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ANNUAL TECHNICAL REPORT

1989 - 1990

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

Contract #ANE-0158-G-9006-00

Submitted to the
Bureau for Europe and Near East
U.S. Agency for International Development

Submitted by the
San Diego State University Foundation

In cooperation with the
Albert Einstein Peace Prize Foundation

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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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OVERVIEW

Funded by the Bureau for Asia and Near East of the Agency for International Development, the Integrated Agricultural Development Project: Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut), is a cooperative effort utilizing the scientific expertise of its participants from Egypt, Israel and the United States. The Maryut Project has two main goals: 1) to strengthen and expand cooperative scientific exchange among its Egyptian, Israeli and United States participants; and 2) through such exchange, produce tangible applied results that are in concert with the arid land development goals of the Governments of Egypt and Israel.

The following are included in the aims and objectives of the project: evaluate the planning assumptions on crops, water use, labor, marketing and income targets; demonstrate various models of crops, methods, and management; offer a base for manpower training and development; plan and effect differing production services required for new lands development; orient research according to market conditions and constraints; develop appropriate soil management and irrigation techniques and develop post-harvest and marketing methods.

The overall activities at the Maryut site are conducted to reflect and support the policies of the Governments of the Arab Republic of Egypt and the State of Israel for the accelerated development of new lands. The "Integrated Agricultural Development Project: Maryut Agroindustrial Complex in the Western Desert of Egypt" (ANE-0158-G-9006-00), began in 1989. Initial efforts at the site concentrated upon adequate facilities which have now been established. Emphasis was also placed on the preparation of a 35 feddan area as a first phase of the 60 feddan research and development unit.

Extensive soil samples were taken from 45 locations and analyzed to ascertain the site's soil profile and characteristics. The results showed a high degree of soil compaction, extensive weed spread, and a high degree of salinity. Necessary drainage was consequently established and the soil has been leached. Deep plowing and levelling has taken place to establish a suitable subsoil.

Members of the Maryut Steering Committee, a nine-member group representing the Arab Republic of Egypt, the State of Israel and the United States of America, met three times in this report period to plan and define work plans and site preparation, and review scientific and administrative progress of the project. In addition, the Technical Consultant Panel, a 22-member group of scientists from the three participating nations, also met three times to define and refine the project's plan of operation and to review progress at the site. An external evaluation was also conducted in Spring 1990 and concluded that the project had made outstanding progress towards achieving its stated objectives.

At Maryut, an irrigation network and 29 plastic houses were constructed. Following recommendations of the Technical Consultant Panel in December 1989, crops were planted at Maryut in that month and in winter and spring of 1990 for yield in the spring and summer months of 1990, to begin the initial production phase of this important desert development effort. Research and development activities involving appropriate technologies and agromanagement techniques were important factions in the initial stages of the project.

This Technical Report outlines the scientific, cooperative and administrative progress during the establishment and the initial portions of the Maryut Project.

TECHNICAL REPORT

INITIAL ACTIVITIES

The initial activities for the program included the following:

- Hiring personnel for the Maryut team.
- Soil survey and preparation.
- Completion of existing irrigation and drainage system as well as establishing new network for irrigation and drainage.
- Erection of plastic houses and low tunnels for vegetable crops.
- Importation of fruit tree seedlings and seeds.
- Establishing fruit tree nursery.
- Preparation of laboratories.
- Preparation of on-site support structures and offices.
- Purchasing farm machinery and vehicles.
- Technical and administrative personnel were appointed to implement a detailed project plan.

The Project Director, Technical Advisor, Farm Manager, assistants and other support staff were the key personnel hired.

Temporary hired laborers from the Maryut area were recruited as needed. The working plan and its implementation were determined by the Steering Committee, Technical Consultant Panel and the Project Coordinators.

SOIL SURVEY AND PREPARATION

Soil Morphology

A detailed morphological study of the soil was carried out by investigating 45 soil profiles representing all morphological variations in the soils of the site.

The soil at Maryut is typical calcareous throughout the whole profile. The soil surface ranges from flat to almost flat with scattered portions of saline or saline alkaline spots. No gravels or stones were observed on the soil surface.

The water table level in the Northern and Eastern part of the site ranges from deep to very deep (below a profile depth of 150cm). In the other parts of the site, however, the water table may reach as high as 70cm below soil surface. Since the water table is an important parameter for crop selection, it was given the proper attention and consideration.

When dry, the surface layer of the soil (0-30cm) is generally reddish-yellow to brown in color and changes to dark brown when moist.

Soil texture is clay to sandy clay loam with no gravel or stones observed. The structure of the soil is generally weak fine or medium angular or sub-angular blocky.

The soil is also characterized by the presence of common fine soft lime segregations, nodules or spots. Fine pores and very strong effervescent HCL and abrupt to clear smooth boundaries were observed.

The subsurface layer (30-65cm) shows a somewhat lighter color in dry or moist conditions. Soil texture is much finer than at the surface and ranges from clay to sandy clay. Soil structure is strongly to moderately medium angular to sub-angular blocky. The subsurface structure is also plastic to very plastic containing many soft lime segregations and extremely strong effervescent with HCL.

These studies revealed no indication that the soil in the site of Maryut Project may contain hard pan formations or impermeable layers. It should be kept in mind, however, that calcareous soil with quite fine texture needs special agromanagement practices in order to improve soil condition and enhance water penetration and salt movement.

CHEMICAL PROPERTIES OF THE SOIL IN THE SITE

Salinity is one of the most important soil characteristics in arid lands. Salinity, therefore, was carefully studied in our survey of the Maryut site and the results indicate the following:

Salinity of the surface layer (0-30cm) of the soil is quite different throughout the site. It ranged from EC of 2.3 to 77.5ds/m. Salinity distribution of the surface layer is classified (According to Soil Survey Manual, 1981) as follows:

Very slightly saline: 4ds/m

Slightly saline: 4.0 - 8.0ds/m

Moderately saline: 8.0 - 16.0ds/m

Strongly saline: 16.0 - 32.0ds/m

Very strongly saline: 32.0ds/m

Salinity distribution maps indicate that areas of strong salinity to very strong salinity are relatively small. The presence of moderate to strong salinity may be due to the fact that prior to the establishment of the Maryut site, the soil was left with no irrigation for long periods under prevailing conditions.

Soil analysis shows that soluble salts are mostly Na cation followed by Ca, Mg, and K cations. The dominant anion, however, is Cl followed by sulfate and bicarbonate. Soil reaction (pH) indicates that the soil is mildly alkaline to alkaline (pH ranges between 7.6 and 8.5). Calcium Carbonate in the soil and its different levels are classified according to the following ranges:

C_1: 20 to 30% $CaCo_3$

C_2: 20 to 40% $CaCo_3$

C_3: above to 40% $CaCo_3$

Soil analysis indicate that the soil of the site is high in calcium carbonate and classified as calcareous soil throughout the whole profile.

According to the physical and chemical properties found in the soils at Maryut, crop selection as well as the agromanagement has been carefully planned with the following points in mind:

- Cultivation of calcium carbonate sensitive crops should be avoided.
- Addition of organic manure either mixed with the surface or subsurface layers of the soil was highly recommended.
- Green manure may be recommended under the prevailing soil conditions.
- A planned drainage system is necessary to help leach salinity.
- Deep plowing has been needed to increase the downward movement of salts throughout the soil profile.
- Application of phosphorus fertilizers was recommended by using different sources and application methods.
- Attention has been given during the seedling stage to reduce the adverse effects of the calcareous crust on the root system at this stage.

The different practices in the soil preparation include the following:

Flood irrigation	New drainage system
Sprinkler irrigation	Cleaning of existing drainage system
Levelling	Erect plastic houses
Subsoiling	Organic manure application
Disc	Application of super phosphate

FRUIT TREES

Proper preparation of the soil and the layout of the needed irrigation and drainage network were accomplished in the areas allocated for the fruit tree section. Attention was given to the level of the water table in the areas of fruit trees to assure a water depth of not less than 2m. According to the Maryut master plan, the main fruit tree crops are Grapes, Peaches, Plums, Apricot, Apple, Pears, Persimmons and other crops including Loquat, Papaya, Annona, Dwarf Mango, Sapota, Opuntia and Carob. Each of the major fruit tree crops has been planted on approximately two feddans.

Importation of Fruit Tree Seedlings

According to intensive research by Dr. Awad Hussein and Dr. Esam Shaltut while in California and Arizona in August 1989, and according to the master plan a number of fruit tree seedlings were imported from the United States. Additional fruit tree seedlings were also imported from Israel. The planting of fruit tree seedlings was accomplished from March 17, 1990 to May 17, 1990. It may be obvious from the planting dates that some of the seedlings were planted very late. Handling conditions at the shipping point as well as airport holding conditions during the delay were also a concern. Such factors clearly affected the viability and establishment of such seedlings when planted at the site (see Problems and Solutions section, page 47).

The following fruit crops were received:

Pears	(4 cultivars)	Persimmon	(2 cultivars)
Almond	(7 cultivars)	Peaches	(3 cultivars)
Nectarines	(5 cultivars)	Plums	(7 cultivars)
Apples	(4 cultivars)	Pecan	(6 cultivars)
Apricot	(3 cultivars)	Grapes	(2 cultivars)

Grapes remained under careful plant quarantine observation and evaluation longer and were planted in due time upon release.

In Appendix A, detailed data regarding each fruit and vegetable crop is indicated. The performance of the planted seedlings in the orchard are also illustrated.

FRUIT TREE NURSERY

The fruit tree nursery was established to serve this planned Maryut Project activity. The fruit tree nursery is well supplied with an effective irrigation and drainage network. Activities began with apple seedlings. Two main rootstocks were obtained and planted in the nursery; Mac9 and MM106 rootstocks. The former was represented by 1,000 seedlings while the latter was represented by 5,000 seedlings; half of the number of each used for stool layering to increase its original number to supply more rootstocks for future use. The remaining half is used as rootstock for budding. The cultivars budded on the above rootstock include:

Jonathan	Anna	Dorset Golden
Orleans	Granny Smith	Stark Addina

The selection of the cultivars for budding is based on both the relative economical value and expected successful performance. Table 2 (see Appendix A) shows the distribution of such cultivars on both Mac9 and MM106 rootstocks.

Other crops planted, along with their rootstocks, are:

Pear: Betuflaefolia (4 varieties)	Persimmon: Lotus (2 varieties)
Almond: Nemagurd, Lovel, (6 varieties)	Peach: Nemagurd (3 varieties)
Nectarin: Nemagurd (5 varieties)	Plum: Almond (7 varieties)
Pecan: Pecan (6 varieties)	Apricot: Apricot (3 varieties)

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

Careful agromanagement is being implemented in the fruit tree section with reference to irrigation and fertilization regimes, drainage and water table, monitoring of salinity and disease control and the application of proper pest management, as well as tree training. Collection of data analysis and careful observation of the growing seedlings are the basis for the agromanagement practices applied at the Maryut site.

VEGETABLE CROP SECTION

The activities in the Vegetable Crop Section were planned in two areas. One area is concentrating upon the growing of vegetables under protected agriculture including long and short walk-in tunnels. The former measures 9x59m and the latter is 9x29m. The second area of activities covers the growing of vegetables in the open field provided that the use of low tunnels during the cold period is applied at the beginning of the growing season.

Comparisons of different technologies were carried out in order to determine technical and economical feasibility under the prevailing conditions in the area:

- The use of different varieties in order to compare their performance, adaptability, productivity and the marketability of their fruits.
- Technical and economical evaluation of the use of both long and short plastic houses provided that the same varieties and agromanagement are applied in both types of plastic houses. Based on such data and some other factors related to the end-user of such technology, a recommendation will be drawn.
- The comparison between the use of mulch against using no mulch with respect to weed control and water conservation in plastic houses and open field agriculture.
- The type of plastic used in mulching with respect to its color, i.e., black against transparent plastics.
- The effect of planting dates on the performance and productivity of different cultivars.
- Planting density and type of plant training in the plastic houses and in open field trials.
- Irrigation and fertilization regimes applied and their effect on growing and the productivity of the cultivated varieties.
- Pest management program and the relative sensitivity of the cultivated varieties to different pests and disease. Efficiency of pesticides applied to control diseases and the safety factors in relation to their post-harvest residues on the consumed fruits.
- Varietal tests include differences among flowering dates, fruit set, fruit growing season (early, moderate, and late), crop-harvesting season (concentrated or spread) and fruit quality evaluation. Storage ability of the fruits during unrefrigerated marketing was of a special importance throughout such evaluation.

The main vegetable crops planted during the first season included:

Cantaloupe	Squash	Cucumber	Sweet Corn
Eggplants	Tomato	Pepper	Watermelon

Table 3 (see Appendix A) illustrates the vegetable varieties, planting location and planting dates.

RESEARCH AND DEVELOPMENT ACTIVITIES: VEGETABLE CROP SELECTION

Research and development activities are centering upon comparison studies of selected crops and their varieties grown indoors in both short (9x29m), and long (9x59m) plastic houses, as well as in open field conditions (low tunnels and actual open field). Variety tests were as follows:

Indoor Production Trials

- Cucumbers - twelve cultivars in three long plastic houses
- Tomato - three cultivars in one short plastic house
- Melon - four cultivars in one short plastic house
- Pepper - ten cultivars in three short plastic houses
- Eggplant - four cultivars in two short plastic houses
- Sweet Corn - one cultivar under cover (low tunnels)
- Squash - one cultivar in one short plastic house

Other Indoor Trials: Commercial Production Tests

- Tomato - two long and one short plastic houses
- Cantaloupe - nine short plastic houses
- Cucumber - three long plastic houses

Open Field Trials

- Cantaloupe - 3 feddan
- Sweet Corn - 1/4 feddan
- Tomato - 1/4 feddan

In addition to the foregoing allocations, one long plastic house has been utilized for the testing of new tomato cultivars. Post-harvest activities included tests for defining water loss in cucumber, as well as studies on the shelf life for various varieties being produced at the Maryut site.

SELECTED VEGETABLE CROPS IN DETAIL

Preliminary research and development activities on selected vegetable crops is as follows:

Cucumber

Varieties in trial: Picobello, Corditto and Samara. Planting date for Picobello and Corditto was January 23; Samara was planted February 5. Picobello and Corditto were planted in two long plastic houses in replication of ten plants each cultivar. Samara was planted in a separate long plastic house.

Planting density for all cucumber varieties was 4 to 5 plants per square meter, in double row beds with distances between bed centers of 160cm. Irrigation regimes were as follows: during first two weeks after planting, 3/4m^3 water application per day, then after 15 days 1m^3 of water per day, every three days. When harvest began, the amount of water was raised to 1.5m^3 per day, every three days. In the

second week of April, approximately 10 weeks from planting, water application was increased to 2.5m^3 per day every three days. After approximately 16 weeks--on May 15--irrigation was raised to 3m^3 per day every two days.

Soils were leached, then enriched by cattle manure. In each plastic house,100kg of super phosphate plus 25kg of ammonium sulfate was also utilized. Fumigation was 50g per square meter. Trailing and pruning activities included cutting sub-branches on one branch per plant after the second joint. Branches were trailed with threads.

Fertilization regimes were: First stage (first 30 days), apply 50ppm "N"; after this period 100ppm "N" was applied until the harvest stage when 200ppm "N" was appled. Compound fertilizers such as "19-19-19" or "19-6-20" were used. Ammonium sulfate was also applied in the first stage.

Weekly harvest comparisons for Picobello, Corditto and Samara varieties in trial at Maryut in Spring/Summer 1990 are shown in Figure 1. According to these data, Picobello was the most consistent variety tested.

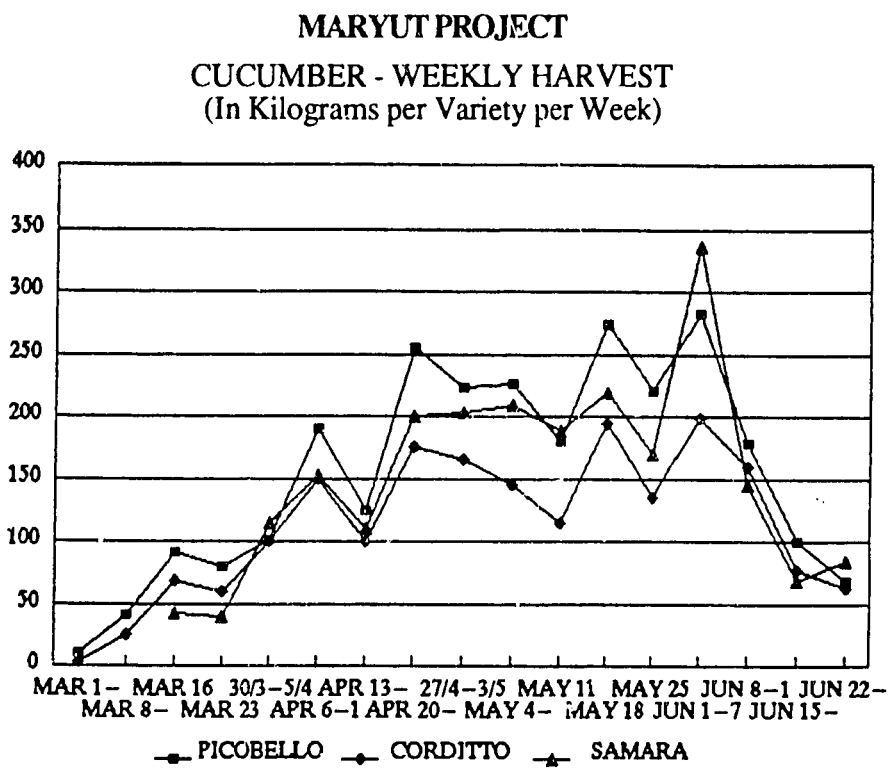

FIGURE 1

Tomato

Varieties in trial: Carmello and Karel. Planting began on February 15, 1990 in one short (9x29m) plastic house and over 1/4 feddan in open fields.

Planting density inside plastic houses was five plants per square meter; in open field planting, density was two plants per square meter. In houses, the distances between beds was 160cm double row beds; open field distances between rows was 200cm.

A subsoiler and a rotorvator were used to work the soils to a depth of 35 to 45cm. Soils were then leached to acceptable EC levels. In the plastic houses, $6m^3$ organic manure per long house and $3m^3$ in the short house was utilized. Each long house also received 100kg of Super Phosphate, while 50kg was used in the short house. In addition, each long house also received an application of 25kg of ammonium sulfate and 12.5kg of ammonium sulfate was applied in the short house. Open field low tunnel growing areas received $10m^3$ of chicken manure per feddan; open field furrows received 200kg of Super Phosphate and 100kg of ammonium sulfate per feddan.

Fumigation regime was 50g per square meter in plastic houses and in low tunnels. Trailing and pruning activities involved one or two branches per plant trailed with plastic thread. New branches, in plastic houses were pruned before exceeding 5cm in length.

Pollination was accomplished by an electric bee. Low tunnels were sprayed with the hormone "Auraset" 0.1% three times per day every 10 days, once three to five clusters appeared.

Plastic house irrigation regimes were applying water at a rate of $3/4m^3$ per long house per day every three days and $1/2m^3$ per short house per day every three days. At a plant age of 15 days, irrigation was increased to $1m^3$ per long house per day every three days and to $3/4m^3$ per day every three days in the short house. After 45 days from planting, these figures were increased to $1.5m^3$ in long houses and to $1m^3$ in the short house. At approximately 60 days, irrigation increased to $2m^3$ per long house per day every two days and to $1m^3$ in the short house every two days. During May and June, applied water rates for the long houses were $3m^3$ per long house per day every two days and $1.5m^3$ in the short house.

Low Tunnel irrigation regimes were: planting to 15 days, $3m^3$ per feddan per day; after which $4m^3$ per feddan per day every two days. At 45 days of plant age, this amount was increased to $6m^3$ per feddan per day every two days and, as days grew warmer, increased to $16m^3$ per feddan per day at last harvest.

After two weeks of age, fertilizer 100ppm "N" was used until plant age one month. This then changed to 150ppm "N"; 80ppm "P"; and 150ppm "P" in plastic houses, until harvest, 200ppm "N", 100ppm "P"; and 200ppm "K" were used in the water.

According to Figure 2, Figure 3, and Figure 4, Carmello provided the highest consistent yield and performed well in both open field and in covered production trials. Figure 5 illustrates the yield comparison of Maryut trials of tomato varieties in long and short houses.

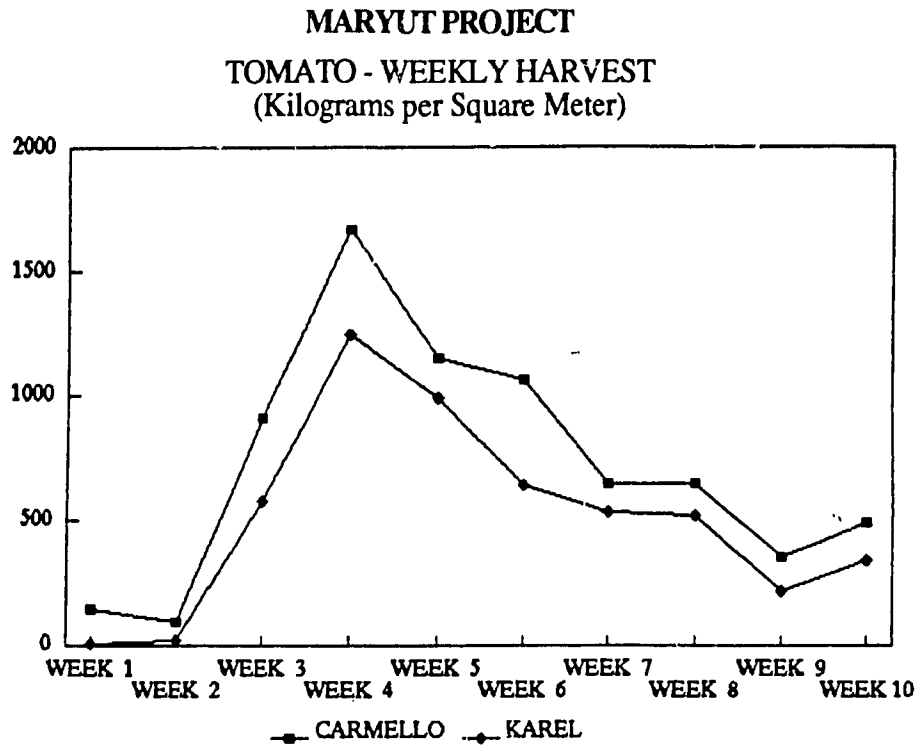

FIGURE 2

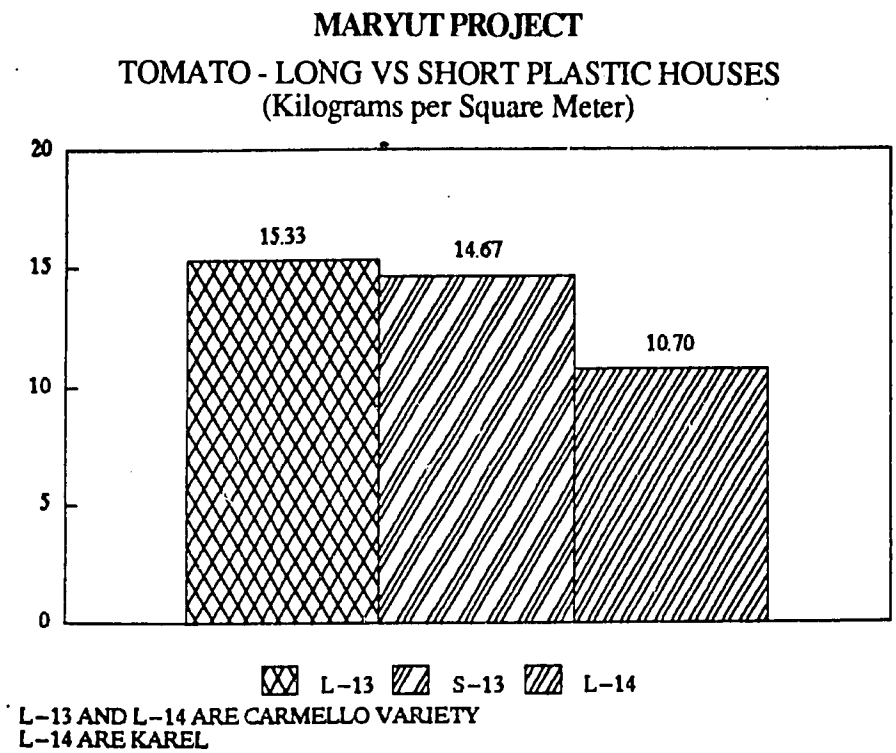

FIGURE 3

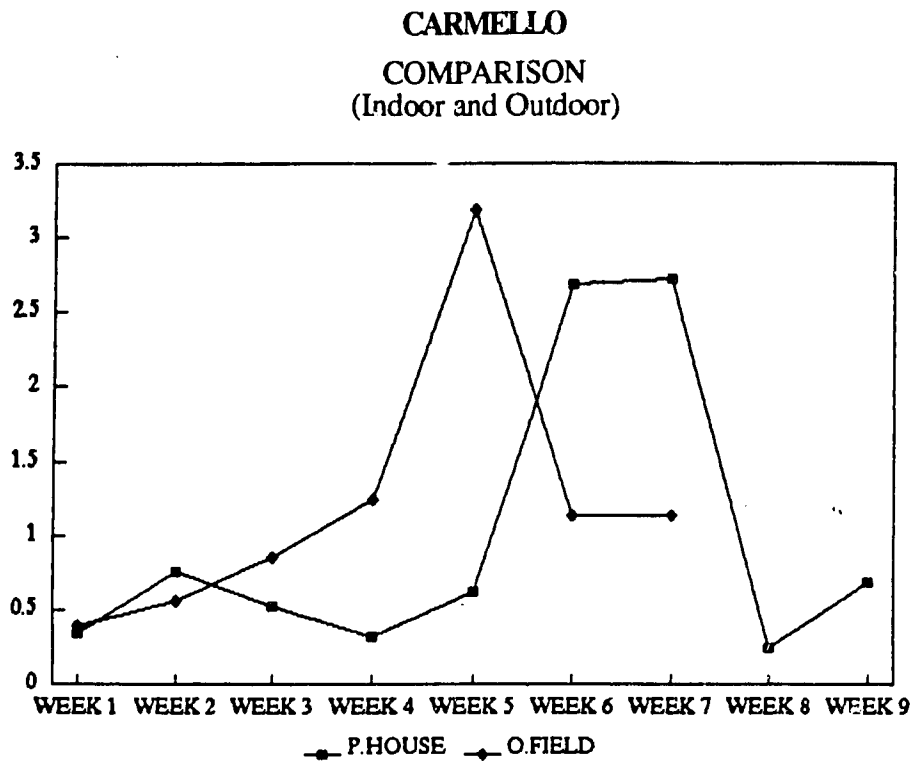

FIGURE 4

Cantaloupe

Variety in trial is Galia. Planting began on January 31, 1990 in nine short (9x29m) plastic houses and on three feddan of open field. In the plastic houses, a density of 4 to 5 plants per square meter, was used; in open fields, two densities were used. These were 30cm and 50cm. Distances between the beds in houses was 160cm, while in open fields, two meters was used.

Fertigation methods involved watering per house 3/4m^3 every three days until plant age of two weeks. At this point, each house received 1m^3 of water per day every three days. After pollination, irrigation increased to 2m^3 per day per house until fruit netting; an increase of 3m^3 occurred until fruit ripening. At this point, irrigation was reduced to 2.5m^3 per day every three days. Fertilization began two weeks from planting. For the first month, 50ppm "P"; then 100ppm "N" until flowering, at which time 200ppm "N" was applied. Compound fertilizers "19-19-19" and "19-6-20" were used.

Soil preparation included leaching, then applying 6m^3 manure in plastic houses and 10m^3 chicken manure in open fields. Super phosphate at 100kg was used in houses and 400kg per feddan in open fields. In addition, 25kg ammonium sulfate per house and 200kg per feddan was used. Fumigation was with methyl bromide at 50g per meter.

Trailing and planting activities included branches trailed with threads in the houses. A comparison test between plants with one or two branches trailed versus no trailing was conducted. Branches were cut after one or two flowers pollinated. Hand and beehive pollination was used.

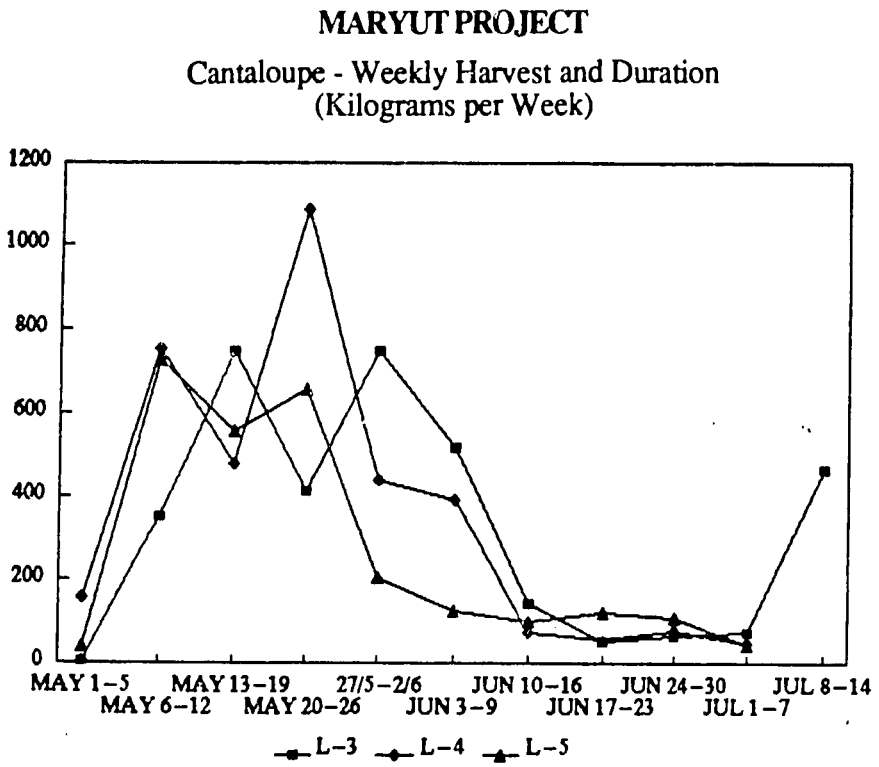

FIGURE 5

Eggplant

Varieties in trial: XP-139; XP-1726; XP-1474 and Classic 1. Planting in two short plastic houses began on February 18, 1990.

Once the soil was leached, manure at $3m^3$ per house was applied and Super Phosphate at 50kg was spread. In addition, 25kg ammonium sulfate per house was also used.

Plant density was one plant every 50cm, with three branches trailed. The spray hormone, "Auraset" 0.1% was applied at night when temperatures fell below 12°C.

Irrigation utilized $0.5m^3$ per house from planting every three days and increased to a level of $1m^3$. At 45 days of plant age, $1.5m^3$ water was applied every three days for a 30-day period. As temperatures rose, water was increased to $2m^3$ per house per day every two days.

Fertilizers were applied at 100ppm "N", for the first month and at 150ppm "N"; 80ppm "P" and 150ppm "K" in the second month.

During harvest, fertilizers were increased to 200ppm "N"; 100ppm "P"' and 200ppm "K". Compound fertilizers "19-19-19", "19-14-26" as well as phosphoric acid and the microelement AS fe-138, were used.

Of the four varieties, XP-139 yielded an average of nearly 5kg per square meter, with Classic, a close second, at 4.8kg per square meter.

Pepper

Under test were the following varieties: Maccabi 1005; Maccabi 7205; XP-807; XP-736; XP-843; F-23; XP-555; XP-817 and Lamuyo. Trials occurred in three short (9x29m) plastic houses.

Planting of varieties was in beds divided with different varieties. Irrigation and fertilization was as for Eggplant. Of the varieties under test, XP-817 at a density of 2.3 plants per meter, gave a yield of nearly 10kg per square meter. At a higher density of 3.2 plants per meter, XP-817 yielded 7kg per square meter. Laymuyo, at a density of 3.2 plants per meter, yielded 7kg per square meter, the highest yield at a higher density for all varieties.

Sweet Corn

Under test was the variety Jubilee, which was planted in open field tests over 1/4 feddan and under cover in low tunnels. Date of planting was April 4, 1990.

Soils were leached with 200m^3 water to dissolve potential salinity. Chicken manure plus 50g "N" per square meter, plus 50g Super Phosphate per square meter, was applied. Open field crops were included.

Germination was assisted by the application of 50m^3 of water at sowing and for the first month, irrigation was 2.5m^3, increasing to 4.8m^3 to plant age 50 days. At this point, water was decreased gradually back to 1.0m^3 per day until Day 78 of plant age.

From 30 to 40 days after planting, the fertilizer "N" (1g) was applied each day to each plant; Day 41 to 60, 1g of "NPK" plus 0.07g of "N" was applied and from Day 61 to 78, 2g of "NPK" plus 0.1g of "N" was used.

An average net weight per cob at harvest was 0.35kg and average weight per plant was 1.14kg. An average of 16 columns of grain per crop was observed.

ORNAMENTAL PLANTS AND LANDSCAPING

The original plan for ornamental plants and landscaping activity and their implementation program are found in Appendix B. Among the plants to be imported, only about 500 different Rose varieties were received. Such rose plants were in pots. Two plastic houses were prepared as sand culture sites to host the Roses and to provide a suitable medium for them to grow. Other preparations such as building the needed plastic houses is being accomplished according to the master plan.

Previously grown plants such as Bird of Paradise were transplanted into pots with a medium of a mixture of peatmoss and soil. They receive the proper care until they prove suitable to be retransplanted to the carefully prepared site. Selected sites for ornamental plants and different desert landscaping models were properly prepared and fumigated for weed and disease control.

An important part of the ornamental activities during this report period has been the production in Israel, of materials for ornamental plantings and low-maintenance cut flowers for foliage. These materials will be utilized in the coming year in the Maryut landscaping area, as well as in a specialized planting to determine their utility for cut flower and foliage production.

The difficulties of the Maryut site are less keenly felt in the area of production ornamentals than in the production of food crops. Modern ornamental crop production largely uses artificial soils so that the nature of the substrate at Maryut is less important for these materials than for fruits and vegetables. In addition, the potential for substantial returns makes ornamental production a desirable activity for a project that has as an objective, the demonstration of superior products and productivity.

PREPARATION OF LABORATORIES

The existing laboratory building is being equipped through this Project to provide proper facilities for plant, water and soil analysis. Plant analysis will include the study of the nutritional status of plant material as well as the evaluation of physical and chemical properties of the fruit as part of the fruit quality evaluation. Soil and water analysis will be used to monitor the physical and chemical properties of the soil and irrigation water to help develop proper soil and water management. The lab also provides facilities to analyze and evaluate the organic matter used in the site and in the future may be used to provide such services to others in the neighborhood. (See Cooperation section of this report, pages 41-45).

FARM MACHINERY AND VEHICLES

The site is equipped with the farm machinery required. During the timeframe of this report, one tractor of 70hp and another of 30hp, both with attachments, are being used. Leasing of additional farm machineries is the current procedure used to implement needed farm services. A truck and trailer were purchased and delivered in mid-June 1990.

One Van (eleven passengers) is in use to commute daily between Alexandria and the site (45km), providing convenient transportation to Project personnel residing in Alexandria. A pick-up truck was purchased from the local market in Egypt to serve different agricultural activities in the site.

Three motorized spraying machines are used for chemical pesticide application and disease control, two of which are of 600 liters capacity each, the third is a back-carried motorized sprayer of 40 liters capacity.

HARVESTING AND MARKETING FACILITIES

In preparation for the harvesting season, a number of consumer bag packages were purchased from the local market of Egypt, while other samples of different consumer bag packages were brought from Israel for experimentation. Harvesting boxes and sheers were bought to serve vegetable harvesting. The harvested crops (except watermelon) were marketed in mesh bag consumer packages. Fruit marketing was done mostly through the Alexandria fruit and vegetable wholesale market. Direct marketing is done at the site to serve and test the neighborhood.

Samples from the marketed fruits were taken to be held at room temperature in boxes or consumer packages to evaluate their storage ability and marketability. Such important parameters are used to evaluate the grown varieties with other criteria being considered.

An electric package-wrapping machine using plastic films, was purchased and is to be used with the laboratory electricity.

PREPARATION OF ON-SITE STRUCTURES

The nature of the research and development work at the project site requires the continuous presence of a number of working personnel. Accordingly, a convenient residence is required to host three persons. Adequate furniture and kitchen facilities were prepared. Running water has been temporarily provided by use of a water reservoir and water pump to serve the residency. Necessary arrangements are being taken to provide permanent and regular running water. A portable generator is used to supply electricity for domestic use in the residency.

SITE LIBRARY

The site library is being stocked and the following items were ordered:

- Books and printed matters of related subjects to the different activities in the site were ordered and received in the site. (102 books and items of printed matter).
- Furniture, including reading tables and chairs were ordered and delivered to the site in the second half of June 1990. These items also include the preparation of the main seminar room.
- Visual aids have been, and still are being prepared, i.e., a video tape recording the initial stage at the beginning of the project and the following developmental stages of the work in the site. The initial stage indicated the general status of the site before the current project started.
- Several slide sets have been prepared to record the different progress stages in the project.
- A television and a video set were ordered to serve in the site library as well as the seminar room during demonstration activities.

Library supplies and equipment support the ongoing demonstration and on-site training of the working personnel in the project which is currently carried out by the Technical Consultant Panel during their visits to the site.

IRRIGATION AND DRAINAGE SYSTEM

The previously established, as well as the newly installed irrigation network, are providing the irrigation water and fertilization to long plastic houses (16 of 9x59ms), short plastic houses (16 of 9x29m), open field vegetables, fruit tree sections (20 feddan), fruit trees nursery (1 feddan), alfalfa area (10 feddan) and the ornamental plants section.

The subsurface drainage system is to be completed before the second season planting. Implementations and remarks of both irrigation and drainage systems are reported herein. It should be kept in mind, however that the planted areas are provided with a proper drainage system.

General Objectives

Technical and economical evaluation of each irrigation method is taken into consideration under the Western Desert conditions (soil type and topography, water supply and quality, water requirements, management and labor availability.)

To collect the necessary data from field trials to guide farmers through an extension and training program for every irrigation method used so as to optimize conditions for both crop production and irrigation management.

To collect accurate data regarding water-use efficiency, capital cost per feddan and recurrent cost per feddan/annually, as well, costs of labor, power, repairs and maintenance, for each irrigation method.

Soil salinity and salt accumulation are to be determined throughout the study of the salt balance under the different irrigation methods.

To achieve these objectives, two irrigation methods are selected as follows:

1. Sprinkler irrigation, portable hand-moved system.
2. Micro-irrigation systems (Drip and Microspray) adapted to be composed of the following elements:
   a. Diversion, including an operative water reservoir (6000m^3).
   b. Pumping devices (2 pump each 90m^3/h at 60m head and the third as a stand-by unit).
   c. Main and sub-main pipelines (200, 160, 110, and 90mm).
   d. Control heads.
   e. Sprinkler irrigation equipment.
   f. Trickle irrigation equipment, on-line emitters, built-in and in-line centimeter systems.
   g. Microspray irrigation system for flowers production.
3. Suggested research and development.

The research and development objectives of the experimental center are divided into the following:

1. Agrotechnical and Soil Investigation:
   a. Selection of the most economical crop-rotation and testing the best new sorts of plants under the conditions of each irrigation method.
   b. Determination of optimum water-demand of different crops for each irrigation.
   c. Investigation of the mutual effect of water and soil.
   d. Investigation of the salt-content in the soil and determination of leaching requirements, if necessary.

2. Technical and Irrigation-Technical Research:
   a. Testing sprinkler and trickle irrigation equipment (hydraulic measurements).
   b. Investigation of different sprinkler and (dripper) spacing for optimum distribution of the best application rate and for elimination of harmful wind-effects.
   c. Study of the use of modern chemigation techniques.
3. Economical Research:
   a. Investigation of profitability (net income rate) and water use efficiency in the case of different corporations and selected plants for different irrigation method.
   b. Investigations for comparing the different irrigation methods as well as different equipment from an economical point of view.
4. Extension and Training Activities.

ECONOMIC FEASIBILITY

The activities being conducted in the Maryut Project including manpower, are being recorded in detail and will be presented for analysis by economists. This will enable the evaluation of the economical feasibility of the entire production system throughout variety selection, agronomical practices, agromanagement, harvesting and post-harvesting marketing. Computer facilities, which will be provided to the site, should be an optimum means to implement such an objective.

MAJOR PROCUREMENT ITEMS

A listing of equipment is included as Appendix D.

WORK PLAN

In accordance with Agency for International Development guidelines concerning submissions of Annual Reports from contracting entities, the following Work Plan is submitted for the period October 1, 1990 through March 31, 1991.

This Work Plan is the result of a cooperative effort among Egyptian, Israeli and United States members of the Maryut Technical Panel and is a direct product of that group's meeting in Cairo and Alexandria, September 2 through 6, 1990. The Work Plan is presented *in toto* and will be subject to potential modification as field situations require. Assignments made by the Panel itself for its members who will work together is a possitive indication the true cooperative spirit of the Maryut participants.

MARYUT PROJECT TECHNICAL PANEL REPORT
SEPTEMBER 1990 MEETING
1990 - 1991 PLAN

RESEARCH PLAN - EGYPT

I. SOIL

Based on the experience of the first year and the previous recommendation in the soil survey report, organic manure application is considered to be one of the most important agriculture practices in improving soil physical and chemical properties. Therefore the plan for the coming season still includes a detailed quantitative evaluation of the effect of different manure applications as follows:

1. Bulk density in the subsequent layers of the profile.
2. Penetrometer resistance which is related to soil strength.
3. Root system performance and root distribution.
4. Infiltration rate and aggregate stability.
5. Availability of micronutrients.

These measurements will be done in statistically designed experiments in two greenhouses using two different sources of manures, and three application rates and two methods of application. The following will be undertaken:

- Study the effect of using chicken manure in the sand culture greenhouse (subsurface application) and compare it with the untreated greenhouse.
- Work with the fruit and vegetables group on salinity management in the site. This will include monitoring soil salinity and suggesting the proper management to avoid or to eliminate its effect on the plant growth. This will also include practices like irrigation intervals and leaching.

II. IRRIGATION MANAGEMENT

Introduction

The main purpose of irrigation is to supply plants with water needed to obtain the optimum yield and desired quality in arid and semi-arid regions. Irrigation has long been essential to crop production as it is the only resource of water supply. The selection of a suitable irrigation method plays an important part in the planning of an irrigation project. The object of obtaining high application efficiency and a uniform distribution as well as water delivery to the effective root zone, with low costs, must be taken into account.

Therefore we are looking for suitable irrigation methods and technology which not only save water but which also reduce the costs.

General Objectives

1. Technical and economic evaluation of each irrigation method taking into consideration the Western Desert conditions (soil and topography, water supply and quality, water requirements, management and labor availability).

2. Collecting the necessary data from field trials to guide the farmers through an extension and training program for every irrigation method, so as to follow optimizing conditions for both crop production and irrigation management.

3. Collecting accurate data about water use efficiency, capital cost per feddan and recurrent cost/feddan/annual (labors, power, repairs and maintenance) for each irrigation method.

4. Determining soil salinity and salt accumulation throughout the study of the salt balance under the different irrigation methods.

To achieve these objectives, two irrigation methods are selected as follows:

a) Sprinkler irrigation, portable hand moved system.

b) Micro-irrigation systems (drip and microspray).

The General System adopted is accomplished in the following stages:

1. The first stage occurred before the start of the project in 1989, and consisted of the following:
   a) Diversion, including an operative water reservoir (6000m^3).
   b) Pumping devices: (2 pumps, each 90m^3/h at 60m head and the third as stand-by unit).
   c) Main and sub-main pipe lines (200, 160, 110 and 90mm).
   d) Control heads (3").
   e) Sprinkler irrigation equipment.
   f) Trickle irrigation equipment on emitters, and built-in drip line. Systems for orchard and vegetables (5 feddan).
   g) Microspray irrigation system for flower production (2 feddan).

2. The second stage occurred in the first year of the project (1989 - 1990):
   a) Drip irrigation system for 22.3 feddan orchard (on-line emitters, 4 and 8 Lph).
   b) Drip irrigation system for 32 greenhouses (vegetable; built-in drip lines system).
   c) Microspray irrigation system for 1 feddan for the nursery.
   d) 50% of the area is covered by open drainage system.

3. The third stage outlines the present and future irrigation and drainage works:
   a) Drip irrigation system for 16 greenhouses (vegetable).
   b) Drip irrigation system for six greenhouses (flowers).
   c) Tile drainage system of the whole area.

Suggested Investigations and Objectives

The research and investigations on the experimental center include the following:

1. Technical and irrigation technological research.

2. On-farm irrigation management research.

   a) Technical and irrigation-technological research.

      1) Testing the sprinkler and trickle irrigation equipment (hydraulic measurements).

      2) Investigation of different sprinklers and emitter spacing for the optimum distribution of the best application rate.

      3) Study of using modern chemigation techniques.

Surface and Subsurface Trickle Irrigation Management in Greenhouse, Open Field and Orchard

Objectives:

1. Study the effect of lateral line length and spacing and orifices discharge on moisture, salt and root distribution in (Calcareous) soils.

2. Evaluate irrigation frequencies and water quantities and rates in term energy conserving trickle systems.

3. Study the possibility of using modern chemigation techniques.

4. Study the effect of irrigation system and treatment on pest management.

5. Evaluate the potential of producing high-value crops irrigated with surface and sub-surface trickle systems.

Treatments:

Irrigation requirements (including leaching requirements) and intervals of some crops under surface and sub-surface drip irrigation are as follows:

Crops:

Tomato; Cucumber; Pepper; Cantaloupe; Flowers; Orchard (fruit crops)

Irrigation requirement:
a) 0.75 EP
b) 1.00 EP

Irrigation frequency:
Daily
Twice weekly
Three times weekly

Irrigation rates:
a) 2 emitters/trees 4 Lph (8 Lph/tree) fruit crops.
b) 2 emitters/trees 8 Lph (16 Lph/tree) fruit crops.
c) 2 and 4 Lph/0.5m drip line for vegetables.

The research work will include the following:

1. Determination of the optimum water requirements and plant-soil water relationships of different crops.
2. Studies of salt balance under the different treatments.
3. Methods of applying chemicals through drip systems.
4. Pest management.
5. Types of chemicals for reducing emitter clogging.
6. Studies of fertilizer uptake and distribution.
7. Investigation of profitability (net income rate) under different irrigation systems and treatments.
8. Economic evaluation of the different irrigation systems.

Measurements:

1. Water requirements, timing and rates.
2. Moisture and salt distribution.
3. Fertilizer distribution.
4. Timing and rate of chemicals applied.
5. Concentration of chemicals in irrigation water.
6. Salt content in the different soil layers.
7. Root distribution and rooting pattern.
8. Water-use efficiency.
9. Cost.
10. Yield (quantity - quality).
11. Chromatological measurements (temperature, relative humidity, wind, etc.).

III. VEGETABLE CROPS

Seven crops will be planted this season as follows:

PLASTIC HOUSE CROPS

1. **Cucumber**

   a) Sowing Plan:

   Three planting dates, mid-September, late January and early May. All double cropping.

   1) Mid-September followed by tomatoes planted late January.
   2) Mid-September followed by late January.
   3) Tomatoes planted in mid-September followed by early May.

   b) Management and Technology:

   Effect of plastic mulch: for the January planting three mulching treatments: black, clear and no mulch, each replicated four times, 6m per plot.

   Single vs double row for all seasons, four replications.

   Sand culture double cropping, September and mid-January.

   c) Varieties:

   One short house for varietal trials for the three seasons. Possible candidates: Picobello, Katia, Corditao, Kessem, Rawa.

2. **Tomato**

   a) Season: Mid-September and January:

   1) Three cherry varieties and one BR variety, grown in short greenhouse with four replications.
   2) Repeat last years varieties during the two seasons: Five Varieties: Carmelo, FA144, F160, F140, F111, N-65, grown in one short house.

   b) Management and Technology:

   Sand culture greenhouse. September planting using two cultivars: Carmelo, and FA144.

   Breeding Program: One short house for comparison of new lines, planting in October.

3. **Melon**

   a) Agromanagement Technology:

   Planting dates: October, November and December, October and November sowing, December planting vs sowing. Pruning: One vs two branches.

   For the above treatments, short greenhouses will be used.

   b) Varieties:

   Four cultivars: Gaila, Arava, Galia C4 and Galia C8 will be planted in all three seasons, replicated four times using clear plastic mulch.

   c) Manure Application:

   Three rates of application of chicken manure 1, 3 and 6 liters/m^2 will be used, using surface and sub-surface application. This experiment will be carried out using tomatoes in two long greenhouses.

   d) Integrated Pest Control:

   White fly (*Bemisia Tabacci*) control. Side covering and top covering. Starting mid-September. Four types of sprayers to reduce insecticide use.

4. **Pepper**

   a) Two planting seasons: Mid-September and mid-February.

   b) Cultivars: Seven or eight cultivars in the two seasons.

   c) Management and Technology: One row vs two rows in the early season.

5. **Eggplant**

   a) One planting season: Mid-September.

   b) Cultivars: Six cultivars with four replications.

6. **Squash**

   Maayan cultivar: Two planting dates. October and November, using short greenhouses.

7. **French Beans**

   One short greenhouse. Planting mid-October using two cultivars.

The irrigation and fertilization management of these crops will be as follows:

Irrigation quantity: 75% and 100% EP.

Irrigation intervals: daily, every second day and twice a week.

Water discharge: 2 vs 4 liter/hr. Drip spacing-50cm. Surface vs sub-surface irrigation.

All treatments are used in cucumber. Trials will be conducted in September, planting some trials for open field cucumber.

OPEN FIELD CROPS

1 **Tomato**

a) The varietal test will include about ten cultivars, replicated determinate cultivars.

b) Indeterminate cultivars: Four cultivars. Two planting dates: September and January. The later under low tunnels.

2. **Cucumber**

Varietal trial under low tunnels October planting. Five cultivars: two seedless and three seeded planting in January.

3. **Melon**

Low tunnels, mid-December using five cultivars.

4. **Sweet Corn**

Varietal trials. Three cultivars and four planting dates: February, April, July and September.

5. **Other Crops**

Artichoke, lettuce.

IV. FRUIT TREES

General Maintenance of Orchard

1. Drainage system, main canal depth should be 3m and sub-main should be 2m at least. Drainage water should be pumped out to the main drainage canal.

2. Introduction of irrigation computer for controlling fertigation in the various plots according to the need of each plot.

3. Installation of permanent drip system consisting of in-line pressure compensating emitter spaced 1m apart.

4. Buy tensiometers and soil extractor for measuring soil, water and mineral composition (5/plot).

Completion of planting different species and varieties on the basis of the plan for year one with minor change.

Introduction of different varieties as bud wood and graft them on available local rootstocks as well as using of available bud from Maryut and local orchards.

All grape materials are available this year and will be planted this coming season as soon as they are released from quarantine. The rest of cultivars will be bought from local markets. New grape cultivars may be imported from the University of California at Davis.

Importation of Elliot Pear from the United States and Peach-Almond hybrid (Hansen 538) as rootstock for Peach and Almond is needed.

Preparation of trellising system for grape training is highly needed as soon as planting takes place next season (February 1991).

Plan for Research

1. Comparison of growth habit, bud opening percentages, time of bud opening of different apple cultivars grafted on different rootstocks.

2. Comparison of different pear and persimmon cultivars in respect to vegetative growth, percentage of bud opening and chilling requirements for each cultivar.

3. In cooperation with soil and water specialists, different water regimes and different fertilizer levels will be compared for different crops.

4. Evaluation of different budding levels of different cultivars and rootstocks.

V. EVALUATION OF QUALITY ATTRIBUTES OF NEW GENOTYPES THAT HAVE ACCEPTABLE YIELDS

Appearance

Color: Minolta color difference meter

Size and Shape: Weight, length and width

Defects: Subjective score (1=none, 5=severe)

Firmness

Penetration Force: Effegi penetrometer

Deformation Force: Deformation tester

Juiciness: Juice extraction and volume determination

Taste (Flavor)

Soluble Solids: Refractometer - sugar analyzer

Titratable Acidity: Titrator

Aroma Intensity: Subjective score

Taste (Overall Flavor): Subjective (taste panel)

Ascorbic Acid

Colorimetric determination

The above parameters will be ascertained for each crop as follows:

	Appearance Cs & CD	Firmness SSC	& TA	Taste Aroma	(Flavor) Overall		Ascorbic Acid
1	Tomato	/	/	-	/		/
2	Eggplant	/	-	-	/	(bitterness)	/
3	Pepper	/	-	-	/	(sweetness) (off-flavors)	/ /
4	Cucumber	-	-	-	/	(bitterness)	-
5	Cantaloupe	-	ssc	/	/		-
6	Watermelon	-	ssc	-	/		-
7	Sweet Corn	-	ssc	-	/	(sweetness)	-
8	Green Beans	toughness	-	-	-		-
9	Artichoke	-	-	-	-		-

Sampling for Quality Evaluation

All Genotypes must be picked at the exact same stage of maturity. Sampling design as follows:

20 Tomatoes

8	12	(IS)*
quarters	remainder	

2, 4 quarters as two replicates of tomato for chemical analysis and taste test.

3-5 replicates of 20 tomatoes

dice 20 fruits

chemical analysis	taste testing

violatiles, non-volatile

Sample Size per Genotypes

3-5 replicates

Replicates can either be 5-15 units or single units for each replicate.

Appearance

Firmness

Taste

Chemical Analysis: scc, TA, AA

Total Number of Samples

9 commodities x 5 cultivars x 3 harvest dates = 135

VI. CULTURAL PRE-HARVEST PRACTICES, POST-HARVEST LIFE OF GENOTYPES (One Genotype per Test) AND RATE OF DETERIORATION

Cultural Practices to be Evaluated

1. Microenvironment = temperature x humidity x light intensity
   a) Plastic house
   b) Tunnel system
   c) Open field
2. Water Quantity
   a) 100% of ET + leaching requirements (daily; 3 times/wk)
   b) 75% of ET + leaching requirements
   c) 125% of ET + leaching requirements
3. Fertilization
   a) No organic fertilizer
   b) Organic fertilizer (chicken manure)

Quality Parameters to be Evaluated

Evaluation criteria will be similar to that used for soils.

Number of Samples

1. 3 treatments x 3 harvest dates = 9
2. 6 treatments x 3 harvest dates = 18
3. 2 treatments x 3 harvest dates = 6

33 samples

Maturity at Harvest vs Eating Quality:

Tomato:	Color
Eggplant:	Size & Color
Pepper:	Size & Color
Cucumber:	Size
Cantaloupe:	Surface Netting & Stem Abscission
Watermelon:	Size, Dryness of Tenderils
Sweet Corn:	Milky Stage of Kernels
Green Beans:	Size & Seed Development
Artichoke:	Size, Color & Tenderness of the Bracts

Extension

Need to prepare some visual aids to use in training the harvest crews.

Preparation for Market:

Harvest in Buckets
Accumulation in Plastic Boxes
Transport to Packing Station
Accumulation Under Shade
Dumping on Sorting Tables
Sorting by Color, Overall Quality and/or Size
Packing in Fiberboard Boxes
Shipping and Temporary Storage

Items to be Purchased or Constructed

Dumping and Sorting Tables
Conveyor Belts (rollers)
Walk-In Controlled-Temperature Room (range 0-15°C, large coil to ensure high RH)

Produce Throughout the Year

Statistics of produce will be kept by month as follows:

Month	Vegetables	Fruits	Ornamentals Cut Flowers & Foliage
J			
F			
M			
A			
M			
J			
J			
A			
S			
O			
N			
D			

Design for 20 tons/day. Assume 5 hours of operation, 4 tons/hr, 4000kg, or eight-hundred 5kg packages/hr, 16 packing points at 50 packages/hr.

Controlled-Temperature Room:

Range between 0-15°C, high RH, 20 tons minimum

Palletization:

Fork-lift

Pallet-Jack

Maintenance:

Develop a schedule for maintenance of all equipment.

Develop a quality and safety assurance program.

Roadside Stand:

Develop a model roadside stand.

Simple, relatively inexpensive to build structure.

Shade all day long, good air flow.

Display structures (washable for easy cleaning).

Scale and cash register.

VII. ORNAMENTALS

Recommendations for research and demonstration in Ornamental Horticulture for the Maryut Project.

In the first year, little progress can be reported on the ornamentals program for the Maryut site. This phenomenon reflects delays in the acquisition of plant material, and in site preparation, as well as the strong concentration on vegetable production and fruit tree establishment in the first year.

A group of rose cultivars from tissue culture, and therefore with their own roots, have been planted in one of the plastic houses. Although not part of the original project design, it is proposed to manage these plants for at least for one year, to determine how they perform, and to provide experience in the techniques of rose cultivation.

An important part of the ornamental activities during the first year was the production, in Israel, of materials for ornamental plantings and low maintenance cut flowers and foliage. These materials will be utilized in the coming year in the landscape area of Maryut and in a specialized planting to determine their utility for cut flower and foliage production.

The difficulties of the Maryut site are less keenly felt in the area of production of ornamentals than in the production of food crops. Modern ornamental production largely uses artificial soils, so that the nature of the substrate at Maryut is less important for these materials than for fruits and vegetables. In addition, the potential for substantial returns which makes ornamental production a desirable activity for a project that is designed for rapid demonstration of superior productivity.

Landscape Ornamentals

1. Overall Plan

A comprehensive list of plants adapted to desert conditions and soils has been drafted by Dr. Ben Dov, and will be amended by additions of other plants known in Egypt, Arizona, and California to be similarly adapted. These plants would be appropriate for landscaping homes and other sites in desert areas, and the list includes trees shrubs, prostrate plants, and lawn grasses. It is proposed to address the intent to provide information on landscaping possibilities in three ways:

a) By establishing an ornamental planting (along the roadside portion of the property), containing as large a number as possible of these species. This planting will serve three major functions:

   1) An investigation of the adaptation of the different plants to the specific microenvironment of the Maryut area.

   2) A demonstration of the range and properties of plants from which landscaping, windbreak, and border plants can be chosen.

   3) Provide a pleasing roadside for the Maryut project.

b) By establishing one or two demonstration landscapes appropriate to typical farm and village housing in the desert area. This might be done in conjunction with present or planned buildings on the site (office block, tractor shed, or pesticide facility, for example), or by actual model houses (perhaps later in the life of the project). A further interesting possibility is to design a public garden incorporating design elements typical and familiar in Egypt.

c) By developing leaflets outlining suggestions for different landscaping approaches, including lists of possible plant materials relating to the ornamental planting at the Maryut site.

2. Implementation

The soil in the area designated for the demonstration planting should be drained with tiles, amended, and leached. Irrigation will be by the standard drip technique; emitters will be placed appropriately to the final planting plan.

A simple planting plan has been designed by the ornamentals group of the Technical Panel in cooperation with project staff. Elements of the design include vistas from the road through the planting to the project, and paths and seats to simplify the use of the planting as a demonstration area. The center of the planting comprises a lawn area which serves as the evaluation area for turf species.

The proposed planting materials have been prepared in Israel, and will be imported as soon as the site is ready, and any quarantine issues have been resolved. In passing, we suggest that it would be convenient, and appropriate, if the Maryut site could be designated as a post-entry quarantine location, to simplify the process of introducing new plant materials to Egypt.

As soon as possible, the Egyptian team will determine which of the plant materials suggested can be readily imported without major quarantine requirements. The Israeli team will obtain the phytosanitary certificates, and arrange shipment when site preparation is complete.

Desert annual seeds provided from Israel and the United States will be planted among the demonstration crops to provide not only immediate display but also an opportunity to evaluate these plants in the Maryut environment. Immediately after planting, the whole area will be irrigated to initiate seed germination and assist plant establishment.

3. Evaluation

In the initial year, evaluation will be restricted to the determination of suitability and growth rates of each of the perennial species, and the desirability of the different annual species. Subsequent evaluation will include aesthetic and maintenance characteristics of the different materials.

4. Action Points

a) Soil and Site Preparation:

- Completion of site preparation: September 18 (Dr. Gindy).
- Bed preparation, according to the plan, and laying of drip lines: by mid-October (project staff).

b) Plant Material:

- Preliminary requests to quarantine authorities as to acceptability of the genera available: mid-September (El-Gamassy) - information to all parties (El-Gamassy).
- Desert annual seeds to be obtained from the United States, Egypt and Israel: mid-October (Biran, El-Gamassy and Reid).
- Final selection of plant material, and information to all concerned: first of October (El-Gamassy).
- Preparation of plant material and obtaining phytosanitary certificate: mid-October (Ben Dov).
- Shipment of plant material - after confirmation of site readiness and lack of visible quarantine problems: mid-October (Ben Dov).
- Planting: by late October.

c) Evaluation Times: February 1; May 1; August 1; November 1.

Floricultural Production in Protected Cultivation

1. Overall Plan

The purpose of this part of the ornamentals project will utilize Egyptian and overseas expertise in demonstrating modern techniques for production of existing ornamental crops, and to demonstrate the production of , and market potential for a group of newer corps. We plan to test in-soil cultivation, and the use of the sand-culture technique, using drip irrigation and liquid feed without recirculation.

2. Implementation

a) Roses:

Because of the importance of roses in Egyptian floriculture, and the popularity of these flowers with consumers in Egypt and overseas, it is proposed to plant one short greenhouse with roses, with the intention of learning production techniques, and testing rootstocks, soil management, and varieties.

The rose house will be situated with the ridges running north/south, and will have ventilation curtains on each side running up to 2 meters, to provide sufficient ventilation under summer conditions. In the same house, sand culture in three plastic-lined beds drained with tiles, and irrigated and fertilized by drip will be directly compared with culture in amended soil, formed into three 30cm high beds, and irrigated similarly. The irrigation system will be split to allow for differences in irrigation and nutrition between the sand and native soil beds. The cultivars to be used will be three, selected from hybrid tea varieties presently cultivated in Egypt, and new varieties adapted to local market demand. Red (Mercedes), yellow (Frisco), and pink (Sonia) are the recommended cultivars.

Because of the special character of the soil at the site, it is planned to sow the plants on three different rootstocks: Indica major, canina, and manetti. The whole planting will comprise a split plot fully randomized block experiment with in soil and soil-less culture as the main plots, and varieties and rootstocks as the sub- and sub-sub-plots, respectively.

It is probable that the plant material will require preparation on site. Therefore, we will acquire for the desired rootstocks (probably available in Egypt), and the scions (Mercedes and Sonia from Egypt, Frisco from Israel). Rootstock plants will be established in the nursery or the present rose greenhouse to provide sufficient growth for preparation of mini-plants. Once sufficient material is available, mini-plants will be prepared using standard techniques (mini-grafted, and rooted simultaneously on the mist bench). The mini-plants will then be cultivated in the rose house.

b) Other Crops:

In the other floriculture production house, we suggest that five crops be selected from the following list, which includes some traditional crops, as well as some that are new to Egypt. All grow readily, and should provide the "immediate success" that we desire on the project.

- *Alstroemeria*
- *Solidaster*
- *Long-stemmed Ranunculus*
- *Tuberose*
- *Liatris*
- *Lisianthus*
- *Spray Chrysanthemums*

Project Coordinators in Egypt, Israel, and the United States will confer to decide which of the crops will be used, a decision which will be made largely on the basis of the ready and early availability of planting material.

The whole house will be set-up for sand culture. In this house, we suggest 5x1m wide beds, which allows more space between the beds than might be used commercially, but will provide for ease of movement during demonstrations.

Soil in both houses will be sterilized after bed preparation with *methyl bromide* (MeBr) to reduce the risk of problems arising from diseases, pests, and weeds, and then flushed with at least 200mm water to remove MeBr residues.

3. Evaluation

Rose production will be slow in getting under way, but evaluation of the ease of production of the different rootstocks, and the success of the mini-plant production technique and their success rate and rate of establishment in the production house will all provide important information.

In the case of the other crops, careful records of growth rate, dates of first appearance of buds, first harvest, vase life of some flowers of each cultivar (in DI water) will be an important addition datum. The vase life studies can be carried out in the main conference room.

4. Action Plan

Identification of sources of rose rootstock materials for nursery production: mid-September (El-Gamassy).

Planting of rootstock mother plants in rose house: October (project staff).

Identification of five crops for the production house: late September (Ben Jacov, Reid, El-Gamassy).

Sourcing and transport of plant materials: mid-October (relevant cooperators).

Planting of production house: late October (project staff).

Evaluation of growth, production, of floricultural crops: weekly, copies to all coordinators (project staff).

Accumulation of bud material and preparation of rose mini-plants: All coordinators to decide on timing, depending on growth of stock mother plants.

Post-harvest life of different cut flower crops: as appropriate (post-harvest team, Reid).

Screen-House Production

1. Overall Plan

In this part of the project, we plan to demonstrate the production of a number of ornamentals at the Maryut site in native soil, and to test the proper lighting conditions for producing optimum quality crops. Crops producing cut flowers or cut foliage will be grown at three light intensities.

2. Implementation

The Technical Panel requests the construction of a screen house, 10x20m, with screening split in two sections, one 30%, one 60% shade (approximately). The house will be constructed in a location which will permit plants to be placed outdoors in beds continuing from the shaded area. We suggest testing in the following species:

a) For Cut Flowers:

- Bird of Paradise (*Strelitzia regina*)
- Large Calla Lily (*Zantedeschia Aethiopica*)

b) For Cut Foliage:

- Variegated euonymus
- Large-leaved ruscus
- Bronze New Zealand flax (*Phormium tenax*)

3. Evaluation

Once every month, the growth, and flowering of the test plants will be recorded in the different light intensities. Photographs of significant differences will provide a useful permanent record of these effects. The production of flowering and foliage material over the production period will be recorded. Simple evaluation of the post-harvest life of the products will also provide information useful for the local market.

4. Action Plan

Preparation (sterilization, amendment, tilling, etc.) of soil, provision of irrigation equipment, and construction of the screen house. Early November (project staff, information to all cooperators).

Sourcing of plant material. Mid-November (project staff with inputs, if necessary, from El-Gamassy, Reid, and Ben Jacov).

Potted Flowering and Foliage Plants

1. Overall Plan

It is planned to demonstrate the latest methods for producing potted plants, incorporating Egyptian expertise in local market requirements, and potential sources of the components of artificial media, as well as overseas developments in engineering for efficient and cost-effective production.

2. Implementation

a) Greenhouse Structure:

We suggest using one of the production tunnel houses for this part of the project, erecting over it (outside) a 50% shade-cloth screen to reduce light and summer heat. This screen might be replaced, in winter months, with a screen inside the tunnel. The house will be split into two sections, a small section (10m long) containing fixed benches providing bottom heat and covered with small polyethylene tunnels for

propagation, and the rest in long benches, 1m wide, rolling on simple pipe structures, and equipped for drip irrigation of potted materials, and overhead irrigation for liners, and to clean foliage before sale.

For preparation of the medium, we will require peat moss, sand, and vermiculite, immediately, and, later, alternative organic materials as identified by the team. The preparation will require a mixer (concrete mixer or other) and a large box which can be sealed and in which sterilization can be achieved with methyl bromide.

b) Production Techniques:

A small range of crops representing different propagation strategies is suggested via:

- Large-leaved pothos (cutting propagation)
- Spathyphylum (tissue culture propagation)
- Monstera (seed propagation)
- One flowering plant, e.g. Guinea Impatiens (from seed)

These materials will be grown in soil-less mix prepared with local materials. Initially we will use imported peat with local sand and vermiculite, pending identification of a reliable local source of a consistent organic amendment. Irrigation and fertilization will be by the standard trickle systems already in use in some Egyptian nurseries.

3. Evaluation

Recording growth of the crops, flowering dates, and dates of removal (at commercial maturity) must be recorded on a weekly basis. Once flower production commences, information should be recorded on production and quality (physical characteristics and post-harvest life).

4. Action Points

Sources of foliage cuttings or other propagules. Mid-September. (El-Gamassy, in consultation - if necessary - with Ben Jacov, Reid, and project staff).

Shade house constructed: mid-December (project staff).

First propagation carried out: mid-January (project staff).

Potting of rooted cuttings: late February (project staff).

Evaluation: weekly, until potted material is in saleable condition.

Turf

1. Overall Plan

Turf cultivars selected in Egypt, Israel, and the United States as being suited to desert condition, will be planted in a demonstration/research area.

2. Implementation

Selected turf varieties will be planted in 100m^2 plots, and will be in soil that has been prepared and sterilized. Plots will be sprinkle irrigated to maintain the open pan ET, and fertilized through the irrigation water. Varieties that are suggested as possible candidates include species or selections of the following:

Paspalum vaginatum	Durban grass (*Dactylotenum australe*)
Bermuda grass (*Cynodon dactylon*)	St. Augustin grass (*Stenotaphylum secundatum*)
Improved bermuda	Hybrid bermuda (*Santa Anna*)
Buffalo grass	Zoysia matrella
Zoysia japonica	

3. Evaluation

Once established, plots will be monitored weekly to evaluate percentage cover. Once complete cover is established, plots will be maintained with medium maintenance (regular irrigation, mowing once per week, and fertigation). The overall quality of the turf will be evaluated at quarterly intervals.

4. Action Points

Preparation of site, fumigation, and leveling: mid-February (project staff)

Identification and sourcing of turf-grass propagules: mid-February (El-Gamassy, Reid, Biran).

Quarantine clearance: late February (El-Gamassy)

Shipping: late February (Reid and Biran)

Planting: early March (project staff)

Evaluation: weekly until complete closure.

Flowering and Foliage Branches

1. Overall Plan

A range of desert-adapted ornamental shrubs and trees with branches judged suitable for cut foliage and flowers have been selected and tested by Dr. Ben Dov and his colleagues. These materials will be evaluated at the Maryut site in terms of their adaptability to the soil and water type, their productivity, and the acceptability of the cut branches in terms of vase life, and potential on the local and international cut flower markets.

2. Implementation

a) Soil Preparation:

A 1 feddan site on the property will be selected by the project manager, and need not be continuous with the other ornamental plantings. Weed control with a broad spectrum non-residual herbicide should be carried out immediately. The soil may be the worst available, and needs to amendment, but should be tilled to 35cm prior to planting.

b) Plant Materials:

Liners of 15 selected species have been prepared in sufficient numbers to plant a total experimental area of $3000m^2$. The plants will be planted according to the suggested arrangement, which groups foliage and flowering branches separately. Before planting the area should be prepared for drip irrigation:

- for the flowering branches, one dripper (2/1h) for every tree, i.e. at 2m spacing.
- for the foliage branches, one dripper (2/1h) for every tree, i.e. at 1m spacing.

c) Cultivation:

In the first year, the plants will be left to grow freely, with sufficient irrigation to maintain rapid growth. Care must be used not to over-irrigate the young plants. Maximum irrigation of the fully-grown plants is $<2400m^3$/feddan/year. Nutrition should be through the drip lines with a balanced fertilizer containing macro and micronutrients, and a nitrogen level of 60ppm.

3. Evaluation

Irrigation of the growing plants should be monitored by recording the volume applied to the plot from the water meter, and soil moisture as registered by one or more tensiometers in the block, at regular intervals. Shaping, harvesting, and determination of quality, vase life, and acceptability will be carried out once the plants are fully grown (after one year). In the first year, we suggest evaluation of general appearance and growth every three months. Photographs of representative plants every three months will help maintain a record.

4. Action Points

a) Soil and Site Preparation:

Selection of site and application of herbicide: by late September.

Ploughing, bed preparation, and laying of drip lines: by mid-October.

b) Plant Material:

Preliminary request to quarantine authorities as to acceptability of Melaleuca and Eucalyptus with phytosanitary certificates: mid-September (El-Gamassy); information to all parties.

Preparation of plant material and obtaining phytosanitary certificate: mid-October (Ben Dov)

Shipment of plant material, after confirmation of site readiness and lack of visible quarantine problems: Mid-October.

Planting: by late October.

c) Evaluation Times: February 1; May 1; August 1; November 1.

TIME SCALE AND PRIORITIES FOR IMPLEMENTATION

Obviously, the extent of the project will require a commitment for very substantial financial and manpower resources, and this point, we think it important to take steps to provide the necessary physical structure, and to start with at least some of the plantings. Early priorities that seem important are:

1. Seed Propagated Crops:

   If possible, obtain best-quality seed lines for selected seed-propagated crops. Raise seedlings insoil-less medium to transplanting stage.

2. Acquisition of Plant Materials:

   The overall plant for ornamentals needs to be developed with time lines for various components, in order to ensure timely delivery of plant materials and necessary equipment.

3. Soil Preparation:

   As the whole site is prepared by installing drain lines, the area selected for ornamental production should be similarly drained. Soil should then be amended as desired, leached sufficiently, and then sterilized (outdoor and shadehouse area) with methyl bromide.

4. Seed Propagated Crops:

   Once the soil preparation is complete, the transplants provided in #1 (above) can be planted in the field and in one of the commercial plastic tunnel houses. At this time, we will require the proportioning equipment necessary to irrigate and fertilize these crops.

5. Screen House:

   The construction of the screen house will provide a place for planting the existing Strelitzia plants, and for the other flowering and foliage materials envisaged for this site. We'll need the fertilizer equipment for here as well.

6. Potted Plants:

   A screen can be erected over the plastic tunnel house designated for the potted plants, and the propagation benches erected and used for starting production until the roller benches are constructed and bottom heat and mist equipment is obtained.

7. Erection of Greenhouses:

   The construction and furnishing of the two ornamental production houses is an important part of the program. As soon as these greenhouses are ready, the beds can be formed, and sterilized prior to planting.

8. Establishment of a Temporary Nursery:

   Since plant materials are likely to arrive before they are needed, and since we want to work on obtaining materials right away, the selection of a nursery area as a temporary holding area for plant materials in both production and landscape efforts is necessary.

VIII. EXTENSION ACTIVITIES

1. Prepare simple leaflets will good illustrations to inform producers in the area about optimum maturity for various vegetables.

2. Leaflet: How to design and build a roadside stand.

3. Leaflet: How to design and build a preparation for market and temporary storage facility.

RESEARCH PLAN - ISRAEL

I. MARKETING

1. Complete tomato marketing survey in Europe.

2. Complete melons marketing survey in Europe.

3. Analysis of production costs for tomato production in greenhouses.

II. POST-HARVEST

1. Determination of simple and replicable chemical indicators of fruit flavor quality for the tomato cultivars FA111 and FA114.

2. Commence studies on simple and replicable chemical indicators of the fruit flavor quality for Galia melons.

III. DEVELOPMENT OF NEW CUT FLOWERS FOR WINTER MARKET

Force-flowering of Eryngium Plannum and Limonium Caspia during winter:

a) Vernalization temperatures and duration.

b) Daylength requirement for floral indication.

c) Optimal temperatures for winter flowering.

Small plot production of Circium Japonicum, Labelia fulgens and Lyturium salicaria.

IV. DEVELOPMENT OF WOODY PLANTS FOR CUT FLOWERS

1. Grafting studies of several commercial cultivating of Leucodendron and other members of the proteaceae family on the high PH tolerance "Orof" rootstock.

2. Planting of grafted plants in various soil types and environments.

V. ENVIRONMENTAL LANDSCAPING WITH NATIVE ANNUALS

1. Studies on commercial seed production of native annuals (Pappaver spp. Mathiola, etc.; sowing dates, agromanagement, harvesting technologies, germination requirements).

2. Production of artificial carpet of seed mixes: Selection of appropriate cotton cloth, effect of seed coating with nutrients assessment of visual effects.

VI. DEVELOPMENT OF EUCALYPTUS FOR FLOWERING & DECORATIVE BRANCHES

1. Irrigation Trials: Effect of three levels of water application (200, 400 and 600mm) on quality and quantity of flowing branches.

2. Grafting trials of selected cloves: type of bed wood, season, size of rootstock.

3. Rooting of selected cloves: pretreatment of cutting, rooting media, hormonal treatment, a level environment.

4. Tissue culture propagation.

COOPERATION

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 SDSU 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.

TECHNICAL CONSULTANT PANEL

The major mechanism for cooperation among Maryut participants are the meetings of the Technical Consultant Panel, a 22-member group of scientists from Egypt, Israel and the United States.

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 Technical Consultant Panel met again in December 1989 and the theme for the second meeting was to define a plan of operation for the project that would provide both long- and short-term results. Members of the panel also reviewed progress at the Maryut site. The Panel's third meeting occurred in September 1990 and concentrated upon a review of the project achievements during its first year of operation, as well as defining long-term operating plans for the Maryut Project for its second year and beyond. (A list of the members of the Maryut Technical Consultant Panel is found in the Organizational Structure section, pages 50-56, of this report; a more detailed synopsis of the activities of the Panel will be found in Appendix C and in the work Plan section, pages 17-40, of this report).

The Technical Consultant Panel meetings not only serve as a mechanism for cooperative efforts between Egyptian and Israeli scientists, but also are a major tool for the participation of United States scientists 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 Consultant Panel have been held in Egypt and have included a site visit to Maryut as a principal part of the meeting.

VISITATIONS: MANAGEMENT AND SCIENTISTS

In addition to the Technical Consultant 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 the Maryut site by Israeli Coordinator, Dr. Dov Pasternak.

Another critical segment that exemplifies cooperation is the on-site participation of Messr. Itzhak Ayalon, the Israeli Technical Advisor, who resides in Egypt in order to fulfill his daily assignments 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 on-going 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 initial meeting in February 1989 to review and adopt the original implementation plan for the first six months of the project (March to September). These activities included the approval of the subagreements; hiring of staff; Consultant Panel Meeting; procurement of equipment; land preparation; establishing greenhouses, open field crops, nurseries; and arranging for scientific visitations. This first meeting occurred in London. ???

In October 1989, the Steering Committee met a second time to review technical progress at the Maryut site. The Committee also approved the implementation of activities for the period September 1989 through March 1990. This meeting was held in Amsterdam, Holland.

A third meeting was held in September 1990 at Alexandria, Egypt and included a visit to the Maryut site to view progress and production. The Committee also reviewed the preliminary report of the Technical Consultant Panel meeting, September 2-6, 1990, as well as the project's technical progress. Other business included approval of the implementation plan for the next period of activity at the site.

The Steering Committee consists of nine members; three are from Egypt, three from Israel and three from the United States. Project Coordinators included in this membership are: Dr. Adel El-Beltagy, Undersecretary of State for Land Reclamation, Egypt; Dr. Samuel Pohoryles, Director General, Rural Planning Authority, Israel; and Mr. Harry Albers, General Manager, San Diego State University Foundation, United States. Ex-Officio members of the Committee are Dr. Dov Pasternak, Israeli Chairman of the Technical Consultant Panel, and Dr. Mohamed El-Assal, United States Administrative Coordinator. A full listing of members is found in the Organizational Structure section of this report.

NEWSLETTER AND OTHER PUBLICATIONS

Regular publications provide the means for the dissemination of project research, results and cooperative activities. Such publications 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 Winter 1990 Newsletter is included as Appendix C to this report and serves as an example of the project's informal publications.

TRAVEL: INTERNATIONAL

Steering Committee Nine members

Steering Committee meetings provide the mechanism for scientific and technical planning and overall direction for the Maryut Project (see page 51). Three meetings were held in this report period.

Steering Committee Meeting: London (February 16-17, 1989) ? Vice Dr Irit Rilski

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

Others Attending: Dr. Dov Pasternak (State of Israel); Dr. Mohamed El-Assal, Ms. Frea Sladek, Ms. Davene Gibson, and Mr. David Moore (United States).

Steering Committee Meeting: Amsterdam (October 22-23, 1989)

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

Others Attending: Dr. Dov Pasternak (State of Israel); Dr. Mohamed El-Assal, Mr. Steven Bloom, Ms. Frea Sladek, Ms. Davene Gibson, and Mr. James Rice (United States).

Steering Committee Meeting: Alexandria, Egypt (September 24-25, 1990)

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

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

TECHNICAL CONSULTANT PANEL

The meetings of the Technical Consultant Panel provide the major mechanism for cooperation among Egyptian, Israeli and United States scientists involved in the Maryut Project (see page 53).

Meeting: Cairo-Alexandria, Egypt/Maryut Site (May 12-15, 1989) 13

Members In Attendance: Dr. Adel El-Beltagy, Dr. Mohamed Maksoud, Dr. Amin El-Gamassy, Dr. Mohamed Hashim, Dr. Achmed Abdel Fatah, Dr. Zaki El-Sawi (Arab Republic of Egypt); 6 Dr. Dov Pasternak, Dr. Samuel Pohoryles, Dr. Arie Szeskin, Dr. Irit Rylski, Dr. Ruth Shilo, Messr. Ben Ami Bravdo, and Messr. Igal Sar Shalom (State of Israel). 7

Meeting: Cairo-Alexandria, Egypt/Maryut Site (December 3-7, 1989) 28

Members In Attendance: Dr. Adel El-Beltagy, Dr. Amin El-Gamassy, Dr. Abdel Ghany El-Gindy, Dr. Emad El-Hawary, Dr. Mohamed Hashim, Dr. Awad Hussein, Dr. Abdel Muhsen Khalil, Dr. Mohamed Maksoud, Dr. Zaki El-Sawi, Dr. Asem Shaltout, Dr. Abdel Aziz Sheta, Dr. Mohamed El-Usta, Mr. Ohood Ghannam, Ms. Atiat El-Menshawy (Arab Republic of Egypt); 14

Dr. Dov Pasternak, Dr. Arie Gur, Dr. Irit Rylski, Dr. Arie Szeskin, Dr. Yaakov Ben-Yaakov, Messr. Itzhak Ayalon, Messr. Yosef Ben-Dov, Dr. Igal Sar Shalom (State of Israel); Dr. Merle Jensen, Dr. Richard Jones, Dr. Adel Kader, and Dr. Michael Reid (United States).

Others Attending: Dr. Mohamed El-Assal and Mr. David Moore (United States). 2

Meeting: Cairo-Alexandria, Egypt/Maryut Site (September 2-6, 1990) 2 K

Members In Attendance: Dr. Adel El-Beltagy, Dr. Awad Hussein, Dr. Mordy Atta-Aly, Dr. Awad Yosef Awad, Dr. Mohamed Ali Nour El-Din, Dr. Amin El-Gamassy, Dr. Abdel Ghany El-Gindy, Dr. Mohamed Hashim, Dr. Dia Hassanen , Dr. Mohamed Maksoud, Dr. Khalid Faray Salem, Dr. Asem Shaltout, Dr. Abdel Aziz Sheta, Mrs. Atiat El-Menshawy (Arab Republic of Egypt); 14 Dr. Dov Pasternak, Dr. Itzhak Biran, Dr.Dov Sitton, Messr. Itzhak Ayalon, Messr. Yosef Ben-Dov (State of Israel); Dr. Merle Jensen, Dr. Adel Kader, and Dr. Michael Reid (United States). 5

Others Attending: Dr. Mohamed El-Assal and Mr. David Moore (United States). 2

TRAVEL: REGIONAL

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

Egyptians to Israel (March 23-30, 1990) 7

Dr. Mohamed Hashim, Dr. Mohamed Yasin Mohamed, Dr. Hisham Abdel Muniem, Dr. Gamel Tawdigue Ahmen, Dr. Naien Elia Nayel, Dr. Naset El-Sayed, and Dr. Mustafa Mahmoud Mustafa.

Israeli to Egypt (April 15-18, 1990) 1

Dr. Dov Pasternak (in addition to regular coordination trips; to accompany Evaluation Team).

Israeli to Egypt (May 6-10, 1990) 1

Dr. Arie Szeskin.

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 Consultant Panel. Another example of the levels of collaboration in the Maryut Project is Messr. Itzhak Ayalon, an Israeli who resides in Alexandria (Egypt), in order to fulfill his day-to-day responsibilities as Technical Advisor at the Maryut site. Dr. Dov Pasternak, Israeli Chair of the Technical Consultant Panel, makes regular visitations to Cairo and to the Maryut site, in order to maximize cooperative research and development activities in Israel. 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.

INTELLECTUAL PROPERTY RIGHTS

Patents and Copyrights

1. Property Rights to Products Developed Through The Maryut Project

   Property rights, copyrights and patent rights to products developed through the "Integrated Agricultural Development Project-Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut)" will conform to published guidelines of the funding agency. This decision has been discussed and mutually agreed upon by the members of the trilateral Steering Committee.

2. Patents Policy

   The San Diego State University's published Patents Policy states in part, "*As an institution of higher education, San Diego State University is dedicated to basic and applied research. It is fully expected that, at times, such research will lead to the conception and development of patentable products. In the event that institutional support in the form of either financial or physical resources is used in the research process, the institution may have an equity in the fruits of that research. Moreover,* ***the institution, as a public agency, has a responsibility to see that inventions are reduced to practice in such a way as to serve the public interest.***" (Section II, Part A).

   In Section III, the SDSU Patents Policy states, "*If an outside agency provides support for a scientific research project which may result in the development of a patentable product, it may be necessary for the SDSU Foundation to enter into an agreement with the agency governing the ownership of patent rights and the distribution of royalties.....****It will be the responsibility of the Foundation to notify the sponsor of any invention and take whatever further action is necessary.***"

   The University has a Copyrights and Patents Committee responsible to the University Research Council and appointed by the Dean of the Graduate Division and Research, which will review all such applicable situations. The General Manager of the SDSU Foundation, who is the United States Maryut Project Coordinator and a member of the Steering Committee, is a member of this Committee.

   Other organization and institutions that participate in the Maryut Project may also have patents and copyright policies that may necessitate review when, and if applicable.

   The applicable policies pertaining to property rights to products and to technologies developed through the continued "Integrated Agricultural Development Project-Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut)," will be reviewed by the Steering Committee, which is composed of members from the three participating countries. All such policies practiced by this Maryut Project will conform to those of the Agency for International Development.

EXTERNAL EVALUATION AND PROGRESS

The Maryut Project External Evaluation was conducted April 13-18, 1990 by Drs. Earl Leng and Max Patterson, who visited both Egypt and Israel. The Evaluation Team conferred with key staff in both countries, as well as with USAID staff in Washington via telephone following their field visits. The evaluation report was finalized in August 1990 and copies were forwarded to USAID/Washington and Cairo and to Embassy Technical staff in Egypt and Israel, as per USAID regualtions.

Major finding and conclusions of the External Evaluation Team were:

- The project has made outstanding progress towards its stated goals and objectives.
- Transferability of technology between Israel and the Maryut site 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 very effective and ahead of plan.
- The present project structure is functioning smoothly and effectively.
- Extension of the project for near-term operations should be approved promptly so that a sustained momentum can be achieved.
- Long-term support of the project, at adequate funding levels, will be required if stated goals are to be attained.

PROGRESS IN COMPARISON WITH STATED GOALS AND OBJECTIVES

Based upon the findings of the Maryut Project External Evaluation Team (see above), progress at the Maryut site -- as well as in all parameters of the project -- has been in positive comparison with the goals and work plans established for the period and those stated in the proposal upon which the project is based.

PROBLEMS AND SOLUTIONS

1. An aspect perceived as a problem by Western businessmen, but which is considered "business as usual" in the Middle East is the reliance upon oral communications. In the West, for example, matters that can be completed by a simple written memo will often require an informal follow-up in which communications between the parties are sustained and buttressed by such personal contact. Oral communications -- especially in the Middle East -- are conducted within the framework of prevailing cultural sensitivities and require finesse, diligence and steady, painstaking efforts.

2. During the report period, it was agreed to purchase a considerable amount of plants from Israel for the Maryut site and the paperwork for this purchase was completed. In order to consummate the deal, however, problems were faced in connection with the selection and packing of the plants to meet Egyptian standards, the transportation of the plants to ensure their timely arrival, the selection of appropriate personnel who would insure the processing of the shipment and the facilitation of the work of the quarantine authorities.

   These problems needed acute attention, not only to assure timely arrival of the plant material at Maryut, but also in view of a series of articles appearing at that time in *El-Shaab*, a Cairo-based opposition newspaper accusing the Government of Egypt and particularly, the Ministry of Agriculture and Land Reclamation, of undermining Egyptian agriculture due to a laxity in the application of quarantine regulations (see Appendix E).

   In this article, the Maryut site was identified as a "conduit" through which diseased plants are introduced with the "goal" of adversely affecting Egyptian agriculture. The problems created by this type of publicity are dealt with by strict adherence to procedure, and by a concerted effort that the needed material meets all quarantine standards and yet arrives at the site safely and on time.

3. A similar problem faced is mass media reporting of cooperative activities. Egyptians, for example, have visited Israel on cooperative activities and have been interviewed by the media. On some occasions in the past, reporters have cast the Egyptian participants as "third-world trainees" in Israel to benefit from "advanced" technology and expertise. The fact of the matter is that the scientists involved are visiting their counterparts to exchange ideas and results. Every attempt has been and will be made to assure the accuracy of such reporting.

BACKGROUND

The Integrated Agricultural Development Project: Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut), was originally conceived as a model comprehensive plan for desert settlement offering original solutions for the technical and socioeconomical aspects for such an endeavor. Due to a rapid rate of recent settlement in Egypt's Western Desert, the Maryut Project has now taken on a significance of national importance in that country and is providing a critical and missing link of area-dedicated research and development for new settlers in the region.

Bringing together the technical expertise of scientists from the Arab Republic of Egypt, the State of Israel and the United States, the Maryut Project had its beginnings in 1982 when the Albert Einstein Peace Prize Foundation (AEPPF), organized an "Arid Lands Agricultural Development Conference," which convened an international team of experts to recommend ways to develop Egypt's vast desert regions.

After the conference, which was hosted by the French Government, discussions continued between AEPPF representatives and representatives from the Government of Egypt (GOE), culminating in the signing of a "Declaration of Intent" between the Egyptian Ministry of Agriculture and Land Reclamation and the AEPPF in May 1983. This document reaffirmed the commitment of the GOE and the AEPPF to the program concept, stipulating that a prefeasibility phase and a feasibility phase would be undertaken to begin implementation. The AEPPF agreed to manage and coordinate the prefeasibility study, including site selection and analysis, and to initiate requests for funding of the feasibility study from international agencies.

The Egyptian Ministry of Agriculture and Land Reclamation pledged to make available an area of land suitable for the feasibility phase of the program. The parcel identified would be located as to be expanded into a much larger area upon implementation of the long-range program. For this parcel of land, the Egyptian Ministry also agreed to furnish adequate water resources. The Ministry also agreed to identify appropriate Egyptian experts for inclusion into the multinational teams to be assembled by the AEPPF, and to otherwise facilitate the planning and implementation of the program.

A delegation from the AEPPF and other international experts spent nine days in Egypt, in 1984, meeting with top ranking experts and officials from the Ministry and other Egyptian government organizations. A specific land parcel of 2,000 feddan, located in the Maryut area of the Western Desert, was selected. A number of studies of the site were prepared, including profiles of the climate and soil conditions, the outlines of existing and proposed irrigation systems, utilities, and other infrastructure.

A Protocol was signed in October 1984, formally identifying the parcel of land and specifying the terms of its lease to a trusteeship established by the parties to the agreement. The AEPPF pledged to establish a research and development center on approximately 60 feddan, prepare a development plan for the center, and seek funding for the first feasibility phase.

A Board of Trustees, composed of five Egyptian members, four members from the United States, and one member from the international community, was formed to provide oversight responsibilities for the program. This Board of Trustees recommended that a program draft paper be prepared. Two members of this Board would serve as a voluntary Steering Committee to oversee this preparation, and in November 1985 the AEPPF convened a team of international experts to begin the compilation of technical data and material for the program draft. At the initiation of both the Egyptian and U.S. members of the Board of Trustees, the San Diego State University Foundation was invited to participate in the conference, and assume responsibility for the preparation of a final document for a formal program proposal. The initial draft of this document was completed in August 1986. Experts who were involved in conceptualizing the project and in formulating the text, revised this document in 1986 and 1987.

In June 1987, the Joint Agricultural Committee, Egypt-Israel met in Cairo to discuss potential joint efforts of mutual concern. One of the major topics for discussion for this Committee was the proposed AEPPF initiative involving the development of the Maryut site in Egypt's Western Desert and the finalization and submission of a proposal for funding for the project. The Committee placed a high priority upon this item, and representatives from Egypt and Israel signed an agreement to cooperate in the organization and management of the project begun at Maryut.

In July 1987, representatives from Egypt and Israel, acting upon the Committee's recommendations, drafted and signed an Operational Plan for the Project, formally launching this initiative as a cooperative project to be undertaken jointly by their respective countries.

Representatives from the AEPPF met with representatives from the San Diego State University Foundation (SDSUF), in October 1987, to discuss mutual interests in the project. At the request of the AEPPF, the SDSUF assumed the responsibility for completing the formal project document and proposal for the Maryut initiative, and at the same time, assume management, administrative, and contractual responsibilities for the project. In December 1987, a Memorandum of Understanding was signed by the AEPPF and SDSUF.

Work had progressed on the project document and a final proposal was submitted to the U.S. Agency for International Development (USAID) for funding consideration in December 1987 by the SDSUF through AEPPF. Under the terms of the Memorandum of Understanding the proposed project would be administered by the SDSUF through a cooperative agreement with USAID. SDSUF, under the Memorandum, would provide an additional member to the project's Steering Committee.

In March 1988, USAID responded to the formal AEPPF/SDSUF proposal with a request for clarification on several items in the final document. Working with representatives from the AEPPF, Israel, and Egypt, the SDSUF responded to this request in June 1988. In that same month, representatives from Egypt's Ministry of Agriculture indicated their final approval of the project, and the SDSUF forwarded all documentation to USAID, with its organizational approval.

A final review by USAID Bureau for Asia and Near East approved the project in December 1988 for a funding level of US $1 million per year for fiscal years 1988-89 and 1989-90.

Subagreements between SDSUF and Egypt's Ministry of Agriculture and Land Reclamation and Israel's Ben-Gurion University of the Negev, were signed in March 1989.

Today, the Maryut site is becoming a true center for desert development in Egypt's New Lands. Research and development efforts--and results-- at Maryut will benefit large numbers of settlers, including young university graduates who are beginning to farm the region.

The Maryut Project is helping to meet the national priorities for desert development in Egypt while providing support for such activities in Israel and, at the same time, is providing highly-visible results in cooperative research among scientists from Egypt, Israel and the United States.

ORGANIZATIONAL STRUCTURE

The management plan is for the Maryut Project based upon that in use by the successful USAID-funded CALAR and CALAR II Programs* operated in Egypt, Israel, and the United States by the San Diego State University (SDSU) and its Foundation, in cooperation with the Albert Einstein Peace Prize Foundation.

The contract administrator for the "Integrated Agricultural Development Project-Maryut Agroindustrial Complex in the Western Desert of Egypt (Maryut)" is the San Diego State University Foundation, located in San Diego, California.

The SDSU Foundation is responsible for developing, in cooperation with parties in Egypt and Israel, the detailed program, contracting directly with USAID for the overall program; and contracting with parties in Israel and Egypt for the execution of the technical program. The SDSU Foundation is also responsible for administering all grant monies and submitting all required technical and financial reports to USAID and other financing agencies; participation in the oversight of the program by representation on the Steering Committee and assuming responsibility for the operation of the program according to guidelines and phases as described in the original proposal to USAID; coordination with all parties of the program and providing, upon request, required technical and logistic assistance to all aspects of the program; and providing periodic technical evaluation of its progress.

As the originator of the initial Maryut Project, the Albert Einstein Peace Prize Foundation promotes the project to additional potential funding agencies and institutions; seeks and investigates such funding sources; and, working with SDSUF arranges for necessary support. The AEPPF provides active participation to the project through its representation on the Board of Trustees and the Steering Committee. (See Organizational Chart, Figure 6).

In Egypt

Leading institutions involved in the research and development conducted in the Maryut Region and who implement the program include the Ministry of Agriculture and Land Reclamation, Ain-Shams University and other universities, as well as various research organizations belonging to the Agriculture Research Center. All the organizations have extensive experience in arid region development and in cooperative research with Israel through the original Maryut Project and other USAID-funded programs. Administration in Egypt is the responsibility of the Foreign Agricultural Relations office of the Ministry of Agriculture and Land Reclamation.

In Israel

Leading institutions involved in the research and development conducted in the Maryut Region are the Institutes for Applied Research of the Ben-Gurion University of the Negev, the Agricultural Research Organization of the Ministry of Agriculture (Volcani Center), the Faculty of Agriculture of the Hebrew University of Jerusalem and the Agriculture Planning Authority of the Ministry of Agriculture. Ben-Gurion University has extensive experience in arid region development in Israel and in cooperative research with Egypt through the CALAR Program and the Calar II Program. Administrative responsibilities in Israel lie within the Ben-Gurion University.

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* "Cooperative Arid Lands Agriculture Research Program I, 1982-90 (NEB 0170-A-00-2047-00), and Cooperative Arid Lands Agriculture Research Program II, 1990-95 (ANE-0158-G-00-0017-00).

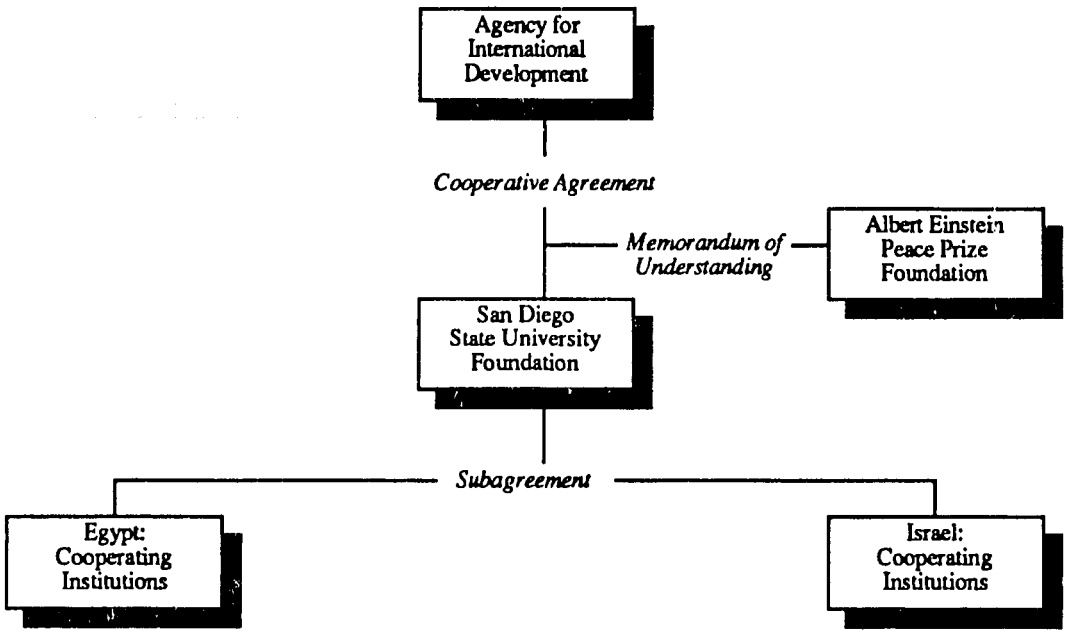

Figure 6. *Technical Organizational Structure*

Other Organizations and Individuals

Further advice and evaluation is and will be sought from the Agency for International Development, international agencies, organizations and recognized individuals who are interested in the technology and socioeconomic concepts being explored by the experimental desert farming complex at Maryut.

Board of Trustees

A Board of Trustees, composed of five Egyptian members, four members from the United States and one member from the international community, serves in an advisory capacity to the project. The Board of Trustees define development targets upon which all parties involved have agreed. This framework acts to promote projects for strengthening cooperative efforts in the region.

The Chairman of the Board of Trustees is His Excellency, Professor Dr. Yousef Wally, Deputy Prime Minister and Minister of Agriculture, Arab Republic of Egypt.

Steering Committee

The Steering Committee establishes the planning, operational, and logistical aspects and coordinates between professional issues and administration of the project.

The Steering Committee is composed of nine members: three each from Egypt and Israel, and three from the United States. Mr. Harry Albers, Professor A. El-Beltagy and Professor S. Pohoryles will serve as Co-Chairmen of the Steering Committee and as Coordinators of the Maryut Project.

The full Committee is made up of the following members:

EGYPT

Dr. Adel El-Beltagy
Undersecretary of State for Land Reclamation
Ministry of Agriculture and Land Reclamation

Dr. Mahmoud Mahfouz
Member of the Shura Council

Mr. Mohamed Dessouki
Undersecretary of State for Agricultural Development
Ministry of Agriculture and Land Reclamation

ISRAEL

Dr. Samuel Pohoryles
Director-General, Rural Planning and Development Authority
Ministry of Agriculture

Dr. Itzhak Abt
Ministry of Agriculture

Dr. Irit Rilsky
Ministry of Agriculture

UNITED STATES

Dr. Albert Johnson
Vice President for Academic Affairs
San Diego State University

Mr. Harry Albers
General Manager
San Diego State University Foundation

Mr. Bertram Wolf
Albert Einstein Peace Prize Foundation

EX-OFFICIO MEMBERS

Dr. Dov Pasternak
Israeli Chairman of the Technical Consultant Panel

Dr. Mohamed El-Assal
U.S. Administrative Coordinator

Technical Consultant Panel

A panel of consultants, including experts from Egypt, Israel, the United States and other countries provides orientation regarding the activities of the Research and Development.

The Technical Consultant Panel is jointly chaired by an Egyptian scientist and an Israeli scientist. This Panel is responsible for professional consultation to the Steering Committee and to the Coordinators.

Members of the Technical Consultant Panel are:

EGYPT

Dr. Adel S. El-Beltagy
Undersecretary of State for Land Reclamation
Ministry of Agriculture
Project Coordinator

Dr. Awad Hussein
Director of the Maryut Project

Dr. Amin El-Gamassy
Professor of Horticulture, (vegetables)
Ain Shams University

Dr. Abdel Ghany El-Gindy
Professor of Agriculture, (water management)
Ain Shams University

Dr. Asem Shaltout
Professor of Horticulture, (fruit trees)
Ain Shams University

Dr. Mohamed A. Maksoud
Head, Department of Agriculture, (horticulture)
Ain Shams University

Dr. Zaki El-Sawi
Assistant Professor of Horticulture, (vegetables)
Ain Shams University

Dr. Mohamed Hashim
Assistant Professor of Horticulture, (vegetable production)
Ain Shams University

Dr. Abdel Muhsen Khalil
Director of Salinity Laboratory, (plant nutrition)
Ministry of Agriculture, Alexandria

ISRAEL

Dr. Dov Pasternak
Head, Boyko Institute
Ben-Gurion University
Chair, Consultant Panel

Mr. Itzhak Ayalon
Technical Advisor, Maryut Project (stationed in Egypt)

Dr. Ben Ami Bravdo
Professor of Agriculture, (fruit trees)
Hebrew University

Dr. Dov Sitton
Research Officer, (fruit quality and post-harvest)
Ben-Gurion University

Dr. Irit Rylski
Agriculture Senior Researcher, (vegetables)
Volcani Institute

Dr. Ariel Szeskin
Researcher, (agricultural economics)
Ministry of Agriculture, Israel

Dr. Igal Sar Shalom
Researcher, (extension service)
Ministry of Agriculture, Israel

Dr. Yaakov Ben-Yaakov
Research Scientist, (ornamentals)
Volcani Institute

UNITED STATES

Dr. Richard Jones
Professor of Agriculture, (vegetables and fruit trees)
University of California, Davis

Dr. Merle Jensen
Professor of Agriculture, (protected agriculture)
University of Arizona

Dr. Adel Kader
Professor of Agriculture, (post harvest)
University of California, Davis

Dr. Michael Reid
Professor of Agriculture, (ornamentals)
University of California, Davis

Distinguished scientists who serve on the Panel include representatives from leading institutions with expertise in arid land research and development. Panel members are available for technical assistance, consultation, and advise to the Project Staff in Egypt and Israel. Technical consultants may also serve on short-term or intermediate-term basis. Their assistance is sought for training, consultation, internal evaluation, participation in workshops or seminars, dissemination, and other formal and informal technical needs.

Coordination

Effective coordination is the key to effective cooperative scientific achievements and an emphasis has been place upon close and continuing coordination among those who are responsible for the success of the Maryut Project.

Based upon the experience of the SDSU Foundation in the effective management of international programs that range from agroindustrial activities to farm planning to education and training, a key element is a competent and well-qualified staff. Figure 7 illustrates the Administrative Organization.

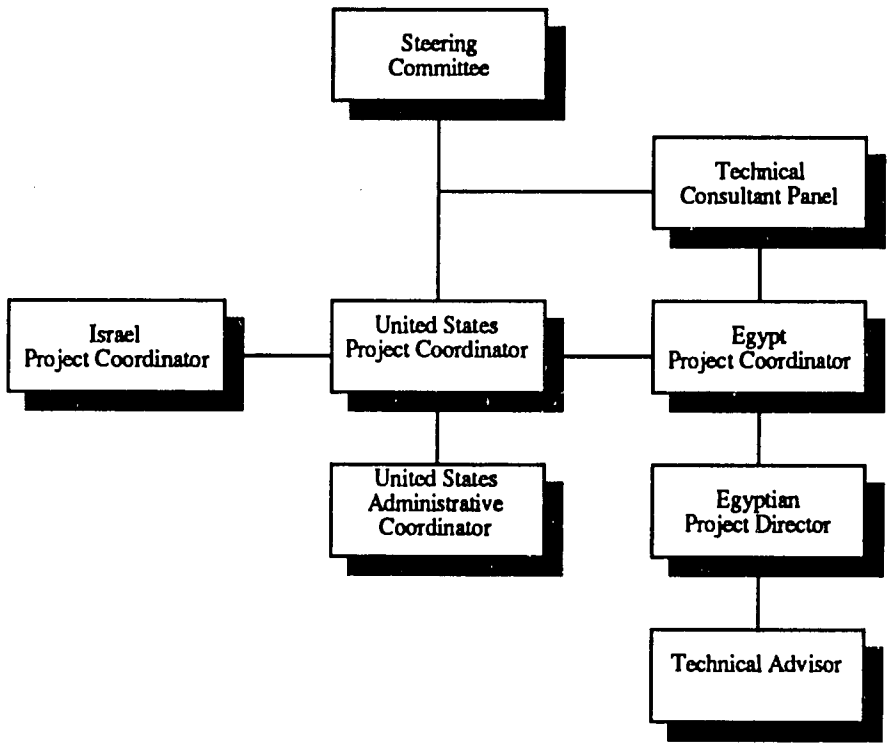

Figure 7. *Organizational Structure Administration*

United States of America

The U.S. Coordinator, Mr. Harry Albers, has the responsibility to assure maximum cooperation between all factions involved in the Maryut Project. His duties also include establishing and maintaining communication with USAID representatives, officials of the AEPPF. He coordinates his activities with the other Coordinators and the Steering Committee.

Dr. Mohamed El-Assal, a native of Egypt, is the Administrative Coordinator and is currently the U.S. Coordinator of the Cooperative Arid Lands Agriculture Research Program II administered by the SDSU Foundation and funded by USAID.

Egypt and Israel

The Project Coordinator in Egypt and the Project Coordinator in Israel each assume total responsibility for the coordination of all efforts within their respective nation. They meet regularly with each other and other Maryut staff, and communicate with the United States Coordinator to oversee the technical success. The Coordinators work closely to initiate, plan, and organize all aspects which involve cooperation between Israel, Egypt, and the United States. The Coordinators serve as active partners in order to meet day-to-day demands of the overall project and serve as Co-Chairman of the Steering Committee. Dr. Adel S. El-Beltagy is the Coordinator for Egypt; Dr. Samuel Pohoryles is the Coordinator in Israel.

Project Director

The Project Director, Dr. Awad Hussein, has responsibility for the day-to-day operations. He assures optimum coordination between all components related to the actual on-site operation; maintains communication between research components and management; assists in identifying required equipment and supplies; oversees the on-site personnel; coordinates research and training activities with appropriate staff; arranges for required reviews and evaluations; and coordinates his activities with the Egyptian Project Coordinator.

Technical Advisor

The Technical Advisor, Mr. Itzhak Ayalon, through the Project Director, advises in the project's technical execution. He advises in matters relevant to selection of equipment; the application of such equipment; the utilization of consultants; research, development and application.

Farm Manager

The Farm Manager, Mr. Nabil Mahmoud, assists the Project Director in executing and implementing physical development on site as well as experimental programs and various developmental components. He ensures the smooth and effective implementation of all activities. He is assisted by a Deputy Farm Manager.

Evaluators

Eminent scientists, selected by the Steering Committee, are recruited to visit the sites and submit comments and reports to the Coordinators as to progress from a technical perspective. The evaluators are asked to develop specific evaluation criteria that will provide both short- and long-term evaluative materials. Such reports are submitted to the Steering Committee (see External Evaluation section, page 46, of this report).

MARYUT: BUILDING FOR THE FUTURE

Based upon irrigation from the Al Nasr Canal, an area of 400,000 feddan is now being reclaimed in Egypt's Western Desert. This innovative new action includes the settlement of a series of desert villages by university graduates who utilize modern agricultural techniques based upon the latest technologies.

In Israel, the need to develop new arid lands and new crops is being influenced by a number of factors in both the domestic and export markets.

The Maryut Project is playing a prominent role in assisting Egypt and Israel in achieving desert development goals of the utmost priority. At the same time, and equally important to its technical goals, the Maryut Project is expanding and strengthening cooperative efforts among scientists in Egypt, Israel and the United States.

Capabilities as well as facilities now being developed and established through our Maryut Project will be further amplified in the coming months. Working in cooperation, scientists in Egypt and Israel, with their U.S. colleagues, are investigating a number of topics that are critical to the success of new lands development in both countries.

Cooperative exchange between Maryut participants are strengthened through a number of programmatic elements that include: one-to-one visitations, regular meetings of the Steering Committee and the Technical Consultant Panel, publications and joint papers written by the participants. Successful varieties and technologies are exchanged and shared among Maryut participants on a regular and on-going basis.

In building and expanding cooperative and complementary research efforts between investigators in Egypt and Israel, the Maryut Project also meets the stated national priorities of the governments of those two nations, providing new crops and technologies for the development of desert lands.

Continued and expanded complimentary applied research among participants in Egypt, Israel and the United States is providing a number of long-term benefits. Among these are the development of new agricultural lands with the techniques based upon the latest technologies and the enhancement of a number of socioeconomic concerns. Cooperation between Egypt and Israel in addressing common goals is also of importance, as well as in keeping with the original legislation in 1979 in the United States Congress initiated by the historic Camp David accords that established the Regional Cooperation Programs.

Because the development of arid lands is of utmost importance throughout much of the Mediterranean Basin and the Middle East, the visibility and success of the Maryut Project will have a significant impact throughout the region.

APPENDICES

APPENDIX A. TABLES 1 THROUGH 6

APPENDIX B. ORIGINAL ORNAMENTAL PLAN

APPENDIX C. MARYUT NEWSLETTER (Winter 1990)

APPENDIX D. MAJOR PROCUREMENT ITEMS

APPENDIX E. *EL-SHAAB* NEWSPAPER CLIPPING

APPENDIX A

TABLE 1 Fruit Seedlings Planted in the Site

TABLE 2 Sprouting (Growing) Seedlings for Different Fruit Crops - June 1990

TABLE 3 Grape Cuttings in Quarentine

TABLE 4 Program for Apple Propagation

TABLE 5 Plastic House-Grown Vegetables

TABLE 6 Grown Vegetables and Their Production by the First Week of June 1990

Table 1. Fruit Seedlings Planted in the Site

No.	Fruit Crop	Cultivar	Rootstock	Origin	Number
1	Pear	Shinseiki	Betulaifala	USA	48
	1.25 feddan	Hosue			48
		T. Century			48
		Kikusi			48
				Total:	**192**
2	Persimon	Fuyu	Lotus	USA	144
	1.0 feddan	Hachya			90
				Total:	**234**
3	Almond	Sonara	Nemaguard	USA	50
	2.5 feddan	Non-Paril	Nemaguard		50
		Fritz	Lovel		45
		Naplus Ultra	Lovel		42
		Naplus	Almond	Israel	92
		Um El Fahm	Almond	Israel	196
		M.D.	Almond	Israel	16
				Total:	**391**
4	Peach	Almog	Nemaguard	Israel	52
	2.5 feddan	Texas	Nemaguard	Israel	52
		Tropic Snow	Nemaguard	Israel	39
				Total:	**143**
5	Nectarin	837	Nemaguard	Israel	64
	2.5 feddan	835w			78
		gc/100			26
		513			26
		515			26
				Total:	**220**
6	Plum	Santa Rosa	Almond	Israel	60
	2.5 feddan	Laroda			80
		Sun Gold			80
		Nubiana			40
		Red Beat			60
		Aldorado			20
		Premier			39
				Total:	**379**
7	Apple	Stark Adina	MM106	USA	216
	1.25 feddan	Auna	MM106	Egypt	91
		Golden Dorst	MM106	Egypt	11
		Orleans	Hoshabi	Israel	34
				Total:	**352**
8	Pecan	Wichita	Pecan	USA	68
	2.5 feddan	Cherokee			34
		W. Schley			68
		Choctan			34
		Cheyenne			34
		Mohank			34
				Total:	**272**
9	Apricot	Aviv	Apricot	Israel	153
	2.5 feddan	Jam			51
		Canino			85
				Total:	**289**

Table 2. Sprouting (Growing) Seedlings for Different Fruit Crops
June 1990

No.	Fruit Crop	Planting Date	Total Number	Success Rate Number	Success Rate %
1	Pear	March 20	192	188	89
2	Persimmon	March 20	234	209	85
3	Almond	March 18	187	180	96
		April 21	304	64	21
4	Peach	April 25	104	86	83
		May 17	39	20	51
5	Nectarin	April 25	220	148	67
6	Plum	May 1	379	35	9
7	Apple	March 21	216	211	97
		April 10	124	54	43
		May 2	34	30	88
8	Pecan	March 19	272	30	11
9	Apricot	April 30	289	141	49

Table 3. Grape Cuttings in Quarentine

No.	Variety	Date	Number of Cuttings Received	Number of Cuttings Planted	Growing Cuttings Number	Growing Cuttings %	Remarks
1	Perlette	March 3	50	125	83	66.4	Data collected
2	Christmas Rose	March 3	50	130	124	95.4	by June 16
3	Superior	March 23	291	658	370	56.2	

Table 4. Program for Apple Propagation

Rootstock	Apple Variety	Number
Mac 9	Jonathan	25
	Dorst Golden	25
	Stark Adina	25
	Anna	55
	Gary Smith	25
	Orleans	55
	Total:	**240**
MM106	Orleans	100
	Jonathan	50
	Gary Smith	50
	Dorst Golden	720
	Anna	1,806
	Total:	**2,720**

Table 5. Plastic House-Grown Vegetables

House No.	Vegetable Crop	Variety	Planting Date day/mo/yr
L-1	Cucumber	Picobello Corditto	23/03/90 03/03/90
L-2	Cucumber	Picobello; Corditto	25/01/90
L-3	Cantaloupe	Galia	31/01/90
L-4	Cantaloupe	Galia	31/01/90
L-5	Cantaloupe	Galia	05/02/90
L-6	Cantaloupe	Galia	14/02/90
L-7	Cantaloupe	Galia	14/02/90
L-8	Cucumber	Samara	05/02/90
L-9	Cantaloupe	Galia	14/02/90
L-10	Cantaloupe	Galia	14/02/90
L-11	Cantaloupe	Galia	18/02/90
L-12	Cantaloupe	Galia	23/02/90
L-13	Tomato	Carmello	25/02/90
L-14	Tomato	Karel	26/02/90
L-15	Tomato	Hybrib	26/02/90
L-16	Nursery		
S-1	Squash	Ma'ayan	13/02/90
S-2	Cucumber	Kesem 292; Shira 222; Ehud 205; Rina 204; 436; 428; 847/2; 253/8; 254/8	13/02/90
S-3	Cantaloupe	Gaila; Gaila C-4; Gaila C-8; Arava	13/02/90
S-4	Cantaloupe	Gaila; Gaila C-4; Gaila C-8	13/02/90
S-5	Eggplants	Classic; XP-139; XP-1726; XP-1474	15/02/90
S-6	Eggplants	Classic; XP-139; XP-1726; XP-1474	15/02/90
S-7	Tomato	F-144; F-148; F-149; F-160	15/02/90
S-8	Pepper	Lamuyo	18/02/90
S-9	Pepper	Lmaor	
S-10	Pepper	Macabi 1005; 828; 843; F-25; XP-817; XP-555; XP-807	18/02/90
S-11	Pepper	828; 843; F-23; XO-736; XP-817; XP-555; XP-807	18/02/90
S-12	Hot Pepper	9702; 9785	18/02/90
S-13	Tomato	Carmello	25/02/90
S-14	Watermelon	Omer	
S-15	Sand Cultr		
S-16	Sand Cultr		

Table 6. Grown Vegetables and Their Production by the First Week of June 1990

Location	Vegetable Crop	Harvested Crop (Kg)
LPH No. 1	Cucumber (two varieties)	4202
LPH No. 2	Cucumber (two varieties)	4400
LPH No. 8	Cucumber (samara)	4500
LPH No. 3	Cantaloupe (Galia)	2141
LPH No. 4	Cantaloupe (Galia)	2527
LPH No. 5	Cantaloupe (Galia)	1863
LPH No. 6	Cantaloupe (Galia)	1517
LPH No. 7	Cantaloupe (Galia)	1957
LPH No. 9	Cantaloupe (Galia)	1603
LPH No. 10	Cantaloupe (Galia)	1649
LPH No. 11	Cantaloupe (Galia)	1941
LPH No. 12	Cantaloupe (Galia)	1882
LPH No. 13	Tomato (Carmello)	3167
LPH No. 14	Tomato (Karel)	2160
LPH No. 15	Tomato (different varieties)	2346
SPH No. 1	Squash	805
SPH No. 5	Eggplant	169
SPH No. 6	Eggplant	309
SPH No. 8	Pepper	667
SPH No. 9	Pepper	270
SPH No. 10	Pepper	236
SPH No. 11	Pepper	Not productive yet
SPH No. 12	Pepper	345
SPH No. 14	Watermelon	90

APPENDIX B

ORIGINAL ORNAMENTAL PLAN

Recommendations for Research and Demonstration in Ornamental Horticulture for the Integrated Agricultural Development Project (Maryut II) in Egypt's Western Desert

The Maryut Consultant Panel, Cairo, Egypt, December 1989

The challenges of the Maryut site are less keenly felt in the area of production ornamentals. Modern ornamental production largely uses artificial soils, so that the nature of the substrate at Maryut is less important for these materials than for fruits and vegetables. In addition, ornamental production is very intensive and small growing areas can generate substantial returns, which makes ornamental production a desirable feature for a project that is aimed at rapid demonstration of superior productivity.

Landscape Ornamentals

Overall Plan

A comprehensive list of plants adapted to desert conditions and soils (appended) has been drafted by Dr. Ben-Dov, and will be amended by additions from Dr. El-Gamassy of those plants known in Egypt to be similarly adapted, and by Dr. Reid's colleagues in the United States of a group of native southwestern (U.S.) plants with similar properties.

These plants would be appropriate for soil retention, windbreaks and landscaping homes and other sites in desert areas, and the list includes trees, shrubs, prostrate plants, and lawn grasses. It is proposed to address the intent to provide information on utilization possibilities in three ways:

1. By establishing an ornamental planting (along the roadside portion of the Maryut property), containing as large a number as possible of these species. This planting will serve three major functions:

a. An investigation of the adaptation of the different plants to the specific micro-environment of the Maryut area,

b. A demonstration of the range and properties of plants from which landscaping, windbreak, soil retention and border plants can be chosen, and

c. A pleasing roadside for the Maryut project.

2. By establishing one or two demonstration landscapes appropriate to typical farm and village housing in the desert area. This might be done in conjunction with present or planned buildings on the site (office block, tractor shed, or pesticide facility, for example), or by actual model houses (perhaps later in the project's life).

3. By developing instructional leaflets outlining suggestions for different landscaping approaches, including lists of possible plant materials relating to the ornamental planting on the Maryut site.

Implementation

The soil in the area designated for the demonstration planting should be drained with tiles, amended, and leached. Irrigation will by the standard drip technique; emitters will be placed appropriately to the final plan for the planting.

Sources of the proposed planting materials will be identified, and obtained when required. In passing, we suggest that it would be convenient and appropriate if the Maryut site could be designated as a post-entry quarantine location, to simplify the process of introducing new plant materials to Egypt.

The planting area and proposed landscapes should be designed by a landscape architect, in consultation with project staff. An appropriate cooperator(s) needs to be identified, and the designs should be developed soon. Elements of the design of the major planting will include vistas from the road through the planting to the project, and paths and seats to simplify the use of the planting as a demonstration area. The designs for domestic landscapes should include at least one shade tree, possibilities for home vegetable production, and play areas for children.

Floricultural Production in Protected Cultivation

Overall Plan

The purpose of this part of the ornamentals project is to utilize Egyptian and overseas expertise in demonstrating modern techniques for production of existing ornamental crops, and to demonstrate the production of, and market potential, for a group of newer crops. We envisage the construction of two greenhouses adapted to this purpose, one heated, one not, and the use of the sand-culture technique, using drip irrigation and liquid feed without recirculation. One of the existing production tunnels will also be used to test production of a range of seed-propagated annual crops which will also be tested in the open field (See Section V).

Implementation

1. House construction. The two new houses will be 20 m x 20 m, and will be situated with the ridges running north/south. Each house will have ventilation curtains on each side running up to 2 meters, to provide sufficient ventilation under summer conditions. In the heated house, a transverse curtain halfway along the house will separate a heated section from an unheated section. In this same house, sand culture in plastic-lined beds drained with drain tile, and irrigated and fertilized by drip will be directly compared with culture in amended soil, formed into 30 cm-high beds, and irrigated similarly. The cool house will be set up for sand culture. In both houses, we suggest 5 x 1 meter wide beds, which allows more space between the beds than might be used commercially but will provide for ease of movement during demonstrations.

Soil in all three houses will be sterilized after bed preparation with methyl bromide (MeBr) to reduce the risk of problems arising from diseases, pests, and weeds, and then flushed with at least 200 mm water to remove MeBr residues.

2. Crops. In the warm house, the crop will be roses only, to simplify operational procedures, spraying, fertilization and the like. The irrigation system will be split to allow for differences in irrigation and nutrition between the sand and native soil beds. The cultivars to be used will be five, selected from hybrid tea varieties presently cultivated in Egypt, and new varieties adapted to local market demand (red, yellow, pink cultivars).

In the cool house, we suggest that five crops be selected from the following list, which includes some traditional crops, and some that are new to Egypt. All grow readily, and should provide the "immediate success" that we desire for the project.

Alstroemeria

Liatris

Solidaster

Lilium longiflorum

Miniature carnation

Tuberose

In the production tunnel, we suggest that 30 cm-high, 1 m wide beds of amended soil be planted with the following seed-propagated chosen from crops such as the following:

Matthiola incana

alistephus chinensis

olidago sp.

The plants will be irrigated and fertilized using drip irrigation.

III. Screen-house production

Overall Plan

In this part of the project, we plan to demonstrate the production at the Maryut site of a number of ornamentals, in native soil, and to test the proper lighting conditions for producing optimum quality crops. Crops producing cut flowers or cut foliage will be grown at three light intensities.

Implementation

We propose the construction of a screen house, 20 m x 20 m, with screening split in two sections, one 30%, one 60% shade (approximately). The house will be constructed in a location which will permit plants to be placed outdoors in beds continuing from the shaded area. We suggest testing the following species:

1. For cut flowers

Bird of paradise (Strelitzia regina)

Large calla lily (Zantedeschia aethiopica)

Small heliconia (Heliconia psittacorum)

2. For cut foliage

Variegated euonymus

Large-leafed ruscus

Bronze New Zealand flax (Phormium tenax)

IV. Potted flowering and foliage plants

Overall Plan

We intend to demonstrate the latest methods for producing potted plants, incorporating Egyptian expertise in the local market requirements, and potential sources of the components of artificial media, as well as overseas developments in engineering for efficient and cost-effective production.

Implementation

1. Greenhouse structure

We suggest using one of the production tunnel houses for this part of the project, erecting over it (outside) a 50% shade-cloth screen to reduce light (and summer heat). This screen might be replaced, in winter months, with a screen inside the tunnel. The house will be split into two sections, a small section (10 m long) containing fixed benches providing bottom heat and covered with small polyethylene tunnels for propagation, and the rest in long benches, 1 m wide, rolling on simple pipe structures, and equipped for drip irrigation of potted materials, and overhead irrigation for liners, and to clean foliage before sale.

For preparation of the medium we will require peat moss, sand, and vermiculite, and, later, alternative organic materials deemed appropriate. The preparation will require a mixer (concrete mixer or other), and a large box which can be sealed, and in which sterilization can be achieved with methyl bromide.

2. Production techniques

We suggest a small range of crops representing different propagation strategies, viz.,

Large-leafed Pothos (cutting propagation)

Spathyphylum (tissue culture propagation)

Monstera (seed propagation) and one flowering plant

New Guinea Impatiens (from seed)

These materials will be grown in soil-less mix prepared with local materials. Initially we will use imported peat with local sand and vermiculite, pending identification of a reliable local source of a consistent organic amendment. Irrigation and fertilization will be by the standard trickle systems already in use in some Egyptian nurseries.

V. Open field production

Overall Plan

We have identified a range of crops adapted to open field production of foliage, and suggest a list of species which may provide useful flowering branches (see appended list of species). In addition, it is proposed that we test winter production in the field of the same crops that are being grown from seed in one of the polyethylene tunnels, Stock, Goldenrod, and Chinese aster.

Implementation

The proposed area will be drained, amended, leached, and sterilized with methyl bromide prior to planting. Species selected for cut foliage will be planted on 1 m centers in 5 meter-wide beds, with a walkway between each bed to simplify demonstration, and agricultural operations. Suggested flowering branches will be planted in the landscape plant collection, and will be observed in the first years of the project before being planted for production. Seed-propagated cut flowers will be planted in 30 cm-high 1 wide beds spaced 60 cm apart. Plants will be planted in 4 2-m replicate plots.

VII. Turf

Overall Plan

Turf species selected in Egypt, Israel and the United States as being suited to desert low maintenance conditions will be planted in a demonstration/research area, and provided with minimal maintenance.

Implementation

Selected turf varieties will be planted in 2m x 2m plots, replicated at least 4 times, and will be in soil that has been prepared and sterilized. Plots will be sprinkle irrigated to maintain the open pan ET, and fertilized annually with a maintenance fertilizer. Varieties that are suggested as possible candidates include species or selections of the following:

Paspalum vaginatum

Bermuda grass (Cynodon dactylon)

Buffalo grass

Zoysia hybrid

Durban grass

TIME SCALE AND PRIORITIES FOR IMPLEMENTATION

Obviously, the extent of the projects proposed here will require very substantial financial and manpower resources, and implementation will be effective, only if approached in stages. At this point, we think it important to take steps to provide the necessary physical structures, and to start with at least some of the plantings.

Early priorities that seem important are:

1. Seed propagated crops

If possible, obtain best quality seed lines for selected seed-propagated crops. Raise seedlings in soilless medium to transplanting stage.

2. Acquisition of plant materials.

The overall plan for ornamentals needs to be developed with time lines for various components, in order to ensure timely delivery of plant materials and necessary equipment.

3. Soil preparation.

As the whole site is prepared by installing drain lines, the area selected for ornamental production should be similarly drained. Soil should then be amended as desired, leached sufficiently, and then sterilized (outdoor and shadehouse area) with methyl bromide.

4. Seed propagated crops.

Once the soil preparation is complete, the transplants provided in Item 1 can be planted in the field and in one of the commercial plastic tunnel houses. At this time, we will require the proportioning equipment necessary to irrigate and fertilize these crops.

5. Screen house

The construction of the screen house will provide for planting the existing Strelitzia plants, and for the other flowering and foliage materials envisaged for this site. The fertilizer equipment will be used here as well.

6. Potted plants

A screen may be erected over the plastic tunnel house designated for the potted plants, and the propagation benches erected and used for a starting production until the roller benches are constructed and bottom heat and mist equipment is obtained.

7. Erection of greenhouses

The construction and furnishing of the two ornamental production houses is an important part of the program. Once the houses are ready, the beds can be formed, and sterilized prior to planting.

8. Establishment of a temporary nursery is a priority. Since plant materials are likely to arrive before they are needed, and since we want to work on obtaining materials right away, we should designate a nursery area as a temporary holding area for plant materials in both production and landscape efforts.

MARYUT PROJECT FOR THE PURPOSE OF GARDENING AND PRODUCTION OF FLOWERING BRANCHES & POT PLANTS

List of recommended plants

Trees

Acacia gerrardii
Acacia horrida
Acacia raddiana
Acacia salicina
Acacia seyal
Acacia tortilis
Albizzia lebbeck
Atalaya hemiglauca
Balanites aegyptica
Brachychiton dcerifolium
Brachychiton discolor
Brachychiton gregori
Brachychiton populneus
Brachychiton rupestris
Casuarina glauca
Casuarina cristata
Cercidium floridum
Delonix regia
Eucalyptus sargenti
Eucalyptus spatulata
Eucalyptus torquata
Eucalyptus torwood
Ficus bengalensis
Ficus sycomorus
Geofrea sp.
Haematoxylon brasileto
Kigelia africana
Lagunaria patersonia
Lysiloma candida
Maytenus emarginatus
Moringa aptera
Pachycormis discolor
Parkinsonia aculeata
Peltophorum africanum
Pestasia atlantica
Prosopis alba
Prosopis juliflora
Rhus lancea
Zizyphus spina-christi

Tall Shrubs

Acacia ligulata
Acacia sclerosperma
Acacia victoriae
Callistemon captain cook
Callistemon citrinus harkness
Callistemon kingspark
Callistemon rigidus
Cassia auriculata
Cassia emerginata
Cassia eremophila
Colutea istrea
Dichrostachys nutans
Melaleuca coccinea
Melaleuca diosimifolia
Melaleuca elliptica
Melaleuca glaberrima

Melaleuca huegelii
Melaleuca hypericifolia
Melaleuca nesophila
Melaleuca pubescens
Melaleuca styphelioides
Pistacia lentiscus
Retama roetam
Rhus integrifolia
Schinus terebinthifolius
Sophora secundiflora
Vitex agnus-castus
Vitex trifolia
Westringia blue

Shrubs

Acacia glaucoptera
Cassia artemisioides
Cassia sturtii
Castela sp.
Encelia farinosa
Eremophila glabra-silver
Eremophila macuaurea
Eremophila maculata
Euphorbia cotinifolia (cotonina)
Grevillea oleoides
Leucophyllum frutescens
L. Plactranthyus sp.
Portulacaria spp.
Rosmarinus officinalis
Scaevola taccada
Viguiera tomentosa
Westringia fruticosa

Dwarf Shrubs

Alternanthera amoena
Centaurea cineraria
Centaurea gymnocarpa
Eriocephalus africanus
Inula crithmoides
Notonia abyssinica
Ruellia ciliosa
Santolina chamaecy-parissus
Scaevola crassifolia "bush"

Creepers

Bougainvillea spp.
Clerodendron inerme
Cryptostegia madagascariensis
Ipomea pescarprae

Prostrate Plants

Crithmum maritimum
Drosanthemum floribundum
Enchylaena tomentosa
Galenia secunda
Inula crithmoides
Ipomea pescarprae
Lampranthus balandus
Lippia nodiflora
Lotus comicurpus
Myoporum parvifolium
Nitraria schoberi
Portulacaria elephantipes
Sesuvium portulascastrum
Sesuvium verrucosum
Sesuvium sp (green)
Sesuvium sp. (red)
Suaeda vera
Verbena sand dune
Wedelia paludosa

Lawns

Cynodon dactylon var. suwannee
Paspalum vaginatum

Flowering plants

Arctotis grandis
Aster alpinus
Catharanthus roseus
Euphorbia pulcherrima
Gazania creeping
Gazania splendens
Glottiphylum sp.
Limonium axillare
Limonium pectinatum
Limonium perezii
Limonium vulgare
Oenothera spp

Plants for production of flowering branches

Acacia spp
Eucalyptus leucoxylon
Eucalyptus torquata
Eucalyptus torquata x *woodwardii*
Eucalyptus torwood
Eucalyptus woodwardii

Plants for production of ornamental branches

Leucadendron galpinii
Leucadendronsilver
Melaleuca coccinea
Melaleuca diosmifolia
Melaleuca elliptica
Melaleuca huegelii
Melaleuca hypepricifolia
Melaleuca nesophila
Melaleuca pubescens

Pot plants

Bursera spp.
Ficus spp.
Pistacia lentiscus
Portulacaria spp.
Punica granatum

APPENDIX C

MARYUT NEWSLETTER
(WINTER 1990)

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

A Program Funded by the Agency for International Development/Bureau for Asia and Near East
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In Cooperation with the Albert Einstein Peace Prize Foundation ■ Chicago, IL 60044

NEWSLETTER Winter 1990

Technical Committee Meets

The Technical Committee for the Maryut Project met December 3-7, 1989, in Egypt. The main theme for this second meeting of the Committee (the first meeting was in May) was to define a plan of operation for the project that will provide both short-and long-term results. Twenty-two participants from Egypt, Israel and the United States attended the sessions and were briefed regarding Egypt's initiatives in land reclamation in a special meeting with Deputy Prime Minister and Minister of Agriculture Professor Yousef Wali.

Members of the Committee visited the Western Desert and Nile Delta regions to view various sites of relevance to the Maryut Project. The sites visited were: Dina Farm Agroindustrial Complex; land reclamation activities and new settlements along the Al-Nasr Canal; and fruit tree nursery and greenhouse vegetable production at El-Bouseilly. The Committee also had a detailed tour and briefing at the Maryut site and the Dokki Training Center in Cairo.

In Cairo during the last two days of the meeting, the Technical Committee divided into three subcommittees, each with specific expertise in vegetables, ornamentals and fruit trees. Each group developed a plan of operation for their specialty area. Abstracts from these plans follow.

Egyptian, Israeli and United States members of the Technical Committee toured the Maryut site in December to view progress.

Vegetable Crops

Research and development activities for vegetables may be divided into two topics: indoor (grown inside walk-through plastic tunnels) and out-of-doors (low plastic tunnels and open-field production). Another way to classify the recommended activities for vegetables at Maryut is to divide these topics into three specific areas: technologies, management and crops.

Technologies

Technologies utilized include sand culture with and without recirculation of the nutrient solution; side ventilation compared with top ventilation; long tunnels compared with short tunnels; use of screens for summer production; and the use of insect nets for virus-free production of summer tomatoes.

Agromanagement Studies

The use of plant hormones to enhance the productivity of vegetables; optimal planting time for various crops; double cropping; and tests of wind break effects are among agromanagement studies.

Crop Production

Irrigation and fertilization regimes will follow the recommendations established by the Ministry of Agriculture of Egypt.

Greenhouses utilized will include the "long" type measuring 60 by 9 meters, as well as the "short" version measuring 24 by 9 meters. Total greenhouse area will cover 12,816 meters, which will be divided into 16 "long" units and 16 "short" units.

Varietal Trials

Six specific varieties will be grown: tomatoes; cucumbers; peppers; eggplants; and French beans.

Additional greenhouse trials will include: sand culture; tomatoes grown in "long" versus "short" structures; uncovered compared to insect screen-covered greenhouse; shade screen for summer production of pepper and cucumber; and the commercial production of tomatoes.

Open-field vegetable trials will include four feddans of melons in low tunnels; two feddans of sweet corn in low tunnels (3 planting dates); a quarter feddan of tomatoes grown in low tunnels; and nurseries covering a quarter feddan each of artichoke and asparagus.

Fruit Trees

The subcommittee recommends that preplanting work include leaching the fruit tree areas to a depth of 2 meters. Plots not planted this winter are to be treated with winter and summer green manure.

Main crops to be utilized include: grapevines, apples, peaches, plums, almonds, apricots, olives and bananas. Minor crops are: loquat, a cultivar Acco 1 of loquat seedlings, papaya and hybrid annona. New species to be explored are pittaya, marula, *zyzyphus mauritana*, white sapota, opuntia and carob. As a wind break, *Acacia salicina* is recommended.

Each of the major crops will be planted on approximately 2 feddans. In addition to the plots devoted to the major fruit crops, small areas (about 500 sq. meters each) will be devoted to loquats, papaya and hybrid annona. A separate plot of about 1,000 square meters will be devoted to the testing of new fruit crops. These crops will be developed in the future as commercial fruit.

Professor Yousef Wally, Deputy Prime Minister and Minister of Agriculture (third from left), briefs members of the Technical Committee. From left: Dr. Merle Jensen (United States); Dr. Dov Pasternak (Israel); Minister Wally; Dr. Adel El-Beltagy (Egypt); and Dr. Michael Reid (United States).

Recommendations Regarding the Exact Location of the Main Fruit Plots

Crops most resistant towards a high lime content in the soil are almond rootstocks, olives and grapevines. Most susceptible are apples and apricots. This point is critical in the selection of the plots.

The recommended new species are highly resistant towards salinity. Almond rootstocks, apricots and peaches are susceptible to salt damage. Expected efficient salt leaching by the irrigation system may reduce the subcommittee's concerns.

Ornamental Crops

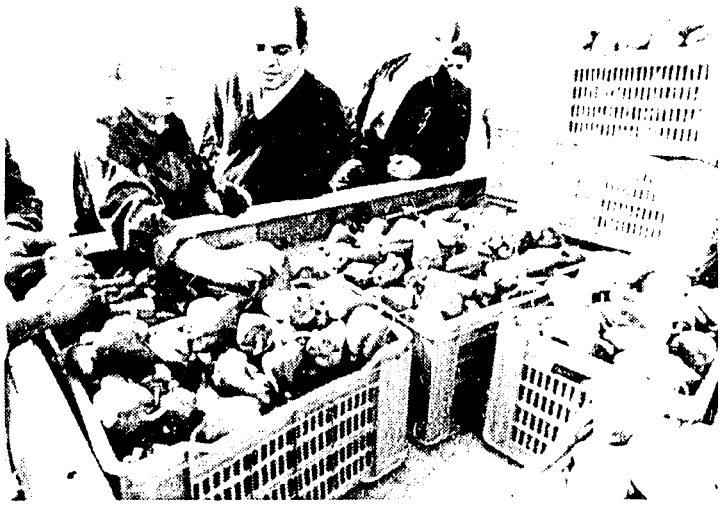
The challenges of the soils are less keenly felt in the area of ornamental crops. Modern ornamental production largely uses artificial soils, so that the nature of the substrate at Maryut is less important for these materials than for fruits and vegetables. In addition, ornamental production is very intensive and small areas can generate substantial returns, which makes this type of production a desirable feature for a project that is looking for rapid demonstration of superior productivity.

Landscape Ornamentals

A comprehensive list of landscape ornamentals was drafted by the subcommittee. The list will be amended by additions of those plants known in Egypt to be similarly adapted, as well as from native U.S. plants with similar properties.

Plants selected by the subcommittee are appropriate for landscaping dwellings and other sites in desert areas and include trees, shrubs, prostrate plants, and lawn grasses. To provide information on landscaping possibilities, the subcommittee recommends:

- Establishing, along the roadside portion of the property, an ornamental planting containing as many of the selected species as possible. This will serve a variety of functions, including: investigating the adaptation of



Dr. Irit Rylsky (Israel), Dr. Mohamed Hashim (Egypt), and Dr. Michael Reid (United States), examine a pepper crop at the Dokki Training Center in Cairo.

the species to the specific microenvironment; demonstrating the range of species available for landscaping, windbreak and border plants; and providing a pleasing roadside for the project.

- Establishing demonstration landscapes appropriate to typical farm and village housing in the area.
- Developing informational "handouts" outlining a variety of approaches to landscaping and lists of recommended plant materials.

The subcommittee recommended that the designs for domestic landscapes should include at least one shade tree, show potential for home vegetable production, and demonstrate play areas for children.

The point was made that it would expedite matters and be appropriate if the Maryut site were designated as a post-entry quarantine location, to simplify the process of introducing new plant materials in Egypt.

Floricultural Production in Protected Cultivation

This segment will utilize Egyptian and overseas expertise in demonstrating modern techniques for the production of existing ornamental crops and demonstrate the production and market potential for a group of newer crops. The subcommittee recommended the construction of two greenhouses adapted to this purpose. One greenhouse should be heated and one left unheated. Both will utilize sand-culture technique with drip irrigation and liquid feed without circulation. One of the existing production tunnels will also be used to test production of a range of seed-propagated annual crops. In addition, the same crops will be tested in open fields.

In the heated greenhouse, roses will be the only crop, in order to simplify operational procedures, fertilization, etc. The irrigation system will be split to allow for differences in irrigation and nutrition between the sand and native soil beds. Cultivars will be selected in Egypt and new varieties adapted to local market demand.

Screen-House Production

This segment will demonstrate the production of a number of ornamentals, in native soil, and will test the proper lighting conditions for producing optimum quality crops. Crops producing cut flowers or cut foliage will be grown at three light intensities.

The construction of a screen house, in a location which will permit plants to be outdoors in beds continuing from the screen area, is recommended. The following species will be tested: For cut flowers: Bird of Paradise *(Strelitzia regina);* large calla lily *(Zantedeschia aethiopica);* small heliconia *(Heliconia psisttacorum).* For cut foliage: *Variancea euonymus;* large-leafed ruscus; bronze New Zealand flax *(Phormium tenax).*

Soil in all three structures utilized for protected cultivation will be sterilized after bed preparation with methyl bromide to reduce the risk of problems arising from diseases, pests, and weeds, and then flushed with at least 200 mm water to remove MeBr residues.

Potted Flowering and Foliage Plants

This portion will demonstrate the latest methods for producing potted plants, incorporating Egyptian expertise in the local market requirements, and potential sources of the components of artificial media, as well as overseas developments in engineering for efficient and cost-effective production. One of the production tunnels may be used for this part of the project.

A small range of crops representing different propagation strategies is suggested, and include large-leafed pothos (cutting propagation); spathyphylum (tissue culture propagation); monstera (seed propagation) and one flowering plant, New Guinea impatiens (from seed).

These materials will be grown

in soilless mix prepared with local materials. Initially, imported peat with local sand and vermiculite will be used, pending identification of a reliable, local, consistent organic amendment. Irrigation and fertilization will be by the standard trickle systems already in use in some Egyptian nurseries.

Open Field Production

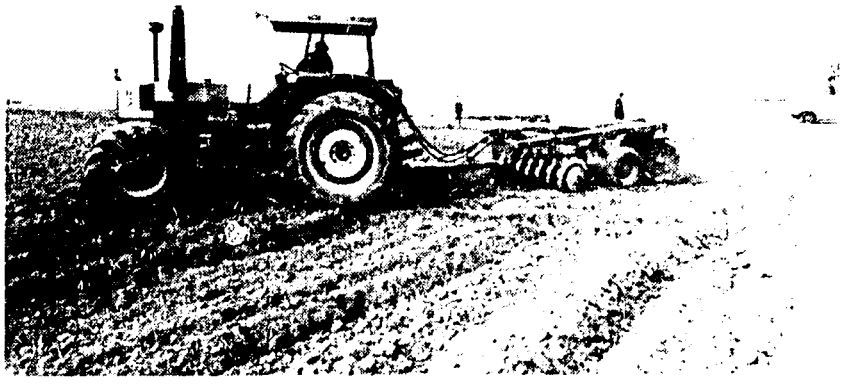
A range of foliage crops adapted to open field production has been identified and a list of species which may provide useful flowering branches has been prepared. In addition, it is proposed that winter production be tested in the field of the same crops that are being grown from seed in one of the polyethylene tunnels, for example, stock, goldenrod, and Chinese aster.

Turf

Turf species selected in Egypt, Israel, and the United States as being suited to desert low-maintenance conditions will be planted in a demonstration/research area, and provided with minimal maintenance. Varieties suggested as possible candidates include species or selections of the following: *Paspalum vaginatum;* Bermuda grass; buffalo grass; zoysia hybrid; Durban grass.

Time Scale and Priorities for Implementation

Obviously, the extent of the projects proposed will require very substantial financial and manpower resources, and implementation will be effective only if approached in stages. At this point the Technical Committee believes that it is important to take steps to provide the necessary physical structures, and to start with at least some of the plantings. Early priorities that seem important follow.



Open field agricultural plot being prepared at the Maryut site in December 1989. Walk-through plastic tunnels may be seen in the background.

Seed Propagated Crops

If possible, obtain best quality seed lines for selected seed-propagated crops. Raise seedlings in soilless medium to transplanting stage.

Acquisition of Plant Materials

The overall plan for ornamentals needs to be developed with time lines for various components, in order to ensure timely delivery of plant materials and necessary equipment.

Soil Preparation

Since the entire site is prepared by installing drain lines, the area selected for ornamental production should be similarly drained. Soil should then be amended as desired, leached sufficiently, and then sterilized (outdoor and shade house area) with methyl bromide.

Seed Propagated Crops

Once soil preparation is complete, the transplants provided can be planted in the field and in one of the commercial plastic tunnel houses. At this time, the proportioning equipment necessary to irrigate and fertilize these crops will be required.

Screen House

The construction of the screen house will provide for planting the existing Strelitzia plants and the other flowering and foliage materials planned for this site.

Potted Plants

A screen can be erected over the plastic tunnel house designated for potted plants, and propagation benches erected and used for starting production until the heated benches are constructed and the proper equipment is obtained.

The construction and furnishing of the two ornamental production houses is an important part of the program. As they are completed, the beds can be formed and sterilized prior to planting.

Establishment of a Temporary Nursery

Since plant materials are likely to arrive before they are needed, and since the Project is now obtaining materials, a nursery area should be designated as a temporary holding area for plant materials in both production and landscape efforts. ■

Steering Committee Meets Twice in 1989

Maryut Project Has On-Site Egyptian-Israeli Management Team

Systematic efforts were undertaken to recruit the Egyptian Project Director and the Israeli Technical Advisor. Because of the crucial role that these two positions have for the success of the project, an extensive search was undertaken and a process was carried out to select the most capable persons who will work as a team. Dr. Awad Hussein, Professor of Horticulture at the University of Alexandria, was chosen as the Project Director. He is a University of California graduate with a wide research background and extensive international experience. Mr. Itzhak Ayalon was selected as the Technical Advisor. He was chosen from among a panel of candidates via a process which included not only comparisons of agricultural expertise but also adaptability, cultural understanding, and communication skills.

Maryut Support Staff

Key staff members include: Mr. Nabil Mahmoud as the Farm Manager, Mr. B. Atif as Resident Foreman, Mr. S. Alaa as Head Technician, Mr. Mohamed Nagid as Resident Technician. A number of laborers were also hired. ■

Site Preparation

Efforts in 1989 have been directed towards rehabilitation of the prefab structure on the site which had neither electricity nor running water. Adequate furnishings were established to accommodate the personnel staying at the site or visiting on a daily basis. Emphasis was then placed on

(continued on page 6)

Members of the Maryut Steering Committee pause during an inspection tour of agricultural production plots as part of their October 1989 meeting.

Members of the Maryut Steering Committee met twice in 1989 to plan and define work plans and site preparation and to review scientific and administrative progress of the Project. The first meeting occurred in London in February and the Committee adopted the original implementation plan for the first six months (March to September), as follows: approval of the sub-agreements; hiring of staff; first meeting of Consultant Panel to develop an agricultural plan; procurement of equipment; land preparation; preparation and planting of open field crops; preparation and establishment of greenhouses; establishing nurseries; Steering Committee and Consultant Panel Meetings; scientific visitations.

In October 1989, the Steering Committee met in Amsterdam, Holland. The Committee reviewed the progress of the Project and discussed the following items: timely financial and technical reporting; the implementation of activities from the period September 1989 through March 1990, which included the acceleration of project activities, crop varieties, composition and seasonal distribution, and settlement models to be demonstrated. In addition, the Committee discussed long range planning for the Maryut Project.

The Committee consists of nine members. The three Israeli members are: Dr. Samuel Pohoryles, Director-General, Rural Planning and Development Authority, Ministry of Agriculture and Israeli Project Coordinator; Dr. Itzhak Abt, Ministry of Agriculture; and Dr. Yosef Shalhevet, Institute of Soils and Water, Ministry of Agriculture. The three Egyptian members are: Dr. Adel El-Beltagy, Undersecretary of State for Land Reclamation, Ministry of Agriculture and Egypt Project Coordinator; Dr. Mahmoud Mahfouz, Member of the Shura Council; and Mr. Mohamed Dessouki, First Undersecretary of State for Agricultural Development, Ministry of Agriculture. The three United States members are: Mr. Harry Albers, General Manager, San Diego State University Foundation and U.S. Project Coordinator; Mr. Bertram Wolf, Albert Einstein

(continued on page 6)

Site Preparation

(continued from page 5)

preparation of a 35 feddan area as a first phase of the 60 feddan R&D unit. Extensive soil samples were taken from 45 locations and analyzed to ascertain the soil profile and characteristics. The results showed a high degree of soil compaction, extensive weed spread, and a high degree of salinity. Necessary drainage was consequently established and the soil was leached. The land was then prepared to establish a suitable subsoil by deep plowing and leveling. An irrigation network has been constructed and a site for the nursery greenhouses was selected and prepared. Greenhouses have been constructed and crops planted at Maryut. (See accompanying story.) ■

Steering Committee Meets

(continued from page 5)

Peace Prize Foundation; and Dr. Albert Johnson, Vice President for Academic Affairs, San Diego State University. The meetings were also attended by Dr. Mohamed El-Assal, U.S. Administrative Coordinator and Dr. Dov Pasternak, Chair, Technical Consultant Panel. ■

MARYUT PROJECT TECHNICAL COMMITTEE MEETING ARAB REPUBLIC OF EGYPT DECEMBER 3-7, 1989

PARTICIPANTS

Egypt

Dr. Adel El-Beltagy, Project Coordinator
Dr. Amin El-Gamasy, Ornamentals
Mr. Ohood Ghannam, Ministry of Agriculture
Dr. Abdel Ghamy El-Gindy, Irrigation Management
Dr. Emad El-Hawary, Marketing and Agricultural Economics
Dr. Mohamed Hashim, Vegetable Production
Dr. Awad Hussein, Project Director
Dr. Abdel Muhsen Khalil, Plant Nutrition
Dr. Mohamed Maksoud, Vegetable Production
Ms. Atiat El-Menshawy, Ministry of Agriculture, Project Administrator
Dr. Zaki El-Sawi, Vegetables
Dr. Asem Shaltout, Fruit Trees
Dr. Abdel Aziz Sheta, Soil
Dr. Mohamed Lutfy El-Usta, Ornamentals

Israel

Dr. Dov Pasternak, Chair, Consultant Panel
Mr. Itzhak Ayalon, Technical Advisor
Mr. Yosef Ben-Dov, Landscaping and Ornamentals
Dr. Arie Gur, Fruit Trees, Program Development
Dr. Irit Rylsky, Indoor and Outdoor Vegetables
Mr. Igal Sar Shalom, Extension, Field Crops and Vegetable Crops
Dr. Arie Szeskin, Marketing and Agricultural Economics
Dr. Yaakov Ben-Yaakov, Ornamentals

United States

Dr. Mohamed El-Assal, Administrative Coordinator
Dr. Merle Jensen, University of Arizona, Protected Agriculture
Dr. Richard Jones, University of California, Davis, Vegetables & Fruit Trees
Dr. Adel Kader, University of California, Davis, Fruit Trees
Dr. Michael Reid, University of California, Davis, Ornamentals
Mr. David Moore, San Diego State University Foundation

San Diego State University
FOUNDATION
San Diego, CA 92182-1900

APPENDIX D

MAJOR PROCUREMENT ITEMS

MARYUT EQUIPMENT

WESCOR SCIENTIFIC PRODUCTS

TH-65 Thermocouple Thermometer
9V Battery operated
In Stock $659.00

LAKOS PLUM CREEK

1911 North Helm Ave. Phone: (209) 255-1601
Fresno, CA 93727 Fax: (209) 255-8093
(Manufacturer) Toll Free: 1-800-344-7205

Referred to Distributor

AGRICULTURAL SUPPLY

1510 Markoni Ct. Contact: Rick F.
San Diego, CA 92073 Phone: (619) 661-6660

ITEM: Self-cleaning Rotary Intake Screen

PC 924 30 Mesh - 3 ea.

PC 92430GE10	Galvanized inlet Epoxie outlet	$ 832.50
PC 92430SE10	Stainless Steel inlet, Epoxie outlet	916.46
PC 92430SS10	Stainless Steel inlet & outlet	1355.00 x 3 ea
	Total:	$3,258.00

Per Dr. Kader: Order # PC 92430SS10 Stainless Steel

PC 2424 18 Mesh - 1 ea.

PC 2424GE	Galvanized inlet Expoxie outlet	$1,086.58
PC 2424SE	Stainless Steel inlet, Epoxie outlet	$1,173.06
PC 2424SS	Stainless Stees inlet & outlet	$ 1,725.00 x 1 ea
	Total:	$ 1,725.00
	Total:	**$ 4,983.00**

Per Dr. Kader: Order the PC 2424SS Stainless Steel- will last longer. **7 days shipping**

SUPERIOR CONTROLS CO., INC.

24950 Avenue Kearny
Valencia, CA 91355

Phone: (805) 257-3533
Fax: (805) 257-9472
Contact: Allen Greenland

ITEM: Sterling Series Controllers
Model: Sterling 18 - Pedestal mounted
220 V/50 Hz.

Superior will mount 220 V input - 24 V output with a 50/60 Hertz switch.

	List price	Quantity
	$ 600.00	2
To add 220 V	12.00	
	$ 612.00	
40% discount =	$ 244.80	
	$ 367.20	
Tax:	26.62	
	$ 393.82	for 2 $787.64

TURFCO MFG. INC.
3456 N. Washington Avenue
Minneapolis, MN 55412-2688

Phone: (612) 588-0741
Fax: (612) 588-2841
Contact: Scott

Pipe Piper
230 B - 12" blade depth

Price	Quantity
$12,458.00	1

Item in stock. Price good for 2 months.
This is the delivered price.

NOTE: Turfco recommends the 230 A - It is slower and applies more power to the ground. Model B goes twice as fast. Per Dr. Kader - order Model A

IRROMETER COMPANY INC.
P.O. Box 2424
Riverside, CA 92516-2424

Phone: (714) 689-1701
Fax: (714) 689-3706
Contact: Antoniette or Bill

Bill will mail more information

Shipping Address:
8835 Philbin
Riverside, CA 92503

Foreign Dept. Pacific Exports
Telefax: (714) 599-8309

Item: Model RA (Automatic) DC Power

Catalog #	Length	Quantity	Price	Extension
606	6"	20	$51.25 ea	$ 1,025.00
612	12"	20	52.50 ea	1,050.00
618	18"	10	53.75 ea	537.50
624	24"	10	55.00 ea	550.00
636	36"	5	57.50 ea	287.50
636	48"	5	60.00 ea	300.00
				$ 3,750.00

Item: Model 200 (Basic Sensor)

200-5		10	$12.00 ea	$ 120.00
100-10		10	14.00 ea	140.00
				$ 260.00

Item: Watermark Meter

30-KTCD		2	$130.00 ea	$ 260.00

Item: Watermark Moisture Control Panel

WFZ-24	24 Station This control panel comes with (24) jumper cables and includes sensors.	1	$475.00 ea	$ 475.00
WFZ-JC	Jumper Cable	3	$225.00 ea	$ 675.00
			Total:	$5,420.00

Ordered books

Crop Loss Assessment and Pest Management	$28.00
Apple and Pear Diseases	20.00
Citrus Diseases	20.00
Grape Diseases	20.00
Rose Diseases	20.00
Genetic Basis of Biochemical Mechanisms of Plant Disease	24.00
Total:	$ 132.00

CID, INC.

Co2 Gas Analyzer CI-301 $ 5,880.00

AC adapter included for 220V
Will take 45-60 days to receive after order

Laboratory Gas Analyzer I-350 $ 4,920.00

220V / 50 Hz
Will take 4 weeks to receive after order **$10,800.00**

SOIL MEASUREMENT SYSTEMS

Tensicorder Cat# SW-020 $ 3,725.00

Includes:
transducer probe
Charger Interface
Cereal Cable

Batteries recharge through the computer when hooked up through the charger interface. FOB Shipping charge

---

A.H. HUMMERT SEED CO.

Digital Thermometers

Model #	E1TH	Cat# 48-0530		$ 29.50
	ERCOLE	48-0535		33.50

Piccolo by Hanna '
ATC PH meter 129.50 ea. 2 ea. 259.00
This item uses watch batteries.

Digital Footcandle Light Meter
Model # FCM-10M
Cat # 47-0725-1 149.50 ea. 2 ea. 299.00

Total: $ **621.00**

P.K. MOAGAN INSTRUMENTS, INC.

HTL-1%RH/T Logger
Portable bench instrument for measuring/recording air humidity and temperature.
Cat# H-100 - comes with 220V Battery charger 1,950.00

NOTE: You can not do anything with the logger unless you have the sensor that plugs into the logger. This machine can take up to 4 different sensors.
The sensor: Cat# H102 is $495.00.
Make sure this is specified to have 220V.

QUESTION: Exhibit B: Do you already have a sensor for this instrument?

CI-201 Portable Leaf Area Meter
Cat# C-100 - Comes complete 3,950.00
Specify 220V with order

$ 6,395.00

ECHO'S TROPICAL FRUIT VIDEO SERIES
By Dr. Carl Campbell

Tape #1	Introduction to Tropical Fruit	50.00	
Tape #5	Part 1-Mangoes		
	Part 2-Papaya, coconut	50.00	
Tape #6	Part 1-Banana and jackfruit	50.00	
			150.00
		6% tax:	9.00
		Shipping:	2.00
		total:	161.00

PAL STANDARD

NOTE: This is not available in 16mm film
QUESTION: Exhibit C: Specify SECAM or PAL STANDARD
SECAM - per Dr. Kader

MINOLTA
Chroma Meter CR-200
Item #1849-128
Includes: Calabration Plate CRA43
ACA-10
1 case
Din Plug
Mini plug $4,850.00

Received

NOTE: Additional charge of $33.00 for 220 V adapter.
The 110 V adapter will be included with the order.
Up to 10 working days to receive order. 4 weeks to receive 220 V adapter.

Chlorophyll Meter SPAD-502 $1,200.00
now order from Wescor Scientific as of 1/1/91

$6,050.00

21

NELSON

11/15/90 WILL NOT ORDER FROM THIS COMPANY

NELSON 7719 North Pioneer Lane
Peoria, Illinois 61615
(309) 692-2200
Fax: (309) 692-5847

(Only sells parts)

Manufacturer: **Nelson**
1961 Miraloma Ave, Suite B
Placentia, CA 92607
Contact: Jim
(714) 993-1188
Fax: (714) 993-0496

PRICES:

	Price	Quantity
Nelson 8426 Series Controllers Six zone model - 220 V/50 Hz (comes in 110 V only 60 Hz No adapter)	$113.95	2
total:	227.90	

7900 Series valves
1" - glass reinforced nylon comes 20/box

50 total

7901 1" Globe W/O flow control	$ 21.95 ea.	=	$1,317.00
7911 1" Globe W/flow control	24.95 ea.	=	1,497.00
7931 1" Angle Valve W/flow control	25.95 ea.	=	1,557.00
7941 1" Angle W/O flow control	22.95 ea.	=	1,377.00

20 total

7937 1 1/2" Globe valve Glass reinforced nylon 6 included in ea. box	$ 70.00/box	=	$1,400.00
7938 1 1/2" Globe valve Glass reinforced nylon 6 included in ea. box	$ 95.00/box	=	$1,900.00

NOTE: Manufacturer prices much higher than distributor price.

Distributor: **Hydro Scape Products**
5805 Kearny Villa Road
San Diego, Ca.

Contact: Colyn
(619) 560-6611
Ex: 3126

7 - 10 working days to order

Nelson 8425 Series Controllers
Six zone model - 220 V/50 Hz
(Quantity) 2 $ 65.98 ea. = $ 131.96

7900 Series Valves
1" glass reinforced nylon
comes 20/box 50 total

7901 1" Globe W/O flow control	$ 12.08 ea	= $ 604.00
7911 1" Globe W/flow control*	16.48 ea	= $ 824.00
7931 1" Angle Valve W/flow control	14.28 ea	= $ 714.00
7941 1" Angle W/O flow control	12.63 ea	= $ 631.50

NOTE: Your order is for the 7900 series valves. There are 4 different valves in this series all with different prices. These valves come 20/box so you have to either order 40 or 60 total.

Special note: Per Dr. Kader: order 60 ea. (3 boxes) of #7911 1" Glove W/flow control at $16.48 ea.

Total: $ 988.80

7937 1 1/2" globe valve 18 ea. (3 boxes)
Glass reinforced nylon
(six per box)
only sold by box orders $ 38.50 ea. $ 693.00

NOTE:
7938 1 1/2" globe valve Not in stock
Glass reinforced nylon 18 ea. (3 boxes)
(six per box)
only sold by box orders $ 52.25 ea. $ 940.50

Total: **$2,754.26**

NOTE: The 7937 and 7938 globe valve are sold by the box only. You will have to order 18 or 24 total.
Per Dr. Kader: Order 3 boxes (18 ea.)

Continued items after receiving highlighted copies per Dr. Kaders recommendations:

VISUAL AIDS

Film and Slide Sets:

California Table Grape Commission
P.O. Box 5498
Fresno, CA 93755
(209) 224-4997

Keep Them Coming Back (Grape Handling at Retail)
Called 1/8/91 - Will mail free to SDSUF CALAR office.

Visual Media
Cooperative Extension
University of California
Davis, CA 95616
(916) 752-1011 Accepts P.O.'s - 30 day delivery

* Postharvest Cooling of Horticultural Crops (#83-130)	$52.00
* Postharvest Care and Handling of Cut Flowers (#84-115)	51.40
* Maintaining Transit Temperature in Truckloads of Perishables (#86-132)	44.90
* Packaging Horticultural Crops (#90-101)	52.00
	$200.30
Tax:	14.52
Total:	214.82

United Fresh Fruit and Vegetable Association
727 North Washington
Alexandria, WA 22314
(703) 836-3410 Pat McIver
Attn: Pat McIver

Prepaid, plus 10% shipping and handling
2 week delivery

* A Fresh Look at Fruits	$ 40.00
* A Fresh Look at Vegetables	40.00
	80.00
10% shipping:	8.00
Total Amount:	$88.00

Natural Resources Institute
Central Avenue
Chatham Maritime
Kent ME4 4TB
United Kingdom

Fax: (44 634 880066

Letter faxed 1/9/91
requesting price info.
1/10/91 - Received answer
from co. Item out of stock.
No available date.

* A Guide to Quality Requirement for Fruit and Vegetables
  in Western Europe.

IFAS Film Library, Bldg. 16
University of Florida
Gainesville, FL 32611 USA (On loan) Unatailable to purchase

* Tomato Packinghouse Dump Tank Sanitation
* A Flow-through System for Introducing Ethylene
  in Tomato Ripening Rooms

POSTERS

Produce Marketing Association
1500 Casho Mill Road
Newark, DE 19711 USA
(302) 738-7100 Fax: (302) 731-2409 Pam

* Cantaloupe Defects
* Green Plants
* Indoor Flowering Plants (Posters no longer available)

International Fruit World Agropress, Ltd.
Aeschengraben 16
4051 Basel, Switzerland (+4161) 231170

* Fruit World Map: Production Centers of Fruit and Vegetables,
  revised 1984

Mailed letter 1/9/91 requesting price information

Department of Agriculture, NSW
C.S.I.R.O Building
Delhi Road (P.O. Box 52)
North Ryde, N.S.W. 2113
Australia

Letter mailed 1/8/91
requesting price info.

* Postharvest Temperature Co9ntrol for Horticulture Produce
  (set of 3 posters)

COLOR CHARTS

Fruit & Vegetable Quality Control
Calif. Department of Food and Agriculture
Shipping Inspection
1220 N Street
Sacramento, CA 95814
(916) 4453913 Gordon

1/9/91 - Will mail what he has free of charge to CALAR SDSUF office.

Visual aids for USDA Standards:

* Tomato Color Charts
* Grade Requirement for Florida Citrus
* Photo Chart & Booklet Defects - may not be available

* Color Requirement for Apples - This booklet has not been published in a few years. None are available.

INSTRUMENTS

McCormick's Fruit Tech. Co.
6111-A Englewood Avenue 5-10 day delivery
Yakima, WA 98908
(509) 966-3999 Fax: (509) 966-7635 Jan

Refractometer, hand-with temperature (to determine Brix or % soluble solids compensating
Model # ATC1 0-32% Soluble soldis range $210.00

Effe-gi Firmness Tester (Fruit Penetrometre)

Model # FTO-500	0-500 gram	$155.00
Model # FT-0211	0-10 lbs.	135.00
Model # FT3-27	0-30 lbs.	135.00
		$635.00
	10% shipping:	64.50
	Total:	$698.50

Company advises to purchase the hand operated drill press and adapter. $90.00

ENVIRONMENTAL MEASUREMENTS

Temperature and Relative Humidity

Cole-Parmer Instrument Company
7425 North Oak Park Avenue
Chicago, IL 60648
(708) 647-7600

Rep: Jim Zawada
7 - 10 day delivery

Digital Hygrometer	(1 ea.)	
#N-03309-50 LCD hygrometer (0.9)		$ 290.00
#N-09376-04 Replacement Batteries (9V) 4 pk.		9.30
Thermohygrographs	(2 ea.)	
Model B - #CN-08368-00		
Two-speed spring wound model	$ 530.00 ea.	$1060.00
Chart Paper		
#CN-08368-10 Two-speed	5 ea. @ 12.45 ea. =	62.25
#CN-08368-20 Two-speed	5 ea. @ 12.45 ea. =	62.25
Felt-tipped pens Pkg. of 6		
#CN-08368-75 Blue	5 ea. @ 15.50/pkg.=	77.50
#CN-08368-80 Red	5 ea. @ 15.50/pkg.=	77.50
		$1638.80
	Tax:	118.81
		$1757.61

Sub of Union Carbide

Linde Gases of So. Calif.
VBA Cryogenics
P.O. Box 15046
Santa Ana, CA 92705

10-14 day delivery

Rep: Jack Hughes
(714) 547-6684

Gas Detector and Detecting Tubes

ITEM	PART NO.		PRICE
Gas Dectector	SG4010	(1 ea.)	$ 340.00
Spare Parts Kits	SG4012	(1 ea.)	25.00
Ammonia-Low Range	SG4101-3L	(1 ea.)	40.00
Carbon Monoxide-Low Range	SG4100-1La	(1 ea.)	40.00
Ethylene (50-800ppm)	SG4102-72	(1 ea.)	46.00
Ethylene-Low Range	SG4102-72L	(1 ea.)	46.00
Ozone (.025-3.0ppm)	SG4103-18L	(1 ea.)	48.75
Sulfur Dioxide - High Ra.	SG4102-5H	(1 ea.)	46.00
- Mid. Ra.	SG4102-5M	(1 ea.)	46.00
- Low Ra.	SG4101-5L	(1 ea.)	42.75
- Low Ra.	SG4100-5La	(1 ea.)	40.00
		Total:	**$760.50**

EG & E Chandler Engineering
7707 E. 38th Street
Tulsa, OK 74145
Contact: Theresa Wilson (918) 627-1740

Low priority item
per Dr. Kader

Gas Chromatographs
* With thermal conduyctivity detector & Porapak
* With flame ionization dectector & alumina column for ethylene determination.

Cat. #72040-05 Series 400 AGC	$12,135.00
Cat. #70619-05 for 220V/50 Hz. plus instalation	300.00
Est. shipping charge:	500.00
	$12,935.00

NOTE: Dr. Kader recommends purchase of the Packing Line as high priority for Maryut Project.
Listed is only supplier that he knows for small-scale equipment.

Tew Manufacturing Corp.
470 Whitney Road West
Penfield, NY 14526
(716) 586-6130

Tomato Packing Line Model ST
(Including Motors)

Series 2450	(Specify 220V/50Hz)	$13,255.00
	Crate:	$ 455.00
	Total:	$13.765.00
	2 Pales of Wax:	140.00
	Total:	$13,905.00

Total Amount: $85,305.33

APPENDIX E

EL-SHAAB NEWSPAPER CLIPPING

SUMMARY OF ATTACHED NEWSPAPER CLIPPING FROM *EL-SHAAB* NEWSPAPER

El-Shaab is an opposition newspaper published in Cairo. It has been printing a series of articles very critical of the trilateral cooperative programs in agriculture. The overall title of these articles is the "Israeli Subversion of Egyptian Agriculture." Although the paper is not taken very seriously by the middle class, it usually publishes material which not only embarrasses the government but also agitates the radical and fundamentalist elements and incites them to demonstrate against the government. The following is a summary of an article appearing on December 11, 1990:

EL-SHAAB CONTINUES IT'S DEFENSE
OF EGYPTIAN AGRICULTURE

NEW DETAILS ABOUT THE ISRAELI PENETRATION OF EGYPTIAN AGRICULTURE

Since Dr. Yussef Wally assumed his position as the Minister of Agriculture, he had been performing a dangerous role in facilitating the Israeli penetration and subversion of Egyptian agriculture. The facts and records show that he had agreed to import contaminated agriculture plants and supplies at the cost of 125 thousand dollars. After planting it, plant disease infestations crept across the land and threatened 125 thousand feddans in the Maryut area.

The reports indicate that the Minister's cooperation with Israel does not give heed to the warnings directed to the dangerous role he plays in weakening the indigenous varieties and introducing diseased or infected varieties which will ultimately undermine the long established agricultural practices in Egypt. More specifically:

> *Last January, Dr. Adel El-Beltagy, the Coordinator of cooperative programs with Israel and the Undersecretary of Agriculture presented Dr. Wally with a request to import suspect agricultural varieties which are known to be unsuitable to the area and susceptible to carry many diseases. Theses varieties include Khashby apples 4-12, Hermza peaches, Soelnak and Babcock plums, almonds and walnuts, Kainto apricot, Laroda Premier plums, Sabadoma and Kotshiba pears and a variety of grapes of the worst kind. Abandoning our true and tried varieties in favor of these suspect ones will lead to agricultural catastrophe.*

Reports also show that the Minister agreed on January 30, 1990 to grant Dr. El-Beltagy permission to import these suspect varieties. *El-Shaab* learned that these plants were brought directly from Tel-Aviv to Cairo on an El Al flight on March 12, 1990, but the agriculture quarantine contained the shipment which was to be carried out immediately to the Maryut Agroindustrial Complex Project.

The project was established as a cooperative program including Egypt, Israel and America to establish an agricultural and industrial complex on 120 thousand feddans in one of the best locations in the Western desert 54 Kilometers from Alexandria. More than 75 American and Zionist experts participate in this project which was supposed to disseminate these unsuitable and infected varieties throughout the area.

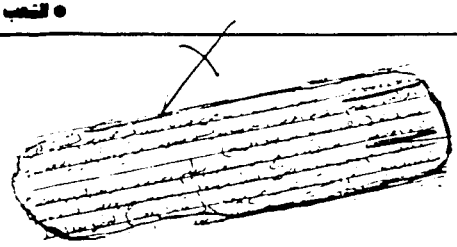
The facts indicated by the records which are printed above that the quarantine indicated the danger with these varieties pose to Egyptian agriculture. The scientists that supervised the quarantine are reputable and established and include Professor Dr. Samia Abdel-Samad, Dr. Mohamed Abdel-Fatah from the Horticultural Institute and Dr. Samir El-Menyawy from the Entomology Institute and Dr. Refaat Al Mahdy. They all advised not to permit the shipment to it's destination because it includes fungi, insects and other kinds of diseases.

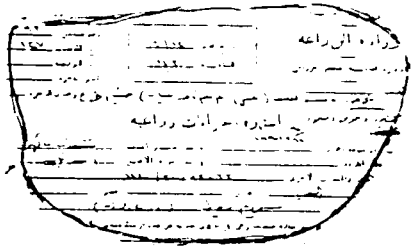
But on March 13, 1990, Dr. Wally issued a Ministerial order to exempt this shipment from quarantine regulations, and in essence nullified the opposition of the quarantine. In this way, the Minister has interfered with due process and the law to facilitate Israeli penetration, and ordered Dr. Asem Shaltout to receive the shipment and take it directly to the project.

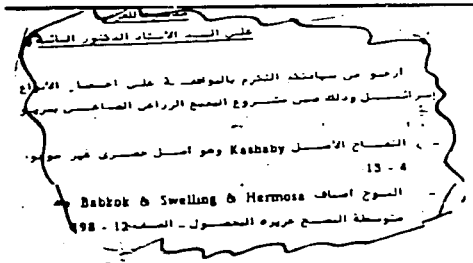
Just as has been feared, after planting the suspect varieties, diseases started showing on the plants and spreading throughout the area. What's worse is the chemicals which were brought with the shipment as pesticides and insecticides were not only ineffectual, but also they contaminated the area and exposes the health of workers to definite dangers.

BEST AVAILABLE COPY

الشعب تواصل دفاعها عن الزراعة المصرية







تفاصيل جديدة عن الاختراق الإسرائيلي للزراعة المصرية

منذ تولى الدكتور يوسف والى منصب وزير الزراعة وهو يقوم بدور خطير فى تسهيل مهمة الاختراق الاسرائيلى للزراعة المصرية وتؤكد الحقائق والمستندات انه وافق على استيراد مواد زراعية ملوثة ثمنها ١٢٥ ألف دولار وبعد زراعتها زحفت الآفات وهددت ١٢٥ الف فدان بمريوط بالفناء والبوار ..

كما تشير التقارير الى ان الدكتور والى وافق على قيام مجموعة صهيونية بمسح منطقة الساحل الشمالى بحجة مطاردة الفئران وهو ما يهدد الامن القومى المصرى . وان موافقة د . والى تمت بالرغم من اعتراض اجهزة الامن ووزارة الخارجية ..

كما وافق الوزير على شراء شتلات وعقل عنب ملوثة ومحظور دخولها من الكيان الصهيونى .. ونجح الوزير فى ادخالها لمصر بالرغم من اعتراض خبراء الحجر الزراعى ..

وتكشف التقارير ايضا . عن موافقة الوزير على التعاون مع العدو لاقامة مولد للطاقة الشمسية وتوليد الكهرباء وشراء اجهزة رى ومعدات بـ ٢٥٠ الف دولار لكل مصنع بما يقدر بـ ١٥ الف دولار خلال ٨ اعوام

ومازال الدكتور . والى . يتحدى الجميع ويعقد صفقات مع محصولات صهيونية مسبوقة . بحجة الاستثمار الزراعى والتكنولوجيا الحديثة . حيث يكشف . باطن . هذه الصفقات عن توريد مواد ملوثة بالفطريات والحراثيم والآفات الى زراعة مصر .

ومن فى هذا التحقيق يتحدى د . والى بالتوثائق . واول الحقائق عن مواقفه عن استيراد شتلات ملوثة .

● فى يناير الماضى عرض د . عادل البلطجى المدير العام لمشروعات التعاون مع الاراضى الصهاينة وفى اول وزارة الزراعة مذكرة على الدكتور يوسف والى طلب رئيس الوزراء ووزير الزراعة طلب منه الموافقة على استيراد الانواع والاصناف التالية من شتلات وعقل من الكيان الصهيونى

- تفاح كاشانى - ملاله - ٤ - ١٣)
- النموذج اصناف - ٥ عروض
- سويلنق . بلكوك - (١٢ - ١٩٨)
- عنبى اللورد والموج
- المشمش صنف . كابيو .
- البرقوق اصناف مصرى . حولد . لاروزا . برمبير
- اللوز صنف . اميل فام .
- الكمثرى صنف . سمادوا . وصنف . كونشيا . دى التمار سبة الصفات
- الفيجو اصناف . سيبرور وسيوبرور . بريليت . ودبليت ٥

● كما باشر وكيل الوزارة الطماحى الوزير والى الموافقة على استيراد مصص انواع الاشجار من العدو الصهيونى مثل اشجار . ارجيبا . العنبة بالرب

- وفاكهة . بيرييبو . والتى تنضج بالشتاء و . ماريلا . ثمارها من انواع . البيت وبيت سون . وسلال سوتوا

● ● وتشير الوثائق التى حصلت عليها الشعب الى انه بتاريخ ٣ سبتمبر ١٩٩٠ وافق يوسف والى على استيراد هذه الانواع

● انه فى فبراير الماضى حصلت طائرة العال هذه الانواع من تل ابيب راسا الى القاهرة

وبتاريخ ١٢ - ٣ - ١٩٩٠ اعتمد المحجر الزراعى هذه الشحنات وصدر استمارة احراءات زراعية تحمل رقم ٢٩٢ سلسلة مشروع التجميع الزراعى الصناعى مربوط حلاصتها ان هذه المواد ملوثة

- وقد اقيم هذا المشروع بمشاركة مصر العدو الاسرائيلى وامريكا لانشاء مجمع للزراعة الصناعية المتعلقة بها على مساحة ١٢٥ الف فدان بمنطقة الكيلو ٥٢ بمطروح . وبالمجمع مالا يقل عن ٧٥ خبيرا وعدا امريكيا وصهيونيا . وتشارك فيه ايضا مصر بخبراء من شركة مونتيد . ويقوم المجمع بامداد الزراعات ومصنوعات الانتاج الحيوانى بمصر بمستلزمات الانتاج فى المرحلة الاولى منه . اما المراحل المقبلة فستهدف اقامة مصانع لتعليب واعداد الخضر والفاكهة

● وتشير شهادة الخبراء الزراعى حول مدى صلاحية الانواع والاصناف الزراعية المستوردة من الكيان الصهيونى والتى اشرف على فحصها كل من د . محمد عبد الفتاح عن معهد بحوث البساتين وكل من د . شعبانة عبد الصمد . واد . صبحى الصباوى عن معهد بحوث الحشرات . ود . رفعت المهدى عن معهد الامراض

الى ان ... شتلات الفاكهة مشتملة وغنية بطفيليات وفيروسات الصدرى وغير صالحة للزراعة

تحقيق صلاح بديوى

■ واكد خبراء الامراض الموقعون على الشهادة

★ وجود نيماتودا جرثومى وفطرى واضح على مستوى التطعيم بصفة عامة وعلى الجذور وبعض انواع العقل

■ كما قام معهد وقاية النباتات بفحص هذه العينات معمليا وعينات من شتلة العنب الواردة معها . وثبت عدم صلاحيتها للزراعة

زراعة التلوث

● وبتاريخ ١٣ من مارس الماضى امر د . يوسف والى بادخال هذه الشحنات والتى فاق ثمنها ١٢٥ الف دولار الى البلاد . ورغم معارضة الخبراء الزراعى لدخولها . وقام د . عاصم شلتوت بتسلمها وارسالها للمشروع مربوط . وتدخل وزير الزراعة لاعادة الشحنة من الفحص ورجوع الشحنة واعتمدت بذلك لجنة العدوين الحكومة مع م / امام مكى . م / محمود حلال . م / عاطف الحمدى

■ وتفيد تقارير الخبراء بمنطقة مريوط وسلحولها عن مشاتل تجريب زراعة الشتلات الصهيونية

● إلى إصابة شتلات المانجو وبسمة ٦٠ / عقب زراعتها بمرض البياض الدقيقى ولفحة الازهار رغم رشها اكثر من ستة رشات بمسحوق الموروسيد إلا أن المرض استفحل

ويشير التقرير وبالتفصيل إلى اصابة العنب العقل بمرض البياض الزغبى وانتشار الحشرات فى ثمار الكمثرى واصابة التفاح بالبياض الدقيقى واحتراق اوراق وثمار الخوخ واصابة البرقوق والمشمش بالعفن الجاف

ويلاحظ ان جزءا كبيرا من المواد المستخدمة فى المكافحة من انتاج صهيونى محرم دوليا مثل الفاروان لخطره على البيئة وصحة الانسان

وتضيف التقارير بان انتشار هذه الشتلات الملوثة امتدت للمحافظات المجاورة وتراوحت مابين ٣٠ ، ٦٠ / من محاصيل الخضر والفواكه

مسمار جحا

■ والقمة اخرى نذكرها ونتحدى والى ان ينفيها ففى ديسمبر الماضى ارسلت وزارة زراعة العدو مذكرة خطيرة الى المهندس عادل البلتاجى وكيل اول وزارة الزراعة والمشرف على العلاقات الزراعية الخارجية يشكو فيها من هجوم فئران شرسة قدمت من مصر عبر حدود . مايمى . بشرائيل و اتهمت مساحات واسعة من المزروعات بقطاع غزة والنقب المحتلة ووصلت تقدمها حتى وصلت للمدن الساحلية بالقرب من تل ابيب

واقترح الصهاينة تشكيل مجموعات عمل مشتركة من المجهودين لمسح منطقة الساحل من السلوم الى تل ابيب

■ وتم عرض مذكرة العدو على الجهات الامنية ووزارة الخارجية المصرية ووزير الزراعة

● وقد وافق د . يوسف والى وزير الزراعة على المذكرة . بينما رفضتها الجهات الامنية ووزارة الخارجية لاعتبارات تتعلق بالامن القومى منها أن منطقة الساحل الشمالى تعد من أخطر المناطق عسكريا لامن مصر . وتضم مدنا إستراتيجية ومواقع عسكرية ومواد معدنية هامة كاليورانيوم التى يحتاجها العدو بينما هو المسئول عن نشرها بمصر منذ أوائل الثمانينات . كما أنها لاتشكل خطرا حقيقيا كما تزعم وزارة الزراعة الاسرائيلية

● بالاضافة إلى أن طلب السلطات الاسرائيلية غير واضح وينضم بالعموض والسرية ومعنى طلب الصهاينة القيام بمسح فى الساحل الشمالى ومطاردة الفئران

■ والقمة الثالثة نتحدى بها د . والى ونطالبه بالجلاء واضحة حولها .

وهى إن الصهاينة أرسلوا لإدارة العلاقات الزراعية بالخارجية يطلبون إستيراد ٣٠ الف طن من القمح المصرى . وتمت الموافقة على طلبهم

والمعروف إن القمح المصرى يدخل فى العديد من الصناعات المتعلقة بالحاصلات والمعدات الحربية والملاحظ أن عدوما يمنح كميات كبيرة من طمح البحر العيت الشديد الملاحة

الدكتور والى

■ ورابع تحد للدكتور والى يتعلق بعروض قدمتها شركات طاقة صهيونية وسماء محطات طاقة شمسية مسيناء والصحراء الغربية والساحل الشمالى على برك المياه بهدف استخدامها فى التسخين والتبريد الشمسى وتوليد الكهرباء اللازمة للزراعة عبر الخلايا الالكتروكيماوية وبمساعدة معهد وايزمن . ويقترب من مزارع الايفلر والمواشى المشتركة والعزم القائمتها قريبا مع العدو وبواسطة معامل تستعمل روث الطير عبر التحويل البيولوجى للبقايا الزراعية .

● وبالفعل يشارك الخبراء الصهاينة حاليا فى اقامة محطات للطاقة بسيناء والنوبارية . كما أنهم اقاموا محطات بالبحر الاحمر والوادى ٦ جديد . وقد أصيبت معظمها بالتلف . معد عام من إقامتها . ولنهم الف بجنة علماء مصر بمجرد عن إدارتها ...