The Maryut Steering Committee met September 24-25, 1990 in Alexandria, Egypt. The meeting included a site visit to Maryut and an evaluation of the progress for year one of the Project. The Steering Committee also reviewed and approved the preliminary report of the Technical Consultant Panel, as well as the Work Plans for year two and financial status reports and projections. The Maryut Steering Committee consists of nine members; three from Egypt, three from Israel and three from the United States.

Visits Among Maryut Scientists

Several scientific exchanges among Maryut Project scientists have occurred. In March, 1990, seven Egyptian scientists visited their colleagues in Israel to exchange results and technical information.

In April, 1990, Israeli participant Dr. Arie Szeskin visited Egypt to confer with Egyptian scientists regarding marketing aspects of Maryut crops. Israeli Co-Chairman of the Technical Consultant Panel, Dr. Dov Pasternak, has made regular visits to Cairo and to the Maryut site to confer with Egyptian colleagues.

External Evaluation Conducted

The Maryut Project external evaluation was conducted April 13-18, 1990, by Drs. Earl Leng and Max Patterson, who visited research sites in Egypt and Israel. The evaluation team conferred with key staff in both countries, as well as with USAID staff in Washington, D.C., following their field visits. The evaluation report was finalized in August, 1990, and forwarded to USAID/Washington and Cairo and to Embassy Technical staff in Israel.

Major findings and conclusions of the evaluation were:

- The project has made outstanding progress towards its stated goals and objectives.
- Transferability of technology between Israeli and Egyptian participants has proven reliable and effective.
- Cool season vegetable production under plastic greenhouses and low tunnels was highly successful during the first winter cropping season.
- Site development has been effective and is ahead of plan.
- The present technical and administrative structure is functioning smoothly and effectively.
- Extension of the project for near-term operations should be approved promptly so that momentum can be sustained.
- Long-term support, at adequate funding levels will be required if stated goals are to be attained.

Based upon the external evaluation, progress at the Maryut site and in all parameters of the project has been in positive comparison with the goals and work plans established for the first year.

MARYUT is a cooperative research program in protected agriculture conducted among scientists from Egypt, Israel and the United States.

Comments or questions about this U.S. Agency for International Development Regional Cooperation Program may be forwarded to:

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