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ANNUAL TECHNICAL REPORT

April 10, 1990 - March 31, 1991

Cooperative Arid Lands Agriculture Research Program (CALAR II) In Protected Agriculture

Contract Number ANE-0158-6-00-0017-00

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

Submitted by the
San Diego State University Foundation
San Diego, California 92182

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This Annual Technical Report of the initial activities of the ***Cooperative Arid Lands Agriculture Research Program (CALAR II)*** was prepared by the San Diego State University Foundation utilizing input from participants in the Arab Republic of Egypt, the State of Israel and the United States of America.

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OVERVIEW

The Cooperative Arid Lands Agriculture Research Program (CALAR II), is funded by the Agency for International Development Bureau for Asia and Near East. Initiated April 1990, the CALAR II Program is being accomplished by scientists from the Arab Republic of Egypt, the State of Israel and the United States of America and is designed to meet the national development priorities that have been established by the governments of its two participant countries in the Middle East.

The CALAR II Program is concentrating upon protected agriculture -- crops grown inside structures of various sorts and covered with glass, plastic, net and other materials -- which will provide the means for both Egypt and Israel to reclaim and utilize utilize the desert climate for production of high-value crops, expand non-urban employment opportunities and establish innovative and important new products for export.

Five major components make up the technical program:

- agromanagement;
- environmental modification;
- structure selection;
- genetic modification; and
- post-harvest aspects.

Scientists involved in CALAR II believe that the results of this integrated interdisciplinary program will have a significant impact upon agriculture in Egypt and in Israel.

Continuing the scientific partnership fostered by the original CALAR Program[1]; the CALAR II Program is strengthening and expanding cooperative efforts between Egyptian and Israeli scientists with its new research topics which has brought an infusion of new people and organizations into the Regional Cooperation Programs.

[1] Cooperative Arid Lands Agriculture Research Program (CALAR), 1982-1990; funded by the Agency for International Development; Contract Number: NEB-0170-A-00-2047-00.

TECHNICAL REPORT

THE TECHNICAL PROGRAM

The Cooperative Arid Lands Agriculture Research II (CALAR II) Technical Program is made up of five components: agromanagement; environmental modification; structural selection; genetic modification; and post-harvest aspects.

Funding for the implementation of the CALAR II Program in Protected Agriculture was received on June 1, 1990, for an April 10, 1990 start date.

CALAR II SITES

Research sites for CALAR II have been prepared in Egypt and Israel.

Arab Republic of Egypt

Three sites are dedicated to CALAR II research. These are:

a. ***Shubra El-Khaima:*** located in the College of Agriculture, Ain Shams University, Cairo. Nutrition and propagation experiments; experiments conducted in growth chambers.

b. ***Shalaquan:*** a site near Cairo, is a former FAO experimental station. Currently six greenhouses contain CALAR II experiments. A shade house will be constructed. Breeding experiments will be conducted at Shalaquan.

c. ***El-Bousseily:*** near Alexandria, consists of extensive sand dune greenhouses. Experiments on structure and material, as well as agromanagement, are localized at this site.

State of Israel

A number of experimental sites and stations are involved in CALAR II research.

a. ***Institute of Applied Sciences, Ben-Gurion University, Beer-Sheva:*** new ornamentals, melon breeding, protected fruit trees, solar energy, CO enrichment, fruit quality.

b. ***Volcani Institute:*** nutrition and fruit quality, tomato breeding, melon and pepper quality.

PROGRESS IN COMPARISON WITH GOALS AND OBJECTIVES

The initial work plan, as approved by the Agency for International Development, is presented in the section entitled, "Work Plan" of this report.

Progress in comparison with this work plan and in comparison to the goals and objectives outlined in our original proposal, has been satisfactory for Year 1 of the CALAR II Program.

WORK PLAN

IMPLEMENTATION

The CALAR II Program is designed to expand cooperative scientific efforts between Egypt and Israel, create and optimize the utilization of needed new lands for agricultural production, establish innovative and competitive products for export and expand non-urban employment opportunities. The Work Plan for Year 1 is being conducted jointly by Egyptian and Israeli scientists, assisted by their United States counterparts, and will be accomplished in two integrated steps: Planning and Initiation, and Implementation in the Region.

Year 1: Planning and Initiation

Inasmuch as the primary objectives of the program involve the optimization of new lands for agricultural production as well as the expansion of cooperative efforts between Egypt, Israel, and the United States, the approach to implementation has been to conduct an intensive planning session for participants from each of the program's factions. The result of this planning session was a detailed work plan describing how each component will coordinate its activities, which will serve as a working guide for the overall operations of the program through its initial five-year cycle.

The preparation of detailed methodologies and schedules by the individuals representing each of the program's units in Egypt, Israel and the United States, who will be working together is critical to the success of the program. The diversity of the program and its research personnel and organizations makes this phase essential if there is to be unanimity of purpose, direction and cooperation throughout the planned time-frame for the program. The impact of a solid planning base is also essential for the maximum leveraging of funding for the program.

Special objectives follow.

Planning and Initiation Activities

1. Appoint Steering Committee.
2. Employ Program Coordinators.
3. Employ Program Staff.
4. Establish Program Office.
5. Meet with representatives from each program component to prepare and execute subcontracts.
6. Invite participants to Steering Committee and planning meeting.
7. Arrange for travel, accommodations, and other meeting logistics.
8. Convene meeting.
9. Develop "Logical Framework" for research, development, demonstration, and training components; develop detailed work plans.
10. Develop internal evaluation plan. Meet with researchers on-site in Egypt and in Israel.

12. Meet with organization members who are participants in the program.

13. Initiate process of procuring equipment (procurement of specifications, bids, etc.).

Persons involved in the foregoing activities include members of the Steering Committee; the United States Program Coordinator; and the Program Coordinators in Egypt and Israel; Program staff; members of participating organizations in the United States, Egypt, and Israel; and San Diego State University Foundation management.

Year 1: Implementation

1. Employ any remaining support staff.

2. Procure equipment.

3. Development of research, development, and demonstration sites in Egypt and in Israel.

4. Initiate Program in Egypt and Israel.

5. Initiate internal program evaluation.

6. Convene Steering Committee.

7. Publish and disseminate technical reports, newsletter, and other information/activities application data and publications.

8. Collect, review, and forward to USAID, contract-required reports.

THE TECHNICAL PROGRAM ACTIVITIES: A KEY TO YEAR 1 ACTIVITIES

The CALAR II Program in Protected Agriculture has two equally important goals: 1) Expanding cooperative applied research efforts between Egypt and Israel (for details, see following Report Section, "Cooperation"); and 2) the Development of Protected Agriculture as a means to produce competitive export products, as well as for providing food for domestic consumption. The improvement of the socioeconomic status of farmers and growers in the participating countries, as well as the development of new productive lands -- and the preservation of fragile ecosystems in those lands -- are also goals for the program.

CALAR II Technical Program activities for Year 1 have centered upon the following topics:

- agromanagement;
- environmental modification;
- structure selection;
- genetic modification; and
- post-harvest aspects.

The five major topics are being divided into sub-elements for research and development. These sub-elements are:

1. Agromanagement. Horticultural research requires the input of a number of scientific disciplines, integrated so as to address and solve a wide range of problems. Agromanagement, one of the most basic of all subjects in the production of protected crops, is also one of the most critical topics influencing optimum quality of the product. The research, development and application of improved agromanagement techniques is a multi-disciplinary subject. Research interests in agromanagement are centering upon:

   a. ***Irrigation water quantity and timing:*** In general, the frequency of irrigation and moisture stress in protected plants are closely related. Moisture stress occurs whenever the rate of transpiration exceeds the rate of water absorption and plant cellos are less than fully turgid. Some moisture stress, however, is desirable in flower crops.

      The amount of water to apply, evapotranspiration, soil water constants, gravimetric determinations, soil water potential, yield and quality of program products are among the interests of CALAR II scientists.

   b. ***Optimal fertilizer needs:*** Although standardized growing media and standardized fertilization programs are fairly well known for a majority of protected crops, the evaluation of how well the required nutrients meet the needs of new strains and varieties under protected growth development is an area that is under investigation.

   c. ***Type of fertilizer and quantity:*** Optimal crop production in protected agriculture has, as one of the major influencers, the type -- or sub-type -- of fertilizer best suited for each species and variety, as well as for the specific growth media. Type and quantity of fertilizer as opposed to crop and growth media are being studied.

   d. ***Use of artificial root-growth substrates:*** To realize the advantages of equipment, fertilizers, and irrigation, investigations of the media in which protected crops are grown is essential. Demonstrations have established that the majority of protected crops can be produced in artificial substrates. Detailed studies are being made to determine optimal requirements for selected crops.

   e. ***Optimal planting season for each particular crop:*** Researchers will determine, under conditions prevalent in program sites, and in application, the optimal planting season for reach selected crop.

   f. ***Methods of intensive cultivation:*** Some methods of intensive cultivation, i.e., pruning, are standardized throughout industry; others, such as the use of chemicals to achieve intensive cultivation, require more study for specific crops.

   g. ***Diseases and pest control:*** Control of pests and diseases in protected agriculture crop production is a critical topic. Because most protected structures are closed environments, pests and diseases can spread quickly. Methods, techniques and application -- as well as various chemicals -- suited to selected crops, is under investigation.

   h. ***Use of computer-aided techniques for optimal water and fertilizer application:*** Computers are being utilized in agriculture for a number of research and applied reasons. Computer-aided techniques are essential in gathering and assessing the large amount of data required by CALAR II researchers.

2. <u>Environmental Modification</u>. By its very nature, the greenhouse -- or other type of protected structure -- influences its own environment. The structure itself has a direct effect on air temperature, solar radiant flux density, quality, relative humidity and carbon dioxide; it also has an indirect effect on soil temperature and soil moisture. The modification of these effects can have additional influences for optimum plant and crop production.

   a. ***Heating, cooling, ventilation, carbon-dioxide enrichment and shading:*** The study of ways and combination of ways that the natural influencers in protected structures can affect crop production is of utmost importance to the CALAR II Program.

   b. ***The use of sources of unconventional heat:*** Unconventional heat sources, such as solar energy, geothermal water and waste water from power plants, as well as other energy-saving methods for environmental control and modification, are being studied.

3. <u>Structure Selection</u>. In addition to green, or glasshouses, a number of other structure types may be utilized to produce protected crops. Cover materials include film plastic, net and other coverings, and may be single or multi-layered. Structure design, as well as materials for the construction of such structures, are of interest to CALAR II participants.

   Design and selection of optimal structures for each selected crop in its regional setting: Structures that provide the most favorable natural influencers at the most favorable cost for users will be studied with regard to optimum production for each selected crop in its regional setting. Newer designs may also be studied.

4. <u>Genetic Modification</u>. Experiments with genetic modification in selected crops is being undertaken so as to optimize these crops for protected production within the framework of the CALAR II Program. Topics are divided into:

   - production of cold- and heat-tolerant cultivars;
   - improving the quality of selected vegetable, fruit and ornamental species;
   - increasing the yield in selected species;
   - extension of shelf-life; and
   - introduction of genetically-controlled tolerance to diseases and pests.

5. <u>Post-Harvest Aspects</u>. Program studies regarding post-harvest aspects include, but are not limited to, optimal harvest date; effects of post-harvest cooling; investigation of different methods to extend shelf-life, packaging methods, environmental control for storage and marketing and economic assessment. Post-harvest topics are divided into the following categories:

   - improving handling methods to aid in extending the shelf-life of products;
   - packaging;
   - optimizing environmental control for storage and shipment; and
   - marketing and economic assessment.

Specific Program Topics

Each of the program research topics is being addressed by a distinct group of scientists. Research in a number of these topics will be conducted in parallel in Egypt and in Israel, while other topics will be addressed separately in either Egypt or Israel. Results from all research will be shared by CALAR II Program participants.

Specific program topics are:

1. **Technology**
   - The Use of Computer-Aided Water and Fertilizer Applications and the Combined Estimation of the Rate of Evapotranspiration in Structures.
   - Comparative Studies of Various Greenhouse Covers.
   - Soil and Space Warming with Solar Energy.

2. **Vegetables and Fruits**

   a. ***Agromanagement:***
      - Production of High Quality-High Yield Vegetables (HQHYV) Under Protected Cultivation.

   b. ***Genetics:***
      - Breeding Tomatoes Tolerant to Tomato Yellow Leaf Curl Virus Adapted to Protected Cultivation.
      - Breeding and Selection of Melon Cultivars for Off-Season Production in Greenhouses.
      - Improving the quality of the Edkawy, the main tomato cultivar in coastal Egypt.

   c. ***Post-Harvest:***
      - Research Into Fruit Quality Improvement.

   d. ***Exotic Vegetables:***
      - Developing Agro-techniques for the Cultivation of Novel Vegetables Under Shelter for the Export Markets.

   e. ***Ornamentals:***
      - Ornamental Crops for Cut Flower and Pot-Plant Production Under Protected Conditions.
      - Heliconia: A New Exotic Flower for Export.

   f. ***Exotic Fruit Trees:***
      - Introduction and Domestication of *Pitahaya dulce* as a New Crop Under Covered Structures.

   g. ***Marketing Studies:***
      - Economic and Marketing Evaluation of Protected Crops Development.

Appropriately, the CALAR II Program is also addressing two other important aspects that will be by-products of its successes in research and development. These are:

- Strengthening research in Egypt's Western Desert coastal zone and in the Nile Delta, as well as in Israel's Negev Desert, in order to investigate, develop and demonstrate program products; and

- Working with farmers and growers to demonstrate and refine methods, are techniques developed through the program.

PROBLEMS AND ACTIONS TAKEN TO ADDRESS THEM

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

The integration of differing systems of communications among program participants is one specific example. The impersonal-contractural communication methods favored by Americans must be integrated with the personal-oral style typical of the Middle East. When time is critical in achieving programmatic goals, such integration of the two communication methods is enhanced by an awareness of the cultural sensitivities of the parties involved.

A related problem is maintaining viable, authentic and lasting professional and personal relationships between and among the program participants. To build and maintain this viability, emphasis has been placed on the quality of these contacts among scientists and administrators from the three countries. The mechanisms of cooperation include scientist-to-scientist visitations, the Scientific Workshops and the Steering Committee meetings, which have been structured to provide both formal and candid interaction among program participants. In this manner, program scientists and administrators have grown to know one another professionally and personally.

The scope and extent of mass media exposure and publicity in light of cultural and personal sensitivities--as well as security fears and demands--has been an additional set of problems. Newspaper articles in both Egypt and Israel have included distortions and misconceptions that affect the sensitivities of the participants and provoke fears and anxieties. For example, Israeli newspapers have published articles that portrayed the Egyptians as third world trainees coming to benefit for advanced Israeli technology. Similarly, the opposition newspapers in Egypt have characterized visits of Israeli scientists as attempts to undermine the quality of long-established Egyptian agriculture and have published the names of the Egyptian agriculture and have published the names of Egyptian participants as collaborators. Such problems have been dealt with by issuing news releases after the program meetings, and placing more emphasis upon the Newsletters, which are widely disseminated in all three countries. Additionally, a television documentary funded by private donations is now being planned to carry the achievements of the Regional Cooperation Programs to the widest possible audience.

COOPERATION

The Cooperative Arid Lands Agriculture Research II (CALAR II) Program, has two equally important goals: 1) to strengthen and expand cooperative scientific exchange among Egyptian, Israeli and United States participants; and through such exchange, and 2) produce tangible applied results that are in concert with development goals of the Governments of Egypt and Israel. The San Diego State University Foundation, Contract Administrator for the CALAR II Program, has initiated a number of mechanisms to foster success for the two goals. These mechanisms are an integral part of the program's management practices and are a key for continuing success.

Cooperative activities are proceeding along lines similar to CALAR I, and include: 1) Steering Committee meetings; 2) annual workshops; 3) visitations between scientists; 4) Technology exchange; and 5) the newsletter and other publications.

Specific mechanisms for cooperation for the report period are highlighted as follows:

MEETINGS AND COLLABORATIVE ACTIVITIES

Annual Workshop

The major mechanism for cooperation, the Annual Workshops were established in the original CALAR Program and serve as the principal means of scientific interaction among Egyptian, Israeli and United States participants.

As in the past (in the original CALAR Program), the Annual Workshops serve as a foundation for building strong interpersonal relationships among the participants, which in the case of CALAR II is important, since many of the scientists are new to the Regional Cooperation Programs.

First Annual Workshop: November 10-14, 1990

The first Annual Workshop for the CALAR II Program was held in San Diego, California from November 10 through 14, 1990. Egypt was represented by 12 participants; Israel by 17 participants. There were eight United States scientists involved, as well as:
Dr. Abdel Azim El-Gazzar, Counselor for Agricultural Affairs, Egyptian Embassy;
Dr. Joseph Elkana, Counselor for Agricultural Affairs, Israeli Embassy; and Dr. Awad Hussein, Maryut Project Director.

At the Workshop, CALAR II Country Coordinators described their research plans for the initial phases of the program and scientists from the three nations presented plans for on-going research, drawing upon their colleagues for input. Dr. Adel El-Beltagy (Egyptian Program Coordinator), Dr. Dov Pasternak (Israeli Program Coordinator), and Dr. Mohamed El-Assal (United States Program Coordinator) were co-chairs for the San Diego presentations.

Steering Committee Meetings

Cooperation at the management level is a vital aspect for the continuing success of the program. Steering Committee meetings provide the mechanisms for not only crucial scientific and technical planning and direction for the program, but also foster and expand important personal interchange among those responsible for its success.

Steering Committee Meeting: June 18-20, 1990

The first Steering Committee Meeting for the CALAR II Program was held June 18-20, 1990, in Copenhagen, Denmark. The Committee reviewed and concurred upon the Subagreements and Contractual Reporting Requirements for CALAR II.

The Steering Committee also discussed the start-up priorities and procedures for the program. It was noted that the grant documents were received from AID on June 1, 1990, honoring the April 10 start date and making funds available as soon as the subagreements were signed, and budgets and work scopes were approved.

INTERNATIONAL TRAVEL

Steering Committee: June 18-20, 1990: Copenhagen, Denmark

Members in Attendance

Dr. Adel El-Beltagy, Mr. Mohamed Dessouki (Arab Republic of Egypt); Dr. Samuel Pohoryles, Mr. Joel Schechter (State of Israel); Mr. Harry Albers, Dr. Albert Johnson (United States).

Others Attending

Ms. Ariat El-Menshawy (Arab Republic of Egypt); Dr. Dov Pasternak (State of Israel); Dr. Mohamed El-Assal, Ms. Frea Sladek, Ms. Davene Gibson, Mr. Timothy Hushen (United States).

CALAR II Annual Workshop: November 10-14, 1990, San Diego, California

Participants

a. ***Arab Republic of Egypt:*** Dr. Adel El-Beltagy, Dr. Abou El Fettoh Abdalla, Dr. Usama El-Behairy, Dr. Hamdy El-Doweny, Dr. Abdel-Ghany El-Gindy, Dr. Ayman Abou-Hadid, Dr. Mahmoud Hafez, Dr. Mohamed Hashim, Dr. Mohamed Medany, Dr. Zaki-El-Sawy, Dr. Salah Mohamadeen, and Dr. Tarek El-Raggal.

b. ***State of Israel:*** Dr. Dov Pasternak, Dr. B. Aloni, Dr. A. Bartal, Dr. Aliza Benzioni, Dr. S. Cohen, Dr. Uri Drori, Dr. Amos Feigin, Dr. B. Gamliel, Dr. E. Korin, Dr. Samuel Mendlinger, Dr. Y. Mizrahi, Dr. A. Nerd, Dr. N. Pines, Dr. Irit Rylski, Dr. A. Scheffer, Dr. Ruth Shilo, and Dr. Dov Sitton.

c. ***United States:*** Dr. William Bauerle, Dr. James Beutel, Dr. Anthony Hall, Dr. T. Hsiao, Dr. Rick Jones, Dr. Adel Kader, Dr. Andre Lauchli, Dr. Norman Oebker, Dr. Michael Parrella, Dr. Michael Reid, and Dr. T. Short.

d. ***Invited Participants:*** Dr. Abdel Azim El-Gazzar (Egypt); Dr. Joseph Elkana (Israel).

e. ***Other Participants:*** Dr. Awad Hussein (Egypt); Dr. Mohamed El-Assal, Mr. Harry Albers, Ms. Frea Sladek, Mr. Timothy Hushen, and Mr. David Moore (United States).

REGIONAL TRAVEL

No regional travel has occurred during this report period.

ONE-TO-ONE VISITATIONS BETWEEN SCIENTISTS

A mechanism for cooperation that provides valuable experience in the exchange of program plans, research and ideas, as well as for informal discussion of both problems and progress in specific research topics.

TECHNOLOGY EXCHANGE

The CALAR II Program is designed to adapt and develop new technologies and varieties which are being tested at research sites in Egypt and Israel. Successful varieties will be exchanged between participants on a regular and on-going basis, as was the case in the original CALAR Program.

NEWSLETTER AND OTHER PUBLICATIONS

Regular publications, including this report, provide the means for expanding the audience for program research and results. Such publications also serve as an informal record of the program for its participants and as an informational tool for those individuals who are interested in the Regional Cooperation Programs. These publications are an integral part of the CALAR II Program's mechanisms for cooperation.

INTERFACE WITH OTHER PROJECTS

CALAR II Program management recognizes the need and USAID's request for interface with other regional and bilateral activities and will strive for an effective interface with such activities when it is applicable and practical and when such interface effectively serves the needs of the CALAR II Program.

TRUE COLLABORATION AMONG PARTICIPANTS

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

Program participants from Egypt, Israel and the United States work as a team in the major organizational structure, the Steering Committee, that is primarily responsible for the success of CALAR II. Participants from the three nations also worked as teams in the Annual Workshop (November 10-14, 1990), to define specific research goals and plans, as well as to exchange information.

MAJOR PROCUREMENT ITEMS

A list of procurement items, in accordance with USAID Reporting Requirements, is attached as Appendix A.

INTELLECTUAL PROPERTY RIGHTS

Patents and Copyrights

1. **Property Rights to Products Developed Through The CALAR II Program.** Property rights, copyrights and patent rights to products developed through the "Cooperative Arid Lands Agricu'ture Research II (CALAR II) Program in Protected Agriculture," will conform to published guidelines of the funding agency.

   This decision was mutually agreed upon by the CALAR II 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 is a member of this Committee.

   Other organizations and institutions that participate in the CALAR II Program 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 "Cooperative Arid Lands Agriculture Research II (CALAR II) Program" will be reviewed by the Steering Committee, which is composed of members from the three participating countries. All such policies practiced by this program will conform to those of the Agency for International Development.

ORGANIZATIONAL STRUCTURE

ORGANIZATIONS INVOLVED

The management plan for the Cooperative Arid Lands Agriculture Research II (CALAR II) Program is based upon that used by the successful original CALAR Program* operated 1982-1990 in Egypt, Israel and the United States by the San Diego State University (SDSU) and its Foundation.

United States

The contract administrator for the CALAR II Program is the SDSU 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.

Scientists from other United States Universities and Institution are expected to become involved in the CALAR II Program in Protected Agriculture, serving in such roles as reviewing plans, conducting internal evaluations, contributing to the program's workshops and meetings, and serving as consultants in specific capacities as required.

Egypt

The Ministry of Agriculture and Land Reclamation of the Arab Republic of Egypt is the main subcontractor in Egypt. The Ministry is responsible for establishing, coordinating, and participating in all the initial research, development, and demonstration activities in Egypt; devising the technical program relating to the experimental and demonstration sites; data collection; and drawing and executing the training and educational segments of the program. Egypt's Ministry of Agriculture and Land Reclamation has played a critical role in the success of the original CALAR Program; this strong support and commitment continues for the CALAR II Program.

Personnel from a number of Egyptian universities, offices and entities participate in the program.

* Cooperative Arid Lands Agriculture Research (CALAR) Program, 1982-90. Contract #: NEB-0170-A-00-2047-00.

The Agricultural Research Center

Technically, an arm of the Egyptian Ministry of Agriculture and Land Reclamation, the Agricultural Research Center operates with responsibilities in the following areas:

- research leading to the development of improved technology;
- field evaluations and verification;
- local testing and demonstration; and
- the farm application.

The Agricultural Research Center operates two institutes: one is devoted to studies of soil and water; the other concentrates upon field and garden crops.

Egyptian Universities

Ain-Shams University has played a leading role in experimental arid lands research and in protected crops research and development. Other Egyptian universities which are playing key roles in program-related research are: Al-Azhar; the University of Alexandria; and Zakazik.

ISRAEL

The Ben-Gurion University of the Negev is the main subcontractor for the Israeli component of the program. The University is responsible for establishing, coordinating, and participating in all initial research, development, and demonstration activities in Israel; and devising the technical plan relating to the research and development segment of the program; and for coordinating such activities with other program participants. Other applied research aspects of the program are also the responsibility of the Ben-Gurion University.

Personnel from a number of Israeli universities, offices and entities participate in the program.

Ministry of Agriculture

The Ministry of Agriculture of the State of Israel has played an important role in assuring the success of the original CALAR Program; this strong support and commitment continues for the CALAR II Program in Protected Agriculture. Organizations of the Ministry of Agriculture which participate in CALAR II are:

1. **Rural Planning and Development Authority**. The Ministry of Agriculture's Rural Planning and Development Authority operates with responsibilities in planning and development of new agricultural projects, marketing and the utilization of natural resources to meet development objectives.

2. **The Volcani Center: Institute of Soils and Water**. The Institute of Soils and Water is responsible for ensuring the continued and sustained increase in agricultural knowledge, through the study of soils, climate and water resources.

3. **The Volcani Center: Institute of Field and Garden Crops**. Most efforts of the Institute of Field and Garden Corps are aimed at developing new crops for export or determining the optimal conditions for growing certain crops for export in new areas. High priority is given to growing vegetable and ornamental crops out-of-season; production under protected cover and the breeding of new crops, among other studies.

MANAGEMENT AND COORDINATION

SDSU Foundation

The overall management, administration and coordination--and ultimate success--of the CALAR II Program is the responsibility of the SDSU Foundation, the contractor to USAID.

The Steering Committee

The management format proven successful in other international agriculture programs operated by the proposed contractor has involved the utilization of a Steering Committee.

The CALAR II Program in Protected Agriculture Steering Committee consists of six members, two members from each of the three countries: Israel, Egypt, and the United States. The Steering Committee is entrusted with the overall responsibility for the entire program. It reviews and examines progress to date, provides policy direction to the program, and assures that all technical and cooperative aspects of the program are working at optimal levels. The Steering Committee meets at least once a year. Program Coordinators who are not members of the Steering Committee attend the meetings as non-voting members.

For maximum leveraging of Federal funding, we are continuing with the well-experienced Steering Committee for the original SDSU Foundation-managed CALAR Program to serve as the Steering Committee for the CALAR II Program.

The voting members of the Steering Committee are:

EGYPT

Mr. Mohamed Dessouki
First Undersecretary of State
Foreign Agricultural Relations
Ministry of Agriculture and Land Reclamation

Dr. Adel S. El-Beltagy
Undersecretary of State
Land Reclamation and Foreign Agriculture Relations
Ministry of Agriculture and Land Reclamation

ISRAEL

Mr. Joel Schechter
Former Director
Negev Institute for Arid Zone Research
Ben-Gurion University of the Negev

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

UNITED STATES

Mr. Harry R. Albers
Executive Director
San Diego State University Foundation

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

Ex-officio members of the CALAR II Program in Protected Agriculture Steering Committee are:
Dr. Dov Pasternak (Israeli Program Coordinator and Principal Investigator); and
Dr. Mohamed El-Assal (United States Program Coordinator).

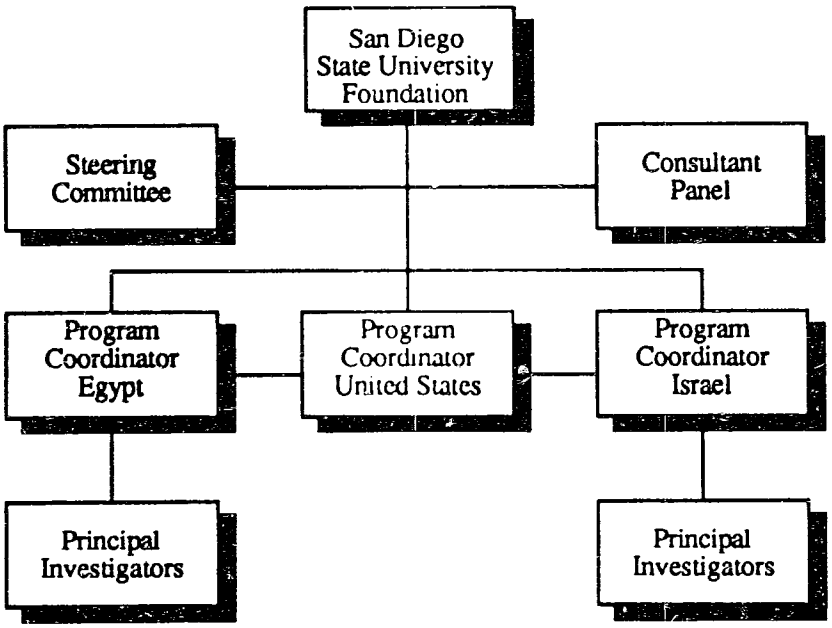
Joint Agricultural Committee: Egypt-Israel

The activities to be implemented through the program will be coordinated with and sponsored by the Joint Agricultural Committee Egypt-Israel, which was created to realize the Memorandum of Understanding signed by both countries on March 24, 1980. The Joint Committee is composed of leading experts and scientists from the Egyptian and Israeli Ministries of Agriculture. As the central institutional framework for promoting agricultural cooperation between both countries, the Committee is in charge of numerous workshops, meetings, training courses, and expert visits organized in Egypt and Israel. It meets every six months.

Program Staff

Based upon our experience in the effective management of international programs that range from agriculture to family planning studies, to broad-based training efforts, a key element is a competent and well-qualified staff. Another key element is an effective and prompt start-up for the program upon which to build a truly successful operation.

CALAR II Organizational Chart



Program Coordinators

1. **The United States:**

   Program Coordinator. The Program Coordinator, Dr. Mohamed El-Assal, has responsibility for the day-to-day operations of the program. His duties include: ensuring the optimum coordination between all program components; disseminating research results: working with the Egyptian and Israeli Program Coordinators in arranging for program review and evaluations; and collecting and forwarding, to SDSU Foundation, contract-required technical reports from the Program Coordinators in Egypt and Israel. The United States Program Coordinator works closely with the SDSU Foundation to ensure the smooth operation of the contract.

2. **Egypt and Israel:**

   Program Coordinators. The Program Coordinator in Egypt, Dr. Adel El-Beltagy, and the Program Coordinator in Israel, Dr. Dov Pasternak, work with the United States Program Coordinator. Each Program Coordinator assumes total responsibility for the coordination of all efforts within their respective nation. They meet regularly with their Principal Investigators and oversee the technical aspects of each component within their nation. The Program Coordinators work closely with each other to initiate, plan, and organize, along with the United State Program Coordinator, all aspects of the program which involve cooperation between Egypt, Israel, and the United States. The Program Coordinators in Egypt and in Israel serve as active partners with the United States Program Coordinator in order to meet day-to-day demands of the overall program.

Principal Investigators

Principal Investigators work directly with, and are responsible to, their Program Coordinators. Their responsibilities include: detailed planning and design of the research program; maintaining communication with their counterparts through their respective Program Coordinators; requesting support (equipment, international travel, United States technical assistance) from the San Diego-based United States Program Coordinator through their country Program Coordinators; recruiting and supervising their personnel; procuring supplies and other resources for the program through their Program Coordinator; working with their Project Coordinator in planning the training, dissemination, visitations, and other cooperative efforts; keeping their colleagues informed of research progress; collaborating with their colleagues and counterparts to plan and organize presentations in the Annual Workshop or any other scientific or professional meetings; writing annual technical research reports; and preparing and forwarding required reports to the Program Coordinator. Each Principal Investigator will, through their Program Coordinator, assist with arrangements for the subcontract between the SDSU Foundation and his/her country's subcontracting institution.

Consultant Panel

A Technical Consultant Panel, selected by the three Program Coordinators in consultation with the Steering Committee, augments the program's scientific expertise. Distinguished scientists who serve on the Panel include representatives from leading institutions with expertise in arid land research and protected crop research and development. Panel members are available for technical assistance, consultation, and advice to the Program Coordinators, and the Principal Investigators of the components of the program in Egypt and Israel. Technical consultants also serve on short-term or intermediate-term bases. They are reimbursed for their efforts either directly or through subcontracting arrangements with their institutions. Their assistance is sought for training,

consultation, internal evaluation, participation in the Annual Workshop, dissemination, and other formal and informal technical needs.

Evaluators

Eminent scientists, selected by the United States Program Coordinator in consultation with the Steering Committee, will be recruited to visit the program sites and to submit comments and reports to the United States Program Coordinator as to the progress of the program from a technical perspective. The evaluators will be tasked to develop specific evaluation criteria that will provide both short- and long-term evaluative materials.

THE ORIGINAL CALAR PROGRAM

CALAR RESEARCH

The Cooperative Arid Lands Agriculture Research (CALAR) Program research work and the application of its results was conducted over a period of eight years, starting in 1982, and involved more than 70 scientists from both Egypt and Israel, as well as some 15 scientists from the United States.

Researchers in the program concentrated upon three important areas of arid lands agriculture:

- Utilization of saline water for irrigation
- Production of fodder and small ruminants*
- Industrial crops for arid lands

A majority of the CALAR Program research areas were of an applied nature, directed toward practical solutions for real field situations. In both Egypt and Israel, field research was carried out in the farmer's plots, grazing ranges or regional experimental stations.

The research and its impact has directly influenced thousands of farmers and grazers in both Egypt and Israel.

Through saline water irrigation projects, scientists of both countries worked with two important vegetable crops: tomatoes and melons. Salinity research included a wide range of topics such as physiology of salt tolerance, agromanagement studies, salt effects on fruit quality and on post-harvest behaviors of fruit breeding, and selection for salt tolerance.

In the area of fodder production, substantive work has been done on the contribution of drought and salt tolerant shrubs to arid lands range productivity. Small animal work centered upon genetic improvements of Barki goats by cross-breeding with the Damascus goat. In addition, a basic study was carried out in order to characterize the potential of new management systems for goat and sheep production in Egypt's north west costal zone.

The work with industrial crops for arid zones concentrated upon jojoba (*simmondsia drimensis*) and gauyule (*parthemium argentiatitum*). Other crops such as figs, evening primrose and buffalo gourd were also investigated.

The scientific output of CALAR has been significant. More than 60 papers have been published in refereed scientific journals and a number of additional papers are in preparation for publication.

The CALAR Program has also contributed significantly to the development of the large arid land regions of both Egypt and Israel.

In Egypt, the salinity work resulted in an improved Edkawy tomato cultivator, the incorporation of uniform fruit yields, and resistance to root born dosages and nematodes. Drip irrigation was introduced to an area which traditionally utilized subsurface irrigation. Greenhouses have been introduced to the El-Boussielly area to optimize the local mild climate for out-of-season production of tomatoes, melons and other vegetables.

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* Small ruminants in Egypt only.

Fodder shrubs and trees were planted over an area of about 1,500 acres. Seedlings were planted and are continuing to provide planting materials to Bedouin leaders in the Western Desert, particularly *Medicago arborea* which were found to be the most promising of the introduced species.

Small animal improvement projects brought about, the introduction of Damascus goats which has resulted in a significant improvement in the performance of the local Barki goats. On the average, breeds having 1/4 Damascus "blood" (backcrosses to F1 into Barki) were 1.3% heavier in weight and yielded 1.44% more milk than pure Barki. Originally 67 Damascus bucks were introduced through the CALAR Program. It is estimated that in 1990 almost all of the true Barki goats of the northwest desert of Egypt will have been crossed with Damascus bucks.

In Israel, CALAR salinity studies have led to the commercial production of processing tomatoes with saline water irrigation. Demonstration plots for the Bedouin are currently being investigated.

In both countries the industrial crops programs did not lead to a field application, nor was it not meant to do so. However, much basic knowledge has been accumulated on the productivity potential of jojoba and guayule in arid conditions.

CALAR: A FOUNDATION FOR COOPERATION

The CALAR Program has been especially significant in that it has provided an effective framework for the continuity and expansion of joint research efforts among participants from Egypt, Israel and the United States.

In providing a foundation for ongoing scientific cooperation, the CALAR Program has demonstrated the effective manner in which Egyptian and Israeli scientists can work together with their American colleagues to achieve major goals of the highest priority of the Governments of the two Middle Eastern nations.

Also successful has been the program's management philosophy, which has continually placed an equal emphasis upon science and upon cooperation. CALAR Program management has, throughout the eight years of the program, sought to involve many organizations within each country in the scientific and technical aspects of the program; and has established, maintained, enhanced and institutionalized viable relationships among a team of Egyptian, Israeli and United States participants in the program. The science itself has been the context of cooperation, and through this cooperative effort, CALAR's tangible results are now benefiting the people of Egypt and Israel. Cooperation, on the other hand, has been the mode for conducting science in the CALAR Program.

A trilateral Steering Committee, composed of representatives from Egypt, Israel and the United States, provided oversight and guidance for the CALAR Program and has been lauded by reviewers as a major contributor to the success of the program. Also important has been the strong commitment to excellence by the San Diego State University and its Foundation, as the program's prime contractor. Important also, has been the support and commitment from Egypt's Ministry of Agriculture and Land Reclamation and from Israel's Ben-Gurion University of the Negev and the Ministry of Agriculture. This successful program can be used, and is, in the case of CALAR II, as an example for future cooperative programs in the Middle East, as well as in other regions where peaceful scientific cooperation can contribute to mutual development and understanding between neighboring nations.

APPENDIX A

Equipment List

CALAR EQUIPMENT LIST

HUMMERT SEED COMPANY
2746 Chouteau Avenue
St. Louis, Missouri 63103
Attn: Lori Armstrong 1-800-325-3055

Model	Description	Cat. No.	Cat. Page	Price/Unit	Qty. Req.	Price
A-201100	Heavy Duty Mixers (comes in 115V only). *Hummert will check with Manufacturer to see if this mixer can be wired for 220V.*	08-1427-1	96		6 each	
Substitute for Model A-201100 per Manufacturer:						
B2.0	Heavy Duty Mixer (220V/50 Hz)			$425.00/each	6 each	$2,550.00
19-1872-2	Heavy Duty Adjustable Lever Action	19-1872	186	$134.75/box	1 case	$134.75
1-AA	Submersible Pump (not available in 220V/50 Hz)	65-6080	360		8 cases	
Substitute for Model 1-AA per Manufacturer:						
#14	Submersible Pump (220V/50 Hz) 6 pumps per case			$248.82/case	8 cases	$1,990.56
2-EN	Submersible Pump (not available in 220V/50 Hz)	65-6088	360		3 cases	
Substitute for # 4E-34N per Manufacturer:						
2-ENY	Little Giant Submersible Pump (220V/50 Hz) 6 pumps per case			$306.00/case	3 cases	$918.00
4E-34N	Submersible Pump (not available in 220V/50 Hz)	65-6092	360		3 cases	
Substitute for Model 4E-34N per Manufacturer:						
4E-34NRY	Little Giant Submersible Pump (220V/50 Hz) 4 pumps per case			$476.72/case	3 cases	$1,430.16
14-2631	Growing Slabs	14-2631	119	$50.35/case	10 cases	$503.35
14-2632	Growing Slabs	14-2632	119	$65.25/case	10 cases	$652.50
14-2633	Growing Blocks	14-2633	119	$113.85/case	10 cases	$1,138.50
14-2634	Growing Blocks	14-2634	119	$100.75/case	10 cases	$1,007.50

SUBTOTAL:	$10,355.32
7.25% TAX:	$750.76
TOTAL:	$11,106.08

CALAR EQUIPMENT LIST (continued)

MINOLTA

Chlorophyll Meter Spad-502 ..... $ 1,200.00

This product comes from Wescor Scientific Products.

UNIPUB

Book Orders: Diagnosis of Mineral Disorders in Plants

ISBN 0-11-240805-2	Vol. 1 Principals	$ 26.25
ISBN 0-11-240804-2	Vol. 2 Vegetables	$ 35.00
ISBN 0-11-242723-5	Vol. 3 Glasshouse Crops	$ 40.00
ISBN 90-220-0737-5	Glasshouse, Tomatoes, Cucumbers & Lettuce	$ 42.00
ISBN 0-89586-042-2	Plants for Dry Climates. How to Select, Grow and Enjoy. Published by HP Bosks ($12.00 each x 2)	$ 24.00
	TOTAL:	$167.25

VG3 GEAR MOTOR

For Automatic Ventilation Systems (2 each)

Single Phase - 1/2 HP including Torque Limits	Canadian Price:	$1,500.00
	Less 15% U.S. Price:	- $225.00
	TOTAL:	$1,275.00
Add $120.00 each for Travel Limits		$120.00
	Less 15% U.S. Price:	- $18.00
	TOTAL:	$102.00
	Estimated cost for 2 motors:	$2,550.00
	Travel Limits:	$204.00
	ESTIMATED TOTAL:	$2,754.00

HDI HEATER DESIGNS, INC.

10 each	14-20 MM Diameter, KFR 2195	$10.00 each
10 each	8-12 MM Diameter, KFR 2196	$10.00 each
10 each	20-5 MM Diameter, KFM-2324	$10.00 each
	30 Total @ $10.00 each:	$300.00

CALAR EQUIPMENT LIST (continued)

CAB INTERNATIONAL

Disks for Horticulture: CD-ROM

CAB Abstracts database and citations from Horticultural Abstracts and Ornamental Horticulture.

Volume 1	84-866	f1500	$3,000.00
Volume 2	87-89	f3000	$6,000.00
Volume 3	90-92		$7,000.00
		TOTAL:	$16,000.00

WATERMARK SOIL MOISTURE SENSOR

10-200 Centibars	20 each @ $14.00 each	$280.00

WATERMARK DIGITAL METER

30-KTCD	2 each @ $130.00 each	$260.00

WATERMARK 4-ZONE MOISTURE CONTROL PANEL

WFZ-24	4 each @ $14.00 each	$280.00
	TOTAL:	$2,440.00

LI-COR

LI-620	$16,625.00	Base Price (Postponed to 1991)	
	$21,565.00	With All Accessories	$21,565.00
LI-6262	$11,000.00	Base Price (May not need accessories)	$11,000.00
LI-LAI200	$4,875.00	Base Price	
	$5,917.00	With All Accessories, Including Printer (*You may not need Printer*)	$5,917.00
LI-1800	$14,300.00	Base Price (Postponed to 1991)	
	$6,790.00	Suggested Accesories	$21,090.00

NOTE: *Please let us know if we should order the equipment* <u>*with*</u> *or* <u>*without*</u> *accessories.*

ESTIMATED TOTAL: $16,917.00

CALAR EQUIPMENT LIST (continued)

LI'L PERK SOIL TREATMENT

4 each (8 fl. oz), $19.95/8 fl. oz. bottle (covers 1 acre) $79.80

$59.95/litter bottle (covers 4 acres) $59.95

NOTE: *Less expensive to purchase the litter bottle..*

OMEGA ENGINEERING

QTY	DESCRIPTION	
1	0.0 Diameter, 100 ft., Copper Wire, Teflon Insulated	$17.00
1	0.01 Diameter, 100 ft., Constamtan Teflon Insulated	$17.00
1	0.015 Diameter, 100 ft. , Cooper Wire, Teflon Insulated	$17.00
1	0.01 Diameter, 100 ft., Constantan Wire, Teflon Insulated	$17.00
	TOTAL:	$68.00

NOTE: *Refer to Quotation #Q012937863. Quotation valid for 60 days.*

CANCELLED PER AYMAN

<u>SPS - Specialty Products & Services Corporation</u>

DYNAGLAS

Greenhouse Cover Dimensions: 4' wide x 14" long (approx. 5,600 sq. ft.), 100 each.

If purchased in the U.S. (Pennsylvania) and shipped to San Diego, the cost will be $.96/sq. ft.

5,600 sq. ft. x $.96 ..... $5,376.00
Service Charges/Packing for Export $180.00

Total: $5,556.00

Product is made in Israel. If purchased and shipped directly from Israel to Egypt, the cost will be $.83/sq. ft.

5,600 sq. ft. x $.83 ..... $4,648.00

Ribbed Closure Strips - $37.50/box. *You will need to purchase 3 boxes (100 per box).*

$37.50 x 3 boxes $112.50

Estimate at $.83/sq. ft. Price: $4,648.00

Ribbed Closure Strips: $112.50

ESTIMATED TOTAL: $4,760.60

CALAR EQUIPMENT LIST (continued)

DYNAMAX

QTY	MODEL	DESCRIPTION	UNIT PRICE	TOTAL
1	SGB35-WS	1-1/2" Trunkgage, w/Weather Shield	$855.00	$855.00
1	SGB19-WS	3/4" Stem Gage, w/Weather Shield	$510.00	$510.00
1	SGB16-WS	5/8" Stem Gate, w/Weather Shield	$490.00	$490.00
1	DGSF16-WS	Dynagage Flow Analysis Software (5-1/4")	$375.00	$375.00
1	PC208	PC Support Software (Required for DGSF)	$250.00	$250.00
1	SC32A	Interface (Required to load retrieve DGSF program and data)	$130.00	$130.00
1	PCSC	PCAT to RS232 Serial Data Cable	$50.00	$50.00
1	21X	Micrologger w/40K Ram, Specify OSX-0, OSX-1, OSX-2	$1,800.00	$1,800.00
1	AX416	16 Channel 4 Wire Input Multi-Plexer w/o Enclosure	$475.00	$475.00
			Subtotal:	$4,935.00
			Freight:	$50.00
			TOTAL:	$4,985.00

BOOKS

Total cost of 12 books.....$574.83

ESTIMATED TOTAL COST OF EQUIPMENT: $54,205.11

PURCHASE OF THREE (3) CARS. (Estimated Cost Including Shipping): $60,000.00

ESTIMATED COST - SHIPPING OF EQUIPMENT: $8,000.00

TOTAL COST: $124,548.03

CALAR EQUIPMENT LIST (continued)

BOOKS

CALAR

1. Greenhouse Operation and Management; 3rd Edition; By Paul V. Nelson
   A Reston Book - Prentice Hall, Inc., England Cliffs, New Jersey 07632
   (201) 767-5937
   ISBN R25-834 ..... $48.28

2. Western Fertilizer Handbook; Produced by: Soil Improvement Committee
   CA Fertilizer Association
   Interstate Publishers, Inc. (217) 446-0500
   Danville, ILL.
   7th Edition - Field Crops - ISBN 0-8134-2490-9 ..... $14.95
   Horticulture Edition - (Turf & Ornamentals) 1990 Edition - ISBN 0-8134-2858-0 ..... $14.95

3. Soil-Plant Relationships and Ecological Approach; By: David W. Jeffrey;
   C Room Helm
   London & Sydney
   Timber Press - Protland, Oregon (503) 292-0745
   Cloth - ISBN 0-88192-975-4 ..... $33.95
   Paper - ISBN 0-88192-076-2 ..... $26.95

4. Plant Propagation "Principles and Practices"; Hudson T. Hartmann; Dall E. Kerter; Fred T. Davis, IR; 5th Edition
   Prentice Hall, INC (201) 767-5937
   A Division of Rimon I Schuster
   Englewood Cliffs, New Jersey 07632
   ISBN 681-051 ..... $52.00

5. Hydrophonics Food Production; Howard M. Resh, Ph.D.
   A definitive guidebook for the advanced home gardener and the commercial Hydrophonic grower; 4th Edition
   Woodbridge Press Publishing Company (805) 965-7039
   Santa Barbra, CA 93160
   ISBN 0-88007-171-0 ..... $32.95

6. Plant Hormones and Their Role in Plant Growth and Development; D.F. Davies
   Kluwer Academic Publishers (617) 871-6600
   Norwell, Mass.
   Cloth - ISBN 9-02473-497-5 (OUT OF STOCK) $178.50
   Paper - ISBN 9-02473-498-3 (OUT OF STOCK) $45.00
   NOTE: No date for availability - Expected paper 1st of November. Have not received.

7. Stomatal Function; Edwardo Zeiger, G.D. Farguhar, and I.R. Cowan
   Stanford University Press (415) 723-9434
   Stanford, CA
   ISBN 0-80471-347-2 ..... $65.00

8. Biometry
   The Principles and Practice of Statistics in Biological Research; Robert R. Sokal and F. James Rohlf
   W.H. Freeman and Co., New York (212) 576-9400
   ISBN 0-8167-1254-7 ..... $44.95

9. Statistics for Experimenters; Box, Hunter and Hunter
   Wiley Interscience (201) 469-4400
   Somerset, NJ
   ISBN 0-47109-315-7 ..... $54.95

BOOKS (continued)

CALAR (continued)

10. Statistical Methods; Snedicor and W. Cochran
Iowa State University Press
Ames, Iowa (515) 292-0140
1989 Edition
ISBN 0-8138-1561-4 ..... $44.95

11. Emprical Model Building and Response Surfaces; Box and N. Draper
John Wiley and Sons (201) 469-4400
Somerset, N.J. 08873
ISBN 0-47181-033-9 ..... $57.95

12. Linear Models for Unbalanced Data; Searle
John Wiley and Sons
Somerset, N.J. (201) 469-4400
ISBN 0-47184-096-3 ..... $64.95

TOTAL ESTIMATED COST FOR ALL 12 BOOKS (plus shipping and handling): $574.83

Congressional & Public Liason Staff
Washington, D.C. ..... (202) 447-2771

National Agricultural Library
Ask for Public Service ..... (301) 344-3834

Information Desk
National Agricultural Library ..... (301) 344-3755

APPENDIX B

Detailed Financial Budget

CALAR II
DETAILED FINANCIAL BUDGET $64,000.00
523513/6804

DESCRIPTION	DATE	AMOUNT AVAILABLE	O NAME	AMOUNT	WHERE	WHEN	PURPOSE
ASHS MTG.TUCSON	11/90	$6,744.00	EL-BELTAGY	$51.00	USA	11/4/90	HEALTH INSURANCE
AND CALAR II	11/90			$225.00	TUCSON		REGISTRATION FEE /ASHS MEETING
WORKSHOP				$471.00	TUCSON	11/5/90	LODGING /ASHS MEETING
				$180.00	TUCSON	11/4/90	PER DIEM /ASHS MEETING
				$17.00	TUCSON	11/4/90	TAXI /TUCSON AIRPORT-HOTEL
				$90.00	PHOENIX	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
				$872.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$148.00	SAN DIEGO	11/10/90	PER DIEM /CALAR II WORKSHOP
				$325.00	WASH./D.C.	11/13/90	PER DIEM /WASHINGTON, D.C.
				$4,365.00	USA	11/4/90	AIR TICKET /CAIRO-TUCSON-PHOENIX-
							SAN DIEGO-WASH.D.C.-CAIRO
ASHS MTG.TUCSON	11/90	$1,657.00	ABDALLA	$521.00	TUCSON	11/4/90	PER DIEM/LODGING ASHS MEETING
AND CALAR II				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
WORKSHOP				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$614.00	USA	11/4/90	AIR TICKET/SACRAMENTO-TUCSON-PHOENIX-SAN DIEGO
ASHS MTG.TUCSON	11/90	$3,153.00	HAFEZ	$51.00	USA	11/4/90	HEALTH INSURANCE
AND CALAR II				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
WORKSHOP				$568.00	TUCSON	11/5/90	PER DIEM/LODGING ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$1,622.00	USA	11/4/90	AIR TICKET/CAIRO-TUCSON-SAN DIEGO-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
ASHS MTG.TUCSON	11/90	$2,799.00	MOHAMADEEN	$51.00	USA	11/4/90	HEALTH INSURANCE
AND CALAR II				$300.00	TUCSON	11/4/90	REGISTRATION FEE /ASHS MEETING
WORKSHOP				$568.00	TUCSON	11/4/90	PER DIEM/LODGING ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$1,268.00	USA	11/4/90	AIR TICKET/CAIRO-TUCSON-SAN DIEGO-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
ASHS MTG.TUCSON	11/90	$2,799.00	EL-SAWI	$51.00	USA	11/4/90	HEALTH INSURANCE
AND CALAR II				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
WORKSHOP				$568.00	TUCSON	11/5/90	PER DIEM/LODGING ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP

ASHS MTG.TUCSON AND CALAR II WORKSHOP	11/90	$2,799.00	EL-RAGGAL	$51.00	USA	11/4/90	HEALTH INSURANCE
				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$568.00	TUCSON	11/5/90	PER DIEM/LODGING ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$1,268.00	USA	11/4/90	AIR TICKET/CAIRO-TUCSON-SAN DIEGO-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
ASHS MTG.TUCSON AND CALAR II WORKSHOP	11/90	$2,699.00	MEDANY	$51.00	USA	11/4/90	HEALTH INSURANCE
				$200.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$568.00	TUCSON	11/5/90	PER DIEM/LODGING ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$1,268.00	USA	11/4/90	AIR TICKET/CAIRO-TUCSON-SAN DIEGO-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
MTG.GREECE ASHS MTG.TUCSON AND CALAR II WORKSHOP	10/90	$6,202.00	HASHIM	$69.00	USA	10/28/90	HEALTH INSURANCE
				$856.00	GREECE	10/19/90	PER DIEM /CONFERENCE NICOSIA,GREECE
				$181.00	GERMANY	10/27/90	OVERNIGHT FRANKFURT
				$272.00	PHOENIX	10/28/90	PER DIEM/LODGING - IRRIGATION SYMPOSIUM
				$449.00	DAVIS	10/30/90	PER DIEM/LODGING UNIV.OF CALIF.,DAVIS
				$491.00	TUCSON	11/4/90	PER DIEM/LODGING ASHS MEETING
				$300.00	PHOENIX	10/28/90	REGISTRATION FEE/IRRIGATION SYMP.
				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$140.00	GREECE	10/19/90	AIR TICKET/CAIRO-NICOSIA,GREECE
				$1,374.00	USA	10/27/90	AIR TICKET/GREECE-PHOENIX-SAN DIEGO-CAIRO
				$225.00	USA	10/30/90	AIR TICKET/PHOENIX-SACRAMENTO
				$262.00	USA	11/4/90	AIR TICKET/SACRAMENTO-TUCSON
				$90.00	USA	11/9/90	AIR TICKET/PHOENIX-SAN DIEGO
				$245.00	DAVIS	10/30/90	CAR RENTAL TO VISIT NURSERIES
				$426.00	USA		MIS.EXP./GASOLINE,TAXIS,BOOKS,SEEDS
MTG.IN GREECE ASHS MTG.TUCSON AND CALAR II WORKSHOP	10/90	$5,556.00	ABOU-HADID	$69.00	USA	10/28/90	HEALTH INSURANCE
				$856.00	CREECE	10/19/90	PER DIEM/LODGING-CONFERENCE IN NICOSIA, GREECE
				$181.00	GERMANY	10/27/90	OVERNIGHT FRANKFURT
				$272.00	PHOENIX	10/28/90	PER DIEM/LODGING-IRRIGATION SYMPOSIUM
				$449.00	DAVIS	10/30/90	PER DIEM/LODGING - UNIVERSITY OF CALIFORNIA, DAVIS

				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$140.00	GREECE	10/19/90	AIR TICKET/CAIRO-NICOSIA, GREECE
				$1,374.00	USA	10/27/90	AIR TICKET/GREECE-PHOENIX-SAN DIEGO-CAIRO
				$225.00	USA	10/30/90	AIR TICKET/PHOENIX-SACRAMENTO
				$262.00	USA	11/4/90	AIR TICKET/SACRAMENTO-TUCSON
				$90.00	USA	11/9/90	AIR TICKET/PHOENIX-SAN DIEGO
MTF.IN GREECE ASHS MTG.TUCSON AND CALAR II WORKSHOP	10/90	$5,531.00	EL-BEHAIRY	$69.00	USA	10/28/90	HEALTH INSURANCE
				$856.00	GREECE	10/19/90	PER DIEM/LODGING-CONFERENCE IN NICOSIA, GREECE
				$181.00	GERMANY	10/27/90	OVERNIGHT FRANKFURT
				$272.00	PHOENIX	10/28/90	PER DIEM/LODGING-IRRIGATION SYMPOSIUM
				$449.00	DAVIS	10/30/90	PER DIEM/LODGING - UNIVERSITY OF CALIFORNIA, DAVIS
				$491.00	TUCSON	11/4/90	PER DIEM/LODGING - ASHS MEETING
				$300.00	PHOENIX	10/28/90	REGISTRATION FEE - IRRIGATION SYMPOSIUM
				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$140.00	GREECE	10/19/90	AIR TICKET/CAIRO-NICOSIA, GREECE
				$1,374.00	USA	10/27/90	AIR TICKET/GREECE-PHOENIX-SAN DIEGO-CAIRO
				$225.00	USA	10/30/90	AIR TICKET/PHOENIX-SACRAMENTO
				$262.00	USA	11/4/90	AIR TICKET/SACRAMENTO-TUCSON
				$90.00	USA	11/9/90	AIR TICKET/PHOENIX-SAN DIEGO
CONF./PHOENIX ASHS MTG.TUCSON AND CALAR II WORKSHOP	10/90	$6,900.00	EL-GINDY	$111.00	USA	10/14/90	HEALTH INSURANCE
				$2,115.00	PHOENIX	10/14/90	PER DIEM/LODGINT-VISITATION AT WATER CONSERVATION LABORATORY
				$344.00	TUCSON	11/3/90	PER DIEM/LODGING - ASHS MEETING
				$273.00	PHOENIX	11/5/90	PER DIEM/LODGING-VISITATION AT WATER CONSERVATION LABORATORY
				$142.00	PHOENIX		MISC. EXPENSES/GASOLINE FOR RENTAL CAR AND PARKING
				$1,463.00	PHOENIX	10/14/90	CAR RENTAL/OCT.14-NOV.8/TO VISIT SCATTERED SITES
				$225.00	PHOENIX	10/28/90	RESITRATION FEE /IRRIGATION SYMPOSIUM
				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$300.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$222.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$1,315.00	USA	10/14/90	AIR TICKET /CAIRO-PHOENIX-SAN DIEGO-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
ASHS MTG.TUCSON AND CALAR II WORKSHOP CORNELL UNIV.	11/90	$3,495.00	EL-DOWENY	$51.00	USA	11/4/90	HEALTH INSURANCE
				$300.00	TUCSON	11/5/90	REGISTRATION FEE /ASHS MEETING
				$568.00	TUCSON	11/4/90	PER DIEM/LODGING /ASHS MEETING
				$240.00	SAN DIEGO	11/9/90	LODGING /CALAR II WORKSHOP
				$148.00	SAN DIEGO	11/9/90	PER DIEM /CALAR II WORKSHOP
				$403.00	ITHACA,N.Y.	11/13/90	PER DIEM/LODGING /CORNELL UNIVERSITY, ITHACA, N.Y.
				$1,268.00	USA	11/4/90	AIR TICKET /CAIRO-TUCSON-SAN DIEGO-NEW YORK-CAIRO
				$90.00	USA	11/9/90	AIR TICKET /PHOENIX-SAN DIEGO
				$390.00	USA	11/13/90	AIR TICKET /NEW YORK-ITHACA-NEW YORK
				$37.00	ITHACA	11/13/90	TAXI /ITHACA, N.Y.

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$240.00	SAN DIEGO	11/13/90	BUS RENTAL FOR FIELD TRIP /CALAR II WORKSHOP
$60.00	SAN DIEGO	11/14/90	SHUTTLE BUS FROM HOTEL TO AIRPORT

CALAR II
DETAILED FINANCIAL BUDGET $37,970.00
523508/6804

DESCRIPTION	DATE	AMOUNT	BALANCE AVAILABLE	NAME	AMOUNT	WHERE	WHEN	PURPOSE
FOREIGN TRAVEL								
IBD-IDRAS	6/26	$770.00	$37,585.00	EL-BELTAGY	$385.00	EGY/CHINA	7/22-8/7/90	REG.FEE DESERT CONF.$200 FIELD TRIP
			$37,200.00	ABOU-HADID	$385.00	EGY/CHINA	7/22-8/7	REG.FEE DESERT CONF.$200 FIELD TRIP
IBD FEE MARYUT	6/26	$12.50	$37,187.50					BANK DRAFT
IBD FEE IDRAS	7/03	$12.50	$37,175.00					BANK DRAFT
		$3,490.00	$33,685.00	EL-BELTAGY	$3,490.00	CHINA	7/22-8/7	AIRFARE CAIRO/BEIJING DESERT CONF.
		$3,106.00	$30,579.00	ABOU-HADID	$3,106.00	CHINA	7/22-8/7	AIRFARE CAIRO/BEIJING DESERT CONF.
		$1,610.00	$28,969.00	EL-BELTAGY	$1,610.00	CHINA	7/22-8/7	PER DIEM DESERT CONF. & FIELD TRIP
		$1,988.00	$26,981.00	ABOU-HADID	$1,988.00	CHINA	7/22-8/7	PER DIEM DESERT CONF. & FIELD TRIP
		$1,374.00	$26,756.00	EL-BELTAGY	$225.00	TUCSON	11/90	REGISTRATION FEE / ASHS MEETING
INT.CONF HASSAN II	2/08	$520.00	$26,556.00	HASHIM	$200.00	AGADIR	4/26/91	REGISTRATION FEE / CONF. AGR. MANAGEMENT
			$26,236.00		$320.00	AGADIR	4/26/91	PREPAYMENT OF HOTEL ROOM
	3/11/91	$175.00	$26,061.00	HASHIM	$175.00	AGADIR	4/26/91	PER DIEM / CONF. AGR. MANAGEMENT
GO TRAVEL	4/12/91	$1,600.00	$24,461.00	HASHIM	$1,600.00	AGADIR	4/26/91	AIRFARE CAIRO/AGADIR - CONF.AGR.MANAGEMENT
PLANT BREEDING SYMP.	2/11/91	$175.00	$24,286.00	EL-DOWENY	$175.00	RALEIGH	3/10/91	REG. FEE / PLANT BREEDING SYMPOSIUM
	2/18/91	$725.00	$24,061.00	HASHIM	$225.00	RALEIGH	3/10/91	REG. FEE / PLANT BREEDING SYMPOSIUM
			$23,836.00	MAZIED	$225.00	RALEIGH	3/10/91	REG. FEE / PLANT BREEDING SYMPOSIUM
			$23,611.00	HASSANEIN	$225.00	RALEIGHY	3/10/91	REG. FEE / PLANT BREEDING SYMPOSIUM
				EL-DOWENY	$50.00	RALEIGH	3/10/91	LATE REGISTRATION FEE CHARGES
GO TRAVEL	2/28/91	$6,956.00	$21,872.00	EL-DOWENY	$1,739.00	USA	3/10/91	HALF AIRFARE / US VISITATIONS
			$20,133.00	HASHIM	$1,739.00	USA	3/10/91	HALF AIRFARE / US VISITATIONS
			$18,394.00	MAZIED	$1,739.00	USA	3/10/91	HALF AIRFARE / US VISITATIONS
			$16,655.00	HASSANEIN	$1,739.00	USA	3/10/91	HALF AIRFARE / US VISITATIONS
HERTZ CAR RENTAL	2/28/91	$117.00	$16,538.00	HASHIM	$117.00	PHOENIX	3/22/91	CAR RENTAL / VISITATION IN PHOENIX & TUCSON
	2/28/91	$299.00	$16,239.00	HASHIM	$299.00		3/22/91	CAR RENTAL / VISITATION IN SAN DIEGO & DAVIS
			$15,743.00	HASHIM	$496.00	USA	3/22/91	ADDITIONAL PER DIEM FOR US VISITATION
			$15,247.00	MAZIED	$496.00	USA	3/22/91	ADDITIONAL PER DIEM FOR US VISITATION
			$14,751.00	HASSANEIN	$496.00	USA	3/22/91	ADDITIONAL PER DIEM FOR US VISITATION
HEALTH CARE AMERICA	2/25/91	$204.00	$14,700.00	EL-DOWENY	$51.00	USA	3/10/91	HEALTH INSURANCE
			$14,649.00	HASHIM	$51.00	USA	3/10/91	HEALTH INSURANCE
			$14,598.00	MAZIED	$51.00	USA	3/10/91	HEALTH INSURANCE
			$14,547.00	HASSANEIN	$51.00	USA	3/10/91	HEALTH INSURANCE
FOREIGN TRAVEL	2/27/91	$1,342.00	$13,205.00	EL-DOWENY	$1,342.00	USA	3/10/91	PER DIEM / US VISITATION
		$1,542.00	$11,663.00	HASHIM	$1,542.00	USA	3/10/91	PER DIEM / US VISITATION
		$1,342.00	$10,321.00	MAZIED	$1,342.00	USA	3/10/91	PER DIEM / US VISITATION
		$1,342.00	$8,979.00	HASSANEIN	$1,342.00	USA	3/10/91	PER DIEM / US VISITATION

WALLACH CO. INC.	4/5/91		$4,772.00	SALMAN	$60.00	ALABAMA	5/6/91	HEALTH INSURANCE
R'.GENTS OF UC	6/18/91	$100.00	$4,672.00	VISITORS	$100.00	SAN DIEGO	3/26/91	VISITATION WITH US FARM ADVISOR
								DRS. HASHIM, EL-DOWENY, HASSANEIN, MAZIED
TID'N TIME TRAVEL	7/10/91	$1,254.00		EL-BELTAGY, M.	$1,254.00	EUROPE	8/15/91	AIRFARE CAIRO/LONDON - WYE UNIVERSITY, LONDON, UK
TID'N TIME TRAVEL	7/10/91	$1,059.00		ABOU-HADID	$1,059.00	EUROPE	8/15/91	AIRFARE CAIRO/LONDON/MARSEILLE/CAIRO
								WYE UNIV., UNIV. OF WALES, CONF. IN AVIGNON
TID'N TIME TRAVEL	7/10/91	$1,234.00		MEDANY	$1,234.00	EUROPE	8/15/91	AIFARE CAIRO/LONDON/MARSEILLE/CAIRO
								WYE UNIVERSITY, CONFERENCE IN AVIGNON, FRANCE
GREENHOUSE CROP	8/91	$534.00		ABOU-HADID	$267.00	FRANCE	8/15/91	REGISTRATION FEE / INTERNTL. WORKSHOP GREENHOUSE C
MODEL WORKSHOP				MEDANY	$267.00	FRANCE	8/15/91	REGISTRATION FEE / INTERNTL. WORKSHOP GREENHOUSE C

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