MIDDLE EAST REGIONAL COOPERATION PROGRAMS

HEARING

BEFORE THE

SUBCOMMITTEE ON EUROPE AND THE MIDDLE EAST

OF THE

COMMITTEE ON FOREIGN AFFAIRS HOUSE OF REPRESENTATIVES

NINETY-NINTH CONGRESS

SECOND SESSION

MAY 6, 1986

Printed for the use of the Committee on Foreign Affairs

U.S. GOVERNMENT PRINTING OFFICE

83-631 WASHINGTON : 1988

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

COMMITTEE ON FOREIGN AFFAIRS

DANTE B. FASCELL, Florida, *Chairman*

LEE H. HAMILTON, Indiana
GUS YATRON, Pennsylvania
STEPHEN J. SOLARZ, New York
DON BONKER, Washington
GERRY E. STUDDS, Massachusetts
DAN MICA, Florida
MICHAEL D. BARNES, Maryland
HOWARD WOLPE, Michigan
GEO. W. CROCKETT, JR., Michigan
SAM GEJDENSON, Connecticut
MERVYN M. DYMALLY, California
TOM LANTOS, California
PETER H. KOSTMAYER, Pennsylvania
ROBERT G. TORRICELLI, New Jersey
LAWRENCE J. SMITH, Florida
HOWARD L. BERMAN, California
HARRY REID, Nevada
MEL LEVINE, California
EDWARD F. FEIGHAN, Ohio
TED WEISS, New York
GARY L. ACKERMAN, New York
BUDDY MACKAY, Florida
MORRIS K. UDALL, Arizona
ROBERT GARCIA, New York

WILLIAM S. BROOMFIELD, Michigan
BENJAMIN A. GILMAN, New York
ROBERT J. LAGOMARSINO, California
JIM LEACH, Iowa
TOBY ROTH, Wisconsin
OLYMPIA J. SNOWE, Maine
HENRY J. HYDE, Illinois
GERALD B.H. SOLOMON, New York
DOUG BEREUTER, Nebraska
MARK D. SILJANDER, Michigan
ED ZSCHAU, California
ROBERT K. DORNAN, California
CHRISTOPHER H. SMITH, New Jersey
CONNIE MACK, Florida
MICHAEL DEWINE, Ohio
DAN BURTON, Indiana
JOHN MCCAIN, ARIZONA

JOHN J. BRADY, JR., *Chief of Staff*
ROXANNE PERUGINO, *Staff Assistant*

SUBCOMMITTEE ON EUROPE AND THE MIDDLE EAST

LEE H. HAMILTON, Indiana, *Chairman*

TOM LANTOS, California
ROBERT G. TORRICELLI, New Jersey
LAWRENCE J. SMITH, Florida
MEL LEVINE, California
HARRY REID, Nevada
EDWARD F. FEIGHAN, Ohio
GARY L. ACKERMAN, New York

BENJAMIN A. GILMAN, New York
MARK D. SILJANDER, Michigan
ED ZSCHAU, California
ROBERT K. DORNAN, California
CHRISTOPHER H. SMITH, New Jersey

MICHAEL H. VAN DUSEN, *Subcommittee Staff Director*
HILLEL WEINBERG, *Minority Staff Consultant*
KENNETH B. MOSS, *Subcommittee Staff Consultant*
ITOPHER A. KOJM, *Subcommittee Staff Consultant*

CONTENTS

WITNESSES

APPENDIXES

MIDDLE EAST REGIONAL COOPERATION PROGRAMS

TUESDAY, MAY 6, 1986

HOUSE OF REPRESENTATIVES,
COMMITTEE ON FOREIGN AFFAIRS,
SUBCOMMITTEE ON EUROPE AND THE MIDDLE EAST,
Washington, DC.

The subcommittee met at 9:00 a.m., in room 2172, Rayburn House Office Building, Hon. Tom Lantos presiding.

Mr. LANTOS. The subcommittee will come to order.

Chairman Lee Hamilton is at the moment chairing the House Intelligence Committee meeting. He has asked me to chair this very extraordinary hearing.

The Subcommittee on Europe and the Middle East usually deals with very difficult complex and gruesome issues. This is a very pleasant exception. Today we are dealing with the extraordinary success of Israeli-Egyptian cooperation.

This meeting is an open session to conduct an oversight hearing concerning the regional cooperation program under which joint research projects funded by the United States are undertaken by Israeli and Egyptian scientists.

This program has been the subject of much favorable comment and has received widespread support, both in the United States and in the Middle East. Our first witness today will be the Honorable Henry Waxman, Representative in Congress from the State of California and chairman of the Subcommittee on Health and Environment and sponsor of the amendment which resulted in the initial authorization of the regional cooperation program.

Congressman Waxman will be followed by several panels of Egyptian and Israeli scientists who will make very brief presentations of the research projects and by a panel of Egyptians and Israelis on the overall program.

Finally we will hear from Mr. Gerald Kamens, who is responsible for administering the program for the Agency for International Development.

Because we need to finish this hearing within a couple of hours, I will ask all witnesses to be very brief in their opening remarks and allow some time for questioning by the subcommittee.

Your prepared statements, if you have any, will be entered into the record in full, without objection.

The hearing is particularly timely because this is the closing day of the three day conference on the regional cooperations programs sponsored by AID and private donors, and organized by Brandeis

University Center for Social Policy in the Middle East, Intersect, a community development consulting firm, and New Hampshire College's International Community Development Program.

Finally, I would like to recognize the presence of a couple of special guests who will not be taking part in the panels.

Professor Ahmed Salama is a member of the Egyptian Senate, Vice President of National Democratic Party and Professor of Law and Vice President of Ain Shams University, one of the universities participating in the regional cooperation program.

Professor Ahmed Dowedar is Professor and Vice President of Canal University in Ismaliya, another university involved in this program.

And now I would like to welcome my colleague, Congressman Waxman. Please proceed with your statement.

STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. WAXMAN. Thank you very much, Mr. Chairman. I want to thank Chairman Lee Hamilton and you and other members of this committee for affording this opportunity to review what I think has been an excellent and successful program.

The purpose of this hearing, of course, is to learn more about what has been happening with the regional cooperative program that we authorized in Congress in 1981. I hope the record that will be prepared today will be useful in explaining the success of this program and urging upon our colleagues not only its continuation but its expansion.

Mr. Chairman, five years ago, in March 1981, I came before this subcommittee to propose that the U.S. sponsor regional cooperation programs involving Egypt, Israel and the United States. That idea was incorporated into the Foreign Aid bill for fiscal year 1982 and the program began.

Over the last five years the program has proved itself a remarkable success, both in terms of the tangible scientific gains that has come out of it, and in terms of the familiarity and trust it has built among the Israelis and Egyptians that have taken part.

Rather than recounting their successes, which the panelists following are in a much better position to do, let me discuss the value of regional cooperation in more general terms.

In the case of Israel and Egypt or any countries struggling to live at peace with each other there are two ways to work toward that peace. The first is negotiations among governments, and the second is grass root effort involving both side's citizens. The aim of the first, of course, is to produce a breakthrough agreement like the Camp David Accord.

The purpose of the second is to try and create the underlying popular attitudes of trust and understanding that is necessary to stable long-term peace. Indeed, if this is done aggressively enough, it can actually push the first level, the diplomatic level, forward.

In the case of Israel and Egypt, and indeed the whole Middle East at this time, the diplomatic route seems stalled. King Hussein's overtures toward peace appear to have subsided. Egypt has

no ambassador in Tel Aviv; even the tiny strip of land at Taba creates a diplomatic impasse.

Many people regard that as the whole story of current Egyptian-Israeli relations. But as the presence of these scientists today will attest, the reality of the relationship is more complex than many think. There is a way the United States can continue to move the peace process forward; that is by supporting regional cooperation and trying to widen its scope.

With this as background, let me briefly discuss the level of funding we devote to regional cooperation. Last year we put into this program about $3 million, down from a usual level of about $5 million. Compare that to the roughly $6 billion we give Israel and Egypt each year in bilateral economic and military aid. While this expenditure is necessary, we hope for the time when cooperative efforts, fueled by all three nations will be the predominant expenditure.

As the witnesses today will tell you, in reporting on the conference that has just concluded—which is by the way, the first ever of its kind—regional cooperation has survived and proven itself.

I believe that one result of their efforts has been to win tremendous support in the Congress. For example, when we in the Congress heard that budget cuts were being planned for this program, we mounted serious pressure against them. You may have seen the letters from many members of key Congressional committees to our Secretary of State and Administrator of AID telling why cutting this program is wrong.

Indeed, I believe we have been underutilizing this approach, and it is time to expand our sponsorship of it. The witnesses who follow me have been making it clear throughout the conference on this program that has just taken place that they are hampered by a lack of funds. This is felt in the uncertainty that it gives them in planning their work, but more importantly, in the discouragement of so many potential projects by the knowledge that the overall pot is so small.

I would find it presumptious to suggest to this committee whether one program or another should be earmarked, but I would hate to see this program jeopardized because others are earmarked. Either, I believe we should not earmark so many programs or we should earmark this one as well.

However the committee seeks to decide that question, I would hope that the record of this hearing today will illustrate the success of this effort and the reason why we need to continue it, if not expand it, for all the purposes that led us five years ago to create it.

Thank you, Mr. Chairman, for the opportunity to open this hearing. I know there are many witnesses today that would like to be heard and not everybody will have that opportunity to make an oral presentation. I would hope that you would permit any person who has been involved in the conference the last several days who wishes to submit a written statement and have that written statement made part of the record.

Thank you very much for this opportunity to testify.

Mr. LANTOS. Mr. Waxman, without objection, we will be pleased to put in the record all of the statements which will be submitted.

Let me ask just one question because you are correct, we want to move on, because a lot of people want to testify. On balance, how would you evaluate the program?

EVALUATION OF REGIONAL COOPERATION PROGRAMS

Mr. WAXMAN. Mr. Chairman, this program has been a success far beyond our hopes when we created it five years ago. You will hear about developments that have come so quickly as a result of cooperative efforts. They are vital breakthroughs for the people in that region and I think for others around the world who can benefit from these activities, particularly in the area of science.

Professional scientists talk a language and deal with other in a way that transcends politics and we have seen their successes in the results of the various cooperative programs that have been funded under this program.

Mr. LANTOS. To the best of your knowledge, how aware are people in Israel and in Egypt of the existence of the program?

EGYPTIAN-ISRAELI AWARENESS OF THE PROGRAM

Mr. WAXMAN. This would be a good question to ask some of the witnesses, but I have a sense that this program is not widely known in any of three countries that are involved. I think we hear more about military expenditures, on a bilateral basis, particularly. I think that it is a well kept secret that there is successful cooperative effort between the Israelis and the Egyptians with the participation of the United States.

Mr. LANTOS. I suspect one of the responsibilities we at the political level share both in Egypt and Israel and the United States, is to make it better known. Clearly one of the impacts is the scientific impact, but the second impact, just as important, is the change in climate, and the demonstration that cooperation is in fact feasible.

Congressman Levine.

EGYPTIAN-ISRAELI COOPERATION

Mr. LEVINE. Thank you, Mr. Chairman. I would just like to take up for a moment the point that you were on with our colleague, Mq. Waxman. Fiqst -of all, I would lhke to compliment my disthnguished colleague fqom Calhfornia on hhs foqeshghs hn teims of initiating this program, which has been one of the most shining examples of the type of progress that can come from peace between Israel and Egypt and hopefully between Israel and her other neighbors.

I think that all of us who have observed this program over the years feel that this is the type of example that can be a path breaking example for cooperation in the region.

But I do think that the Chairman was correct in putting it in perspective that, unfortunately, while we have this type of extremely worthwhile example and program in the context of what so many of us had hoped and continue to hope will be examples of Egyptian-Israeli cooperation and common activities.

This is in many respects an example that almost stands alone, and it is an anomaly we are here to underscore the importance—at least that is something I hope this subcommittee will be doing this

morning—of this type of a program, when it has been, in fact, such a positive and clear example and when we have seen so many other relative disappointments by comparison.

I think that it is important to remind ourselves and remind the parties that are so intimately involved on a day-to-day basis with the peace process in the Middle East that it is through this type of cooperation in other areas as well that the atmosphere in the region can be improved.

It just strikes me personally as sad that we have such inadequate examples, for example, in tourism, in trade, in commerce, between Israel and Egypt, areas that we had all hoped would have been expanded considerably more broadly than they have been since the signing of the Camp David agreement.

So, while I think that the gentleman from California deserves a great deal of praise and the program that he is here to support deserves a great deal of praise, and I completely agree with the gentleman's comment that if there is to be earmarking in a particular area, it certainly shouldn't be an earmarking that by inference will cut other worthwhile programs, such as this particular program, in the absence of earmarking this program.

At the same time we should place this general program in the context of unfulfilled expectations thus far, and not shrink from underscoring those unfulfilled expectations with regard to tourism trade and so many of the other areas that we had hoped to see greater progress and greater cooperation between Egypt and Israel.

Mr. WAXMAN. Mr. Levine, I support everything you said and let me just underscore one point. What a signal it would be to send to the Middle East, in our disappointment that there is not more cooperative efforts, cut one program that is encouraging cooperative efforts. This is the kind of program we need to protect and expand in order to make sure that in the future our expectations will be realized and not disappointed further.

Mr. LEVINE. I agree with the gentleman and commend him for his initiative and for his thoughtful assistance this morning.

Mr. LANTOS. Congressman Gilman.

Mr. GILMAN. Thank you, Mr. Chairman. I regret the delay in my appearance due to another commitment this morning. I want to welcome our Chairman, Representative Waxman, who has done so much work on regional cooperation.

As was mentioned yesterday at a luncheon which was part of the seminar that is being conducted on the Regional Cooperation Program, we hope that this kind of cooperative venture in scientific and research endeavors would permeate the entire Middle East and be the foundation for a long and lasting peace in that region. There are many of us in the Congress who are supportive of making certain that we have the funding to continue this worthwhile effort. And again, I want to commend the gentleman from California for his continual and diligent concern about this very important endeavor.

Thank you, Mr. Chairman.

Mr. LANTOS. Mr. Waxman, you have made many significant contributions to the work of this congress and I must say that your authorship of this particular cooperative venture in the Middle

East is only one of the many important contributions you have made on behalf of all of us. I want to thank you.

Mr. WAXMAN. Thank you very much.

Mr. LANTOS. We will ask the first panel to come up. Dr. Rachel Galun, Medical Entomologist at the Hebrew University, Dr. Sheif el-Said, Research Entomologist at Ain Shams University. They will be accompanied by Dr. Sanford Kuvin, Founder and Chairman of the International Board of Kuvin Center for the Study of Infectious and Tropical Diseases at the Hebrew University.

We are pleased to have all three of you. Dr. Kuvin, if you would begin.

STATEMENT OF DR. SANFORD KUVIN, CHAIRMAN OF THE INTERNATIONAL BOARD, KUVIN CENTER FOR THE STUDY OF INFECTIOUS AND TROPICAL DISEASES, HEBREW UNIVERSITY

Dr. KUVIN. Sir, the opening statements will be by both Dr. Rachel Galun and Dr. Sherif el-Said. However, I would like to thank, particularly, Congressman Waxman for initiating and continuing this program which we consider to be one of the most extraordinary projects of cooperation.

COOPERATIVE HEALTH PROGRAM

I don't have to tell the congress that this is the only cooperative health program that will have current long lasting progress because all other current aid is not directed at cooperation of this nature. Less than one-tenth of one percent of the United States giving to Egypt and Israel is aimed at projects like this. This project costs only $7 million over 5 years, and our plea for excellence is that our funding not go below critical levels which are necessary to maintain this excellence.

We believe in this project, as you will hear from the participants in the project, that there has been a cross fertilization of bilateral publications of students being educated at both universities, of a family relationship developed, and most of all, I think the thread that runs through this entire program is credibility. And it is this thread of credibility that has allowed this unique cooperative program to exist.

As you know, this is the only cooperative health project in the Middle East, where health doesn't only affect individuals, it affects the national economies, it affects the very infrastructure of sociology, of politics, and the fallout of health is probably the most important advantage that is given to the respective countries involved.

I would like to let the principal investigators go ahead and comment on this splendid program.

Mr. LANTOS. We appreciate your comments, and we would like to begin with Dr. Galun.

STATEMENT OF DR. RACHEL GALUN, MEDICAL ENTOMOLOGIST, KUVIN CENTER FOR THE STUDY OF INFECTIOUS AND TROPICAL DISEASES, HEBREW UNIVERSITY

Dr. GALUN. I am a medical entomologist at the Kuvin Center for the Study of Infectious and Tropical Disease at the Hebrew University, Medical School, Jerusalem, and principal investigator of the

Israeli component on the project of entomology and the control of bone diseases in the near east.

For the last four years, the project has dealt with three regional diseases; Rift Valley Fever, which is a serious viral disease of livestock and humans transmitted by mosquitoes, leishmaniasis, a parasitic disease transmitted by sand flies and the well known malaria.

Proven successful with these three diseases, two additional diseases were added to our repertoire recently and these are filariasis, which is a disease caused by minute worms and is transmitted by mosquitoes and tick borne spotted fever.

Our project is the only currently funded cooperative health project in the Middle East. The project, resulting from the Waxman amendment is a trilateral effort between the Ain Shams University in Cairo, the Kuvin Center at the Hebrew University in Jerusalem and the National Institute of Allergy and Infectious Diseases, which provide close scientific monitoring.

The major objective of the project is to quantify the disease problems form a public health point of view, in order to prevent diseases through scientifically based control strategies.

This effort has proven very successful, both from a training and scientific point of view, as well as being a tool for creating cooperation and mutual trust between Egyptian and Israeli scientists which helped to deal more effectively with health problems of mutual concern.

More than a dozen graduate students received their Ph.D degree working on project problems in Israel. Some of the students from the Kuvin Center work in close cooperation with Egyptian students using the same protocol, so that the data they collected could be compared. Among the graduates and the trainees we had some Israeli Arabs and Bedouins from the Negev Desert.

The scientific highlights include the development of rapid immunodiagnostic methods for leishmania and malaria. These methods are based on sophisticated immunological and molecular biology techniques, but were adapted to field conditions and utilized in the epidemiological studies in disease foci in Egypt.

Another highlight was a combined Israeli-Egyptian team response to a medical emergency in Egypt. My colleague, Dr. Sherif will elaborate on this event.

These studies yielded more than 50 scientific papers, 17 of which are authored jointly by Israelis and Egyptians and published in leading international journals. This is Egypt and the State of Israel.

During the existence of the project, three major joint meetings took place, the first one in 1982, was outside the region, and took place in Stockholm, but the second in 1983 was in Aswan, Egypt and the third one in 1985 in Shoresh, Israel.

In addition to the large number of senior scientists who participated in these meetings, students from both countries played a very active role.

Israeli scientists visited Ain Shams University quite often, mainly to develop a protocol for various components of the joint effort, but as the need arose, with the outbreak of visceral leishma-

niasis in Egypt, also to train Egyptians in the diagnosis of the disease which they were not familiar with previously.

The Egyptians were kind enough to make one of our scientists, a visiting professor of Ain Shams University, for the duration of the training course.

We believe that if enough time and means will be given to continue this fruitful dialogue, it will institutionalize itself and will become a part of our daily life. A true measure achieving normalization in relations between Israel and Egypt.

Mr. LANTOS. Thank you very much, Dr. Galun.

Dr. Sherif el-Said.

STATEMENT OF DR. SHERIF EL-SAID, RESEARCH ENTOMOLOGIST, FACULTY OF SCIENCE, AIN SHAMS UNIVERSITY

Dr. EL-SAID. Besm Allah Al Rahman Al Raheem—in the name of God, the merciful. Thank you, Mr. Chairman, esteemed Congressmen and distinguished colleagues and participants. Allow me to introduce myself.

Mr. LANTOS. Could you please put the mike very close to you.

Dr. EL-SAID. I am Sherif el-Said, head of the Medical Entomology Department of Ain Shams University, Research and Training Center on Vectors of Diseases which is located in Cairo, Egypt. I am also privileged to serve as the principal investigator or coordinator of the first regional cooperative health project in the Middle East.

As my colleague, Professor Galun, mentioned, this cooperative project is administered by the National Institute of Allergy and Infectious Diseases, of the National Institutes of Health, with funds provided by the U.S. Agency for International Development.

Our research center, which houses this regional and cooperative program is based at Ain Shams University, which is the largest university, not only in Egypt, but in the entire Middle East with a student body of over 130,000 and around 10,000 faculty members.

This cooperative health project covers the diseases mentioned earlier by Professor Galun in which 137 Egyptian scientists and graduate students work on various segments of this project.

The Ministries of Health and Agriculture in addition to six Egyptian universities closely work on this project. We feel that this cooperative project provides a unique opportunity to coordinate efforts of scientists from two neighboring universities, long separated by culture, religion and unfortunately, war. Each brought its own expertise and its own orientation. Collaboration was mutually beneficial where joint productivity was enhanced, and we were able to respond to our disease problems with a multidisciplinary theme.

We also feel that this cooperative health project allowed for the first time Egyptian scientists, and especially students, to work hand in hand, and on a one-to-one basis with Israeli scientists. Students in both universities, while upgrading our own technical expertise and research capabilities and creating a research facility second to none in Egypt which can address the health needs of Egypt and the region. I would like to cite one of several concrete examples of how this cooperative program and the genuine spirit of

cooperation has enhanced our capability to respond to a major medical problem in Egypt.

In 1982 a serious disease called leishmaniasis entered Egypt. The diseases was unknown in modern times in Egypt and there was considerable concern in the medical community. It affects children under five years of age and is usually fatal if untreated.

Ain Shams Center in coordination with the Egyptian Ministry of Health was able to quickly respond with a multidisciplinary team. As a consequence, the parasite has been isolated and described, a new sandfly vector species has been identified, physicians have been trained in diagnosis and treatment, animal reservoirs and patterns of transmission have been documented. Control strategies were recommended to the Ministry of Health, implemented, and through the medical health services of the Ministry of Health, transmission of the disease curtailed.

This achievement could not have happened without outside help. Two young NIH scientists assigned to the Ain Shams Center provided important input, but most important, scientists from the Kuvin Center in Israel worked closely on all aspects of the Leishmaniasis program.

Israeli scientists from the Kuvin Center in collaboration with their Egyptian counterparts conducted courses and workshops at Ain Shams University on the culture and identification of leishmaniasis parasites, and the collection and colonization of the sandfly vector. Serological techniques developed at the Kuvin Center were applied to epidemiological studies in Egypt and some of the serum samples were analyzed in Israel. The Israeli input in these studies was appreciated and felt by many as important to the successful completion.

Although the leishmaniasis story just mentioned is one tangible example of regional cooperation, the most important product of this cooperative program is its students. This regional project has provided an opportunity for the best and the brightest Egyptian students to study and research in a first-rate research center, to interact with and international faculty and to work with Israeli scientists as equals.

It is hoped that this cooperative health project can help stem the brain drain which has so devastated Egyptian science. Is it these young, well trained scientists that the future of Egypt rests and in whom the concept of peace and cooperation must be instilled.

I personally and strongly feel that the successes in this regional cooperative health project will make the dream of the long sought peace a reality.

Thank you, sir.

BETTER PUBLICITY FOR THE PROGRAM

Mr. LANTOS. Thank you very much, Doctor.

I would like to ask both of our visitors from Egypt and Israel, in what way could the program be made better known in your respective countries? Dr. Galun.

Dr. GALUN. I mentioned the 17 joint papers that in the scientific community this joint effort is very well known. Now in as far as the general media is concerned, we do maintain a very low profile,

according to the request of our Egyptian colleagues, which felt that it would be more effective to keep it at this level.

Mr. LANTOS. Dr. el-Said.

Dr. EL-SAID. Sir, your question is very well taken, if I might say so. It is very well known on both a scientific level and a political level. I would like to mention that we have in Egypt 13 Egyptian universities in the whole of Egypt.

We are working very closely and in a very formal way through subcontracts with 6 of the aforementioned 13 Egyptian universities, the Ministries of Health and Agriculture, the Egyptian National Academy of Science, and this represents more than half of the brain trust of Egypt. This is the scientific recognition and the scientific publicity, sir, you were referring to earlier. This is the expansion. This is the publicity we need. On a political level, definitely many of the politicians and the policy makers of Egypt are fully aware and bless the concept, and the scientific publications and our presence today and our interaction will testify that the Government of Egypt is definitely blessing peace, cooperation and interaction in a healthy objective way. Peace which is based on equality and prosperity will always be encouraged and promoted.

Mr. LANTOS. Thank you. Dr. Kuvin, would you like to add something?

Dr. KUVIN. Yes. First, the National Institutes of Health, of course, is the manager of this project, and within its own publications and in house methods of dissemination of knowledge our work on a global basis has been widely disseminated.

It is unique and historical that Kuvin Center, Hebrew University, Ain Shams Center publications have been in the best international journals and we have maintained an extraordinarily credible profile.

The NIH which manages us, Congressman Lantos, is interested in excellent science, as you know. That is their mandate. The political fallout is truly secondary as far as their perception is concerned, and indeed, we have met those criteria in a most excellent fashion.

Now, as far as the generation of publicity we find that our work and our excellence generates the type of publicity that we are interested in. Namely, the joint publications, the joint meetings which have taken place in Stockholm, in Jerusalem, in Egypt, in the United States. We have had the largest ingathering of Egyptians and Israeli scientists in Aswan in 1984 ever, larger than the meeting here today, and it is this type of credible publicity that we feel will eventually filter down to the public level. To force feed it on the public initially and work its way up, as it were, would be, we think, counterproductive.

Mr. LANTOS. Congressman Waxman.

Mr. WAXMAN. Mr. Chairman, as you know, I am Chairman of the Subcommittee on Health, which deals with domestic health issues, and because of that I am probably more familiar with this particular project than some of the others we have funded under regional cooperation. I think the work they have done is outstanding. It is exciting. It offers a tremendous hope for not just the people in that region, but around the world.

Disease and illness knows no boundaries and we need to do all we can to eradicate the threat to human health.

LIMITATIONS ON PARTICIPATION

Let me ask just one question of members of this panel. What in your opinion presently limits the amount of participation in this program? Is it the availability of funds or an unclear set of guidelines in submitting project ideas or political problems in the region that make officials in the various governments reluctant to approve these programs.

Dr. KUVIN. If I may, Congressman Waxman, just respond to the opening part of it. There is a boundless opportunity of projects in health, which as you well know, affect the very infrastructure of the countries in the entire region, and as you just said, mosquitoes know no boundaries and parasites don't carry passports.

So the fact is that we have already submitted worked out budgets in nutrition, in diarrheal disorders, in respiratory diseases, which have not been funded because of lack of funds. This is our constraint. These have been meritorious projects that have been peer reviewed in Egypt and in Israel because these are the two countries that must approve them.

Now the United States is an equal partner in this and indeed they are more than a facilitator. We have been hampered by a shortage of funding, and we feel that health is the best prescription for peace in that area.

Mr. WAXMAN. Thank you very much.

Thank you, Mr. Chairman.

Mr. LANTOS. Congressman Gilman.

LACK OF PROPOSALS FOR WORTHWHILE PROJECTS

Mr. GILMAN. Thank you, Mr. Chairman.

I note that in some correspondence we have had with the Agency for the National Development, they said one of the reasons for the constraints is that they have received no new proposals for worthwhile projects. Now, is there some basis for that position? Can you enlighten the committee in regard to that?

Dr. GALUN. To the best of our knowledge, several projects have been submitted and approved at all levels, including the NIH level and the agencies which deal with it, so I just don't understand this statement.

CONSIDERATION OF OTHER PROJECTS

Mr. GILMAN. Are there other projects in the wings that should be considered? Could I address it to the entire panel. Dr. el-Said.

Dr. EL-SAID. In my personal opinion, I think the whole region concept isn't really well known or publicized by U.S. AID. We are all eager to undertake cooperative efforts as scientists. We are all eager as Egyptians and Israelis and Americans to coordinate efforts. We do have fine proposals that have been reviewed by the National Institutes of Health, as represented by the National Institute of Allergy and Infectious Diseases, in collaboration with at least seven prestigious American universities.

So the ideas are there. The problems are there. We have many disease problems that pose a threat to the whole region not only to Egypt and Israel. But the problem is we do not know the specific objectives, U.S. AID has in mind. There is no specific format for regional projects and no set criteria that we are aware of; we are really totally unaware of U.S. AID's philosophy in promoting regional cooperative projects in any field.

Dr. KUVIN. Congressman Lantos and Congressman Gilman, for example, we introduced a rapid diagnostic technique for malaria into Egypt, which does not have much malaria. However, malaria, as you know, killed two million people a year and there are over 200 million cases. Whatever we are doing in the region has a distinct benefit to what is going on on a global basis, and as you well know, the infectious and tropical diseases of the world are the most important diseases causing more death and disability than all other diseases combined. And we are in the very field station, namely that area of the Middle East, to deal with these diseases.

So health is much more important than wealth right now in that area of the world. We have plenty of projects that have been peer reviewed. We have not received funding because we were told that AID is broke.

FUNDING FOR THE PROGRAMS

Mr. GILMAN. One more question, Mr. Chairman.

I note that the overall request for 1986 is $5.8 million. It was reduced to $2.8 million. What would you have considered to have been a more practical figure under which that you could still pursue your projects?

Dr. KUVIN. We are only dealing with the segment of the regional cooperative program. Our component of that $5.8 million is only a component. Our last five years has utilized about $7 million over a five-year period, and the proportion remains exactly the same.

I am not qualified to speak on the exact budget, but I can tell you this, that if we fall below a critical level of funding, as you know, there is a critical mass involved, and if you fall below a critical level after five years of building up this program, you fall flat. You fall into mediocrity.

Mr. GILMAN. What is the critical level? Dr. Galun.

Dr. GALUN. Well, as I mentioned, two additional diseases were added to our repertoire just a few months ago, and without extra cost for the 1986, but we surely expected an increase in budget for 1987 so that we could accommodate these two diseases in the decent way.

Now, the five-year joint project was, as mentioned, about $7 million and I would think that going below that would be very, very difficult.

Dr. KUVIN. That is $7 million over the next five years. We are renegotiating now, as you know, for the next five years. Our cnntract terminates on December 15th of this year, our five year contract with AID and there is now a participating agency service agreement being written for the next five years, and of course, we have had meetings with AID and we have pleaded our case with them.

Mr. GILMAN. Dr. el-Said.

Dr. EL-SAID. One slight comment. The uncertainty in funding is definitely, as an Egyptian, distracting other Egyptians. It is not encouraging them because regional cooperation is a philosophy, a belief in peace based on equality. If we are to expand, we have to expand in quality. We have to insure quality, because quality, sir, develops trust; and a need between two nations long separated by distance, as I previously said, and unfortunately, war.

We need quality and the National Institutes of Health scientifically is insuring this quality, and develops a need. We would like to expand this project and other health projects.

Mr. GILMAN. You have certainly made some strong arguments. We thank the gentlemen.

Thank you, Mr. Chairman.

Mr. LANTOS. We want to thank the panel for an outstanding presentation. We would like to spend more time with you, but I think we need to move on.

If I may ask the second panel to come up, Dr. Rifai A. Bayoumi, Director of the Institute of Oceanography and Fisheries, Egyptian Academy of Scientific Research; Dr. Collete Serruya, Director General of the Israel Oceanographic Research operation, and Dr. Robert Abel, President, New Jersey Marine Sciences Consortium.

We are pleased to have all three of you. Dr. Abel, you may want to open the presentation at this time.

STATEMENT OF ROBERT ABEL, PRESIDENT, NEW JERSEY MARINE SCIENCES CONSORTIUM

Mr. ABEL. Thank you very much, Mr. Chairman.

Speaking in behalf of my colleagues, I want to express our appreciation for your giving us this time to present a program in which we obviously believe very devoutly. Both of my colleagues are here in several capacities. Dr. Serruya, in addition to being Director General of the Institute of Oceanographic Liminological Research in Haifa, is also an internationally recognized liminologist, who has written a classical book on tropical lakes.

Dr. Bayoumi, in addition to being Director of the Institute of Oceanography and Fisheries in Cairo, has I think I can say in all good faith, devoted almost his entire career to the pursuit of international cooperation through the oceans, and has in fact served for the last many years as the first Vice President of the Intergovernmental Oceanographic Commission, directed toward that purpose.

I would also like to introduce our other two colleagues on the steering committee, Dr. el-Said from Texas A&M University, who is sitting behind me and Dr. Mancy from the University of Michigan, both of whom have served with our committee in varying tenures.

Our program was the first. We started planning in 1978, received the first cooperative agreement in 1980. I would like to leave the telling of our tale to my two colleagues and would like to introduce to that purpose, Dr. Serruya.

STATEMENT OF COLLETE SERRUYA, M.D., DIRECTOR-GENERAL, ISRAEL OCEANOGRAPHIC LIMINOLOGICAL RESEARCH, LTD

Ms. SERRUYA. I am the Director of IOLR, a government agency working mostly on applied research on seas and lakes. I have also been the Israeli coordinator of the Marine Program for the last six years.

Our projects have attacked problems of great concern and interest for both countries. The first one concerns the production of fish. The program of mariculture has been initiated by the AID project and the seed money of AID has motivated both governments of Israel and Egypt to allocate more funds, more substantial funds for this program.

As a result, commercial hatcheries are being built now in both countries. Fish species have been exchanged between Israel and Egypt, trying to find out the best way to organize commercial production.

And yesterday we were able to taste at lunch the results of these cooperation in the form of the sea brim, which came directly by plane from the Middle East to Washington, and this was, in fact, the first commercial product developed within the marine cooperative program.

Another problem that we have attacked is the problem of erosion on the coast line of Egypt and Israel which is presently very severe in Egypt, but which might extend to the coast of Israel as well.

The first common data concerning the wave measurement and sand transport have been already published, and now we are on our way to develop a mathematical program, a mathematical model of the coast of Egypt and Israel for a better management of these, for what we call the Nile Sell. This common mathematical model will necessarily oblige Egypt and Israel to work together and to manage their coastline as a common unit.

We have also worked in lakes, in management of lakes, on the only lake of Israel, the Sea of Galilee, and Lake Mancello in Egypt. As a result, management plans have been designed, spawning areas in the Sea of Galilee has been protected from over fishing as a direct result, and this has been a new low which has been elaborated in Israel to protect the spawning area of certain species of fish as a direct result of this program.

Another program concerning the productivity of the Middle East Mediterranean Sea, we have mapped for the first time the spawning area of anchovy and this is a very, very important fishery in this area. This achievement will allow us in the future to improve the fisheries in the Eastern Mediterranean Sea.

In addition to the achievements of these very practical programs which aim at improving food sources, management of coast line, management of lakes; we are also initiating new programs like growing fish in waste water, that is, utilizing sources of water which were unutilized until now in order to produce new food sources, and we are also initiating a new program at managing, monitoring the polluting sources of the industrial areas of Alexandria and Haifa Bay.

So as you can see, we are working on very practical issues, but in addition to that, I wish to mention the extraordinary human rela-

tionship which has been developed between the partners in this theme, and this is certainly not an achievement which has to be considered at the lower level than the technological achievement in this program.

Thank you.

Mr. LANTOS. Thank you very much, Dr. Serruya.

Dr. Bayoumi.

STATEMENT OF RIFAI A. BAYOUMI, M.D., DIRECTOR, INSTITUTE OF OCEANOGRAPHY AND FISHERIES, EGYPTIAN ACADEMY OF SCIENTIFIC RESEARCH AND TECHNOLOGY

Mr. BAYOUMI. Well, my name is Bayoumi from the Institute of Oceanography and Fisheries. I belong to the Academy of Scientific Research and Technology. Well, the cooperative marine science program in the Middle East, I do believe that it is a multidiscipline problem, not including the marine scientists only, but also it includes engineers who are working for the protection of the coast, and at the same time, it is not restricted to the Institute of Oceanography and Fishery, but includes also scientists from Alexandria University, which have the oceanographic department, which is considered one of the strongest departments in this field in our area.

While the projects we have, have been mentioned by my colleague, Dr. Serruya, we started with seven projects, including agriculture and lake management, shore protection and also the nutrition for fishes and one also of the project which has not been mentioned, we have one of the fishes and this is an African fish, and this is Tilopia. We are doing a research on Tilopia in order to improve Tilopia and to have a hybrid which can sustain the environmental impacts in the area.

Well, one of the accomplishments in our project that not only for scientific results, but actually in order to build the career of the young scientists and in the framework of our program, nearly 12 of the younger students have got their degrees, either MS or Ph.D. We also have during the past, well, around the past one or two years, that included new blood in our program, that having to see some people from our national research center working now for seed production, and at the same time we have a project which was introduced also, and that for waste water management, and like that.

Mr. Chairman, I do believe that there is the other side of the coin, that really through this project we could bring together some of the scientists in the area in order to know each other and at the same time to make a change what have been, I mean, a result, not only the result of this project, but also the result of so many activities which are going on in the field of marine science.

And at the same time, I do believe, that our project has one or several impacts on the feeding aspect of the people in both countries, because actually we find now during the past few years that red meat is being a little bit, I mean, expensive, and the meat, or the protein from fish is one of the, well, can be an alternative for red meat.

At the same time, we are trying to use some of the local waste products to produce cheap feed for fish and I believe through this project we can reach some good results in this direction.

My last comment may be in our project. This project is around six years old. An investment in this direction through this program really needs to be continued, and I do feel that there is a momentum which needs to be fostered and encouraged.

Thank you, Mr. Chairman.

Mr. LANTOS. Thank you very much, Dr. Bayoumi.

I want to thank both of you for excellent presentations, and without objection I will put into the record the statement by Dr. Robert Abel entitled Cooperative Marine Technology Program for the Middle East.[1]

Mr. LANTOS. Congressman Waxman.

Mr. WAXMAN. Mr. Chairman, I just want to commend this panel. I think they have made an excellent presentation and I think the work they have done speaks for itself in terms of its contribution to the region and to mankind and for its excellence in its scientific endeavors. Thank you.

Mr. LANTOS. Thank you.

Congressman Levine.

Mr. LEVINE. Thank you, Mr. Chairman. Briefly, I would like to commend the witnesses also. I am sorry I wasn't here for all of your testimony, but I am familiar with it and I appreciate all that you are doing, and your testimony.

Let me just ask one question to Dr. Serruya and Mr. Bayoumi. Has either the Israeli or Egyptian paid any considerable attention to this program? If not, why not? If so, describe it, and how can more press attention be focused on what is happening in this unique and successful program? Dr. Serruya.

Ms. SERRUYA. I must say that the Israeli press has been extremely interested by this project and sometime I had to ask them not to cover this too much about it. If I had something to do to restrain them and try to ask them politely not to publicize it too much because we know very well that this might have a damaging effect and would put our Egyptian colleague in a difficult position. So the Israeli press was always extremely interested by the project, and I have only to give the green light for them to cover pages with this project.

Mr. LEVINE. I don't want to get into too much detail on this, but why—well, I just think that is a sad commentary on the broader question of cooperation between the two countries, that that is a reality, and hopefully that can be something we can work on in a broader context. Thank you for your comment.

Mr. Bayoumi, what about the Egyptian press?

Mr. BAYOUMI. I do believe—I am a scientist and really, scientists sometimes want to be, I mean, the results, well, it is an exchange in the scientific level, but still we are really, the point of the press in order to make a sort of, well, some information concerning the project, I do believe we are in a stage now that to be very cautious

[1] See appendix 1.

in wide publicity, as I stress it to be wide publicity, but we can do it the other way.

Usually you are speaking to the public and really the marine science, it is one of the subjects which are directed to the people. I believe that science can do something, but we need to keep it at a low profile rather than to have it in a high profile and then we lose everything.

Mr. LEVINE. Let me compliment you on the work you are doing and thank you.

Mr. LANTOS. I want to thank all three members of this outstanding panel. Before dismissing you let me say my colleague from California expresses a frustration that all of us in the Congress share. We are so delighted to see cooperative projects and we would like to see it given more publicity. We are fully aware of the political constraints, but I think it is important not to err on the side of ultra caution because you have a responsibility not only to the scientific community and not only to your projects, but you have a broader responsibility of contributing to the climate which we hope will be increasingly more conducive to cooperative projects, and your success will make that climate come about.

I want to thank all three of you for appearing.

Mr. ABEL. Mr. Chairman, I simply want to echo the comments of my colleagues, Dr. Kuvin, and express our hopes that a very small proportion of the investment we make in other kinds of hardware can now be made to help people live, and thank you very much for your time, sir.

Mr. LANTOS. We thank you for your excellent presentation.

I would like to ask members of the third panel to come up please. This panel deals with joint agricultural projects in a common ecosystem system. Dr. Mohammed el-Assal, Professor of Sociology and Social Psychology at San Diego State; Dr. Adel el-Beltagy, Professor of Plant Stress Physiology at Ain Shams University in Cairo; Mr. Sam Pohoryles, Director General, Rural Planning and Development Authority of the Ministry of Agriculture in Israel; Dr. Dan Yaron, Professor of Agricultural Economics at the Hebrew University and the accompanying witness is Mr. David Kincaid, Director of International Research Division, the Office of International Cooperation and Development of our own Department of Agriculture.

Mr. Kincaid, would you begin the presentation.

STATEMENT OF DAVID KINCAID, DIRECTOR, INTERNATIONAL RESEARCH DIVISION, OFFICE OF INTERNATIONAL COOPERATION AND DEVELOPMENT, U.S. DEPARTMENT OF AGRICULTURE

Mr. KINCAID. I am pleased to have the honor of accompanying today's witnesses on the agricultural projects. There are two programs in agriculture. One is the cooperative arid lands agricultural research project, Caylor, which was funded in 1981 and the trinational agricultural technology exchange project which was funded in 1984.

The U.S. cooperator on the Caylar project is San Diego State University and on the other project the trinational technology exchange project is the U.S. Department of Agriculture.

Today's witnesses are leaders and coordinators of these projects since the beginning and are very well versed on all aspects of it, so I would like to turn it over to the first witness.

STATEMENT OF SAMUEL POHORYLES, DIRECTOR GENERAL, RURAL PLANNING AND DEVELOPMENT AUTHORITY, ISRAELI MINISTRY OF AGRICULTURE

Mr. POHORYLES. Mr. Chairman, Congressmen, my name is Sam Pohoryles. I am Director General of Rural Planning and Development Authority of the Ministry of Agriculture in Israel, Professor of Rural Development and Co-Chairman, the Israeli Co-Chairman of a joint agriculture committee, Egypt-Israel.

With your permission, I should like to focus some main points in our agriculture cooperation. The first of them is that according to U.N. evaluations, the Middle East region requires one generation to make its production double, its food production doubled. This is a very long process. It could be accelerated. It could be accelerated through technology transfer and mutual cooperation.

I think this is the main objective, the main strategic objective of our common cooperative agriculture project.

And this is the main goal after the signing of the formal agreement between Egypt and Israel agriculture, which was the Memorandum of Understanding, I had the honor to sign this agreement.

In retrospective balance, we have the last five and a half years after the signing of the formal agreement, we have today the following state of art: the first we have two very significant finance by AID cooperative research projects. The first is the arid land development, which is composition of arid development and industrial development, industrial cooperative development, with a very significant multiplier effect, regional multiplier effect and even the universal multiplier effect.

The second is the younger. This is the second year, a project of technology exchange in a similar ecosystem with very generous composition of crops systems, medicinal crops and economic evaluation. We note very interesting cooperation, empirical cooperation; in the Delta was a strong demonstration effect in local technology transfer to the farmers. This was the strong emphasis of the Deputy Prime Minister and Minister of Agriculture of Egypt.

We have a new agreement signed a few months ago on a second farm, which is based on high genetic seed development which, by nature, has a very, very important affect. We have other items of cooperation like introduction of high genetic helpers, dairy farms, and mutual cooperation in overcoming diseases like firefly diseases.

We examine now possibilities of some cooperation which is very important for Egypt, that is cotton. Now, Mr. Chairman, I have—I should like to raise two new ideas of development. The first is related to a Middle East common market.

It seems to me that if we observe the benefit gained by the countries of Europe, it would be quite reasonable to predict that intro-

duction of a common market to the Middle East should bring about progress, prosperity and involvement of other countries.

Egypt is located in a very strategic position in relation to Africa. I would suggest to consider establishment of technological, logistic, scientific storage center for food in Egypt through a combination of the ecosystem advantages of the climate and sophisticated technology.

Thank you, Mr. Chairman.[1]

Mr. LANTOS. Thank you very much.

[The statement of Mr. Pohoryles follows:]

Mr. LANTOS. Who on the panel will want to make the second presentation?

STATEMENT OF ADEL EL-BELTAGY, M.D., PROFESSOR OF PLANT STRESS PHYSIOLOGY, AIN SHAMA UNIVERSITY

Mr. EL-BELTAGY. My name is el-Beltagy. I represent the Ministry of Agriculture. Mr. Chairman, Congressman Lantos, the Honorable Members of this committee, before I proceed, I would like just to give you some sort of very quick background of how things are going.

In the early time of the peace treaty, there was a general euphoria for peace everywhere, and within this context, Minister Wiley, made a memorandum with Professor Pohoryles, and this memorandum started a lot of projects in the field of agriculture.

We share a lot of problems. Arid land development is our interest. In the last 30 years Egypt developed one million acres. We still have an increase of population which raise to 50 million. This is putting a lot of pressure on Egypt for food supply.

We have at least 55 percent of our food imported from abroad. Within this context, programs have developed in the area of arid land development and this program which we call Caylor, has started and has three components. This is related to the use of saline water for desert development and there is another component for small animal and fodder. The third component is for introduction of industrial crops.

This program has been going on for more than five years. It includes scientists and working technical staff, about 130 Egyptians working within the Ministry of Agriculture in Egypt and Ain Shims University and some other consultants from another five universities. The number of Israeli colleagues on this program is about 70.

The other major project we have is a technology exchange program which is administered by USDA. Actually we have two subcontractors, USDA and San Diego State University. This second program, as Professor Pohoryles said, is a mutual thing, and has a solar, plastic solar cover. It has another intensification component with emphasis on cropping system and irrigation and it has another component for medical crops.

This program involves 50 Egyptian partners with about 50 Israeli partners working in both Hebrew University and the three institutes in the Ministry of Agriculture, Institute of Agricultural Protection, Institute of Agricultural Economics and Soil and Water Science Institute.

[1] Mr. Pohoryles' prepared statement appears in appendix 1.

This is mainly the programs in agriculture, the exchange of seeds, exchange of ideas and knowledge that is going on through scientific meetings. There are a lot of forums and meetings which are going on, a lot of visitation and cooperation between people interested because the topics are of main concern to both scientists from both countries.

One passing comment for the comment which we heard several times, is the point of publicity. I am speaking as an Egyptian, not as what I represent here, and the publicity we have to look at in the context of component of cooperation will induce the real comprehensive peace, will induce the picture and you know this better than us. I mean, we are scientists and you know this. Although I deal with stress physiology and not human stress, we look to the United States Congress and United States support to achieve the comprehensive peace and therefore we are not going to complain after this about publicity.

As for the idea of my colleague, Professor Pohoryles, which is very noble to have an EEC for the area, we are very much looking forward to seeing this within the context of comprehensive peace.

Egypt will be one of the major supporters for this. We hope that this area which has suffered tremendously in the past 30 years will enjoy peace in the coming decade.

Thank you.

Mr. LANTOS. Thank you very much. Would any of the other members of the panel like to make an opening statement? Yes, please go ahead, Dr. Dan Yaron.

STATEMENT OF DAN YARON, PROFESSOR OF AGRICULTURAL ECONOMICS, HEBREW UNIVERSITY

Mr. YARON. My name is Dan Yaron. I am Professor of Agricultural Economics at Hebrew University and Joint Coordinator of the project I will refer shortly to.

Agriculture technology exchange and cooperation, the case of Egypt and Israel. A project initiated in October 1984 comprises five subjects concerned with modern agricultural technology.

The sixth subproject deals with economic and social evaluation of the above technologies and study of methods for technological exchange.

My second point. The subprojects were selected in a series of negotiations between Egyptian and Israeli and U.S. participants in view of, A, a longer vision of regional development which I think is very important, B, specific needs of each country, and C, potential cooperation in the near and far future.

By the end of the first year, which has been submitted to AID in a report, we see some visible result which can be pointed out. Two examples: 15 tons of grain were achieved by the Egyptian team in the Delta experimental farm. B, very good results both in Egypt and Israel of the effect of solar heating of soils as a means of disinfection against soil disease and as a substitute for chemical treatment which has adverse environmental effects.

This technology is now tested by our economic team for its economic and applicational feasibility.

My next point refers to these area experts who are living and working at the farm in the Delta, which has been mentioned by Professor Pohoryles, as consultants to the Egyptian farm manager and who is involved in trying agricultural modern methods which are practiced in Israel. It cooperates as well with Egyptian and Israeli scientists.

My next point is that our research is application oriented and it involves experiments, farm testing and demonstrations. This fall we are going to establish ten demonstration plots in ten villages around the Gemeiza area, and finally release for the promotion of technologies which are found successful.

A sequence of six or seven years is needed to accomplish this task. Namely, we need continuity.

The imbalance between the magnitude of international AID appropriated weapons and those appropriated to development projects in our region is striking, to my opinion.

Please note that one modern airplane fighter is roughly equivalent coast wise to the settlement or rehabilitation of between 1,000 to 3,000 family farms.

I feel that we have to provide the leaders and the people of the region with ideas and plans concerning the economic potential for development in the region and the conditions for peaceful coexistence.

My final comment: I would like to express thanks to the U.S. Government and its institutions for their support of the current regional cooperative activity and suggest to this honorable committee, (a) to support the continuation of our projects, and (b) to take the initiative and provide the motivation for large scale regional development projects.

Our Prime Minister, Mr. Peres, has set forth recently an idea of a Marshal Plan in the Middle East. Our project and other projects can provide a modest contribution to the realization of this idea. Thank you very much.

[The prepared statement of Mr. Yaron follows:]

PREPARED STATEMENT OF DAN YARON

EXECUTIVE SUMMARY SOME INTERMEDIATE REFELCTIONS AND COMMENTS ON REGIONAL COOPERATION BASED ON THE PROJECT "PATTERNS OF AGRICULTURAL TECHNOLOGY EXCHANGE AND COOPERATION"

1. The project, initiated in October 1984, comprises five subjects concerned with agricultural technology. The sixth subproject deals with:
(a) economic and social evaluation of the above technologies, and
(b) study of methods for technological exchange.
2. The subprojects were selected in a series of negotiations between Egyptian, Israeli, and U.S. participants, in view of:
(a) a long-run vision of the region's development
(b) specific needs of each country
(c) potential cooperation in the near and far future.
3. By the end of the first year some visible results can be pointed out. Two examples:
(a) Fifteen tons of grain per hectare achieved by the Egyptian team;
(b) Very good results (both in Israel and Egypt) of the effect of solar heating of soils as a means of thermal disinfection against soil disease, and as a substitute for chemical treatment which has adverse environmental effect;
4. Significant aid to the research process is the participation in the project of an Israeli expert who is living and working at a farm in the Delta as a consultant to the Egyptian farm manager and trying out agricultural methods practiced in Israel.

5. This R and D application oriented research involves:
(a) experiments
(b) farm testing and demonstration
(c) release for diffusion and the promotion of the diffusion.
A sequence of 6-7 years is needed to accomplish these tasks.

6. The imbalance between the magnitude of international aid funds appropriated to weapons and those appropriated to development projects in our region is striking. Note that one modern airplane fighter is roughly equivalent costwise to the settlement or rehabilitation of 1,000-3,000 family farms.

We have to provide the leaders and the people of the region with ideas and plans concerning the economic potential for development in the region, under conditions of peaceful co-existence.

7. Finally, I would like to express our thanks to the U.S. Government and its institutions for their support of the current cooperative regional activity and suggest to this honorable committee a further step—large scale regional development projects. This is essential as a source of hope and trust in peace.

Mr. LANTOS. Thank you very much, Dr. Yaron.

Let me just mention before we turn to the last panel that the Congress is much happier when it can make authorizations and appropriations for peaceful agricultural projects than when we have to fund military operations, but the realities of the region sometimes compel both.

The final member of this panel is Dr. Mohammed el-Assal, Professor of Sociology at San Diego State. We are very pleased to have you.

STATEMENT OF MOHAMMED EL-ASSAL, PROFESSOR OF SOCIOLOGY AND SOCIAL PSYCHOLOGY, SAN DIEGO STATE UNIVERSITY

Mr. EL-ASSAL. I would like to address myself mainly to the Caylor program, which is administered by San Diego State University.

The program started in 1982, the result of various factors; the contribution of private institutions, the Hansen Institute for World Peace, private citizens of San Diego, the San Diego University Foundation, and most importantly, distinguished scientists from Egypt and from Israel.

The main point that has been mentioned by my colleague, Dr. Beltagy, really, the development of waste land, the desert land by the use of saline water rendering this land useful for grazing small animals by planting shrubs that can survive in the desert, and finally introducing plants that have certain industrial use.

Now, our program, which started in 1982, was funded for five years, $5 million; the second year the program was reviewed. Due to its excellence, it was suggested that—the evaluators suggested extending it for three additional years bringing its tenure to eight years.

The review committee recommended extending the funding for one-quarter million dollars. Now, in the fourth year of the program, we are euphoric. We have appreciated the American people's input and AID's appreciation of the program. We went out of our way to increase the cooperation.

We had many meetings, but let me refer to two meetings that took place last year, one in Israel where eight Egyptian scientists toured Israel for 14 days, hosted by their colleagues, seeing all the work of their colleagues there and sharing with them not only the science but also the way of life.

They additionally participated in a steering committee meeting which met in March of 1985. Let me assure you, Mr. Chairman and Congressman Levine, that the meeting was attended by the media, television was there, the news people in Hebrew and English talked about our program. That was widely disseminated, and it was also mentioned in Egypt as well.

Another meeting which took place was in Egypt in January. We were funded to bring eight Israelis, Americans and Egyptians to a scientific workshop. Instead, we went out of our way with the help of private funds to bring 24 Israelis, 52 Egyptians and 10 Americans to attend the workshop.

Mr. Chairman, I wish you had been with us. We had AID members tour the sites. I wish you would have seen how the goods moved from Cyprus to be bred with the local goods and distributed to the farmers and the herders in the north coast of Egypt. One hundred twenty people of the farmers and herders actually participating in the experiment, were partners. I wish you had been with us to see almost a million shrubs planted in the coast of Egypt and thousands upon thousands of similar shrubs planted in Israel to feed these goals.

I wish you had been with us to see how sand dunes in both Egypt and Israel have been rendered useful by using saline water and bringing water from Egypt and saline water to bring prosperity and life to the citizens in Israel and Egypt.

I need not say how much the commitment of the scientists are, but we have been cut by 12 percent. We heard about the cut; there was going to be about 50 percent right in the middle of the workshop. That threw a damper. How can we explain to the participants on the other levels that these cuts mean that the U.S. does not care about these programs.

Mr. Chairman, these programs are very worthy and if the U.S. is really serious about establishing cooperation in this area, the least that could be done is to provide the support of the fund, which is more than matched by the governments of these countries. Institutional support, income support of these countries far exceeds the actual funding which is given by the U.S.

Thank you very much.

Mr. LANTOS. Thank you very much, Dr. el-Assal. Your enthusiasm, I think, is infectious and we all wish we had been there at all of these events.

I am very anxious to move on to the other panels, but let me ask if my colleague has a question.

Mr. LEVINE. No, Mr. Chairman.

Mr. LANTOS. Let me then thank this panel. I am very grateful to you.

Our final panel is on regional cooperation programs. I would like to invite Mr. Adel Merdan, Director of Ain Shams Research Center, Mr. Mohammed Darwashi, Director of the Parliamentary Office of Israeli Knesset Member Abdul Wahab Darawshi, and Mr. Yoel Schecter, Director of Advanced Products of Ben Gurion University of the Negev.

Accompanying them will be Dr. Robert Ontell, Executive Director of the Hansen Institute at San Diego. We are pleased to have all of you. Dr. Ontell, please begin the presentation.

STATEMENT OF ROBERT ONTELL, EXECUTIVE DIRECTOR, HANSEN INSTITUTE

Mr. ONTELL. Mr. Chairman, distinguished members of the committee, my name is Dr. Robert Ontell. I am the Executive Director of the Hansen Institute for World Peace in San Diego. As far as I know, we are the most substantial private organization which has devoted almost 90 percent of its resources to the support of the programs that you have been hearing about today.

REGIONAL COOPERATION PROGRAMS

In the course of the last seven years, we have expended close to a half million dollars in support of the two major programs, the first two programs, I shouldn't say major, the marine scientist program and the Caylor program, the cooperative agricultural program, which we helped bring into being.

I was given notice that I would appear as an accompanying witness entitled the regional cooperation program, a vehicle for greater mutual understanding. Unfortunately, it has not been my privilege to meet either Mr. Adel Merdan or Mr. Mohammed Darwashi until two days ago. I do not know how they came to be on the panel or what the contents of their remarks will be.

I do know Mr. Yoel Schecter very well. I have known him for seven years. He is one of the people who helped put together the Caylor Program. He is a distinguished member of the faculty at Ben Gurion University. He is a world known expert on decertification and understands the ecology of the deserts of the world, probably more than anybody in Israel. He presented a paper on decertification at the Nairobi Conference in 1977, was it?

It is my great pleasure to introduce Dr. Schecter as the first speaker.

Mr. LANTOS. Before we hear from Dr. Schecter, may I ask Dr. Dov Pasternak to join the panel. Please proceed, Dr. Schecter.

STATEMENT OF YOEL SCHECTER, DIRECTOR OF ADVANCED PRODUCTS, LTD., BEN GURION UNIVERSITY OF THE NEGER

Mr. SCHECTER. Well, I don't have to introduce myself after that, but I would like to say in the beginning that I particularly share the concern of this committee for the problem of dissemination of the information on the cooperative and constructive features of this program to both the people of Israel and Egypt.

I think this is extremely important in view of the images that people of each country share as to the people of the other nation. This is a distorted image and one which this program should correct as far as possible.

I believe that in time that this program will be judged as much by its social and political impact as by its scientific excellence and its scientific achievements.

However, this dissemination of information must be done at the proper time in a suitable fashion and it should be mutually consented and agreed upon between both sides of these programs, all sides to these programs, in fact.

I think we are making slow progress on this. One feature that I would like to mention is that at the recent Caylor steering commit-

tee, we did agree upon producing a video show and we hope that this will be done properly and to the agreement of all parties.

Now, I think we should view our present program as a model, as a prototype and not as a finished product. We are now ready, in my opinion, to take this prototype and expand it and bring it up to production levels. I won't say mass production, but certainly we must expand this program considerably if because the more people we have involved in it, the easier it becomes for us to disseminate information on these programs.

I think this is the important point. The larger the programs, the more people involved, the easier it is to give this more publicity. The number of programs we can give is great.

However, we are faced with many problems. We must find money for it. We must find a colleague in the other country. The criteria are very difficult to meet, both scientifically and from the point of view of the regional cooperation.

I see my time is up. I wanted to expand this point, however, I will limit myself to that.

Mr. LANTOS. I appreciate your being sensitive to our time constraints because we will need to finish with this panel in about 10 minutes.

I would like to call on Mr. Merdan, Director of Ain Shams Research Center.

STATEMENT OF ADEL MERDAN, DIRECTOR, AIN SHAMS RESEARCH CENTER

Mr. MERDAN. Mr. Chairman, my name is Adel Merdan. I am Director of the Ain Shams Research Center for research and training on vectors of disease and Professor of Microbiology within the regional project on vector bone disease.

VECTOR BONE DISEASE PROJECT

I have been asked to address the future of regional cooperation but I will confine my comments to the future of the vector bone disease project.

As noted by Dr. el-Said, the principal investigator, an existing framework research between Egypt and Israel has been developed. The opportunity now exists to build and expand on this structure within the spirit of regional cooperation.

As previously noted, two new diseases have been added last year to the program, and they seem to be completed, the virus research laboratory at the Ain Shams Center will allow in-depth studies of a wide range of infectious agents.

The future also allows for expansion into other important diseases, such as respiratory and diarrheal diseases in both Egypt and Israel. The future should also allow expansion regionally. Scientists in Sudan and Turkey are already discussing the possibility of joining in the program.

Finally, the next five years will see the maturation of a whole new generation of young scientists in both Egypt and Israel. These scientists will have been supported to a great extent with project funds, research in project laboratories and will soon begin their careers.

It is this new generation of young scientists in Egypt and Israel with whom peace will depend. It is on young scientists that our hope in the persistence of peace we must trust.

Thank you, Mr. Chairman.

Mr. LANTOS. Thank you very much.

I would like to call on Mr. Mohammed Darwashi.

STATEMENT OF MOHAMMED DARWASHI, MEMBER OF THE KNESSET AND DIRECTOR OF THE PARLIAMENTARY OFFICE

Mr. DARWASHI. Mr. Chairman, Honorable Congressmen. At the beginning I would like to express my appreciation for being here.

COOPERATIVE DEVELOPMENT

My position for cooperative development, as an Israeli-Arab, whose person who is representing people from the street, I would like to put this whole thing in perspective.

As I said, yes for scientific cooperation, yes for this program, but this program is not the solution to the Middle East.

We do not think that we are going to solve the Middle East problem by this program alone. That doesn't mean that we should put it on hold. Definitely we have to expand it, but we have to accompany it with a few other programs such are presented by different groups and organizations that are left outside of this whole program.

The problem back home is between people, not between scientists. The problem is how to make the masses start thinking about coexistence and having it as an option for them. In other words, how to stop actions of violence against such as these scientists that are putting their lives as a target for their cooperation. Americans are also getting also, as peacemakers in some instance, people that are working to—how to save their lives. This is the question of the Middle East now. This is the realm we should start targeting in our minds.

And here, Mr. Chairman, I recommend looking back at you, comments about publicity of this program which has been discussed in this whole conference and has been pushed aside. Nobody wanted that.

A feeling for frustration from people and this frustration is the action of violence. Living in the groups such as Israeli-Arabs, outside of this program, is the only group that might serve as a bridge for peace between the Arab world and Israel. We have identity from both sides. We are Israel from one side and we are part of the Arab Palestine people from the other side. We understand both sides.

This bridge can serve peace just to strengthen and support it, and I think this committee has to take very, very notes about this direction. Neglect leads to resistance. For this program, in the public opinion, with the people that are going to accept this program, if we are going to build fields and trial tests somewhere someone is going to get the—these places that we are fishing in, they might not be there because somebody will think that this cooperation is not good.

How to get these things? I think I have some answers how to get to these masses. There are a lot of programs for reconciliation between Arabs and Jews and I think this program has to be supported.

I have a long, long list of organizations, but I don't want to get into it now, a list of organizations that are walking in this direction with great success. It is proving its success every single day. It is stopping extremism. It is stopping violence.

Because of this program, more and more people are becoming committed to peace and active in it. If we don't support these groups, what is left? We have the program. We have the facilities. We have people organized. We have organizations. We have people lobbying inside the Government in Israel, led by the Minister inside the Prime Minister's office. I am not speaking in a vacuum here. It is very, very well organized and we should start taking care of it.

The AID defines cooperation development projects between Israel and one or more Arab neighbors. We are part of these neighbors as well as we are part from within Israel and I think we deserve to be put in that direction.

To sum up, I think peace process is not just one thing. I think peace is a process that has to be made. To put this program at one shot, that is not going to serve peace. To put this program as something that we did today and we went to a conference for three days and finished it and went home without follow-up, that is not going to serve peace.

We have to get people to know about it. We have to get students involved in it, students exchange.

Thank you.

Mr. LANTOS. Thank you very much.

Dr. Pasternak.

STATEMENT OF DOV PASTERNAK, BEN GURION UNIVERSITY

Mr. PASTERNAK. Thank you very much, Mr. Chairman, and before I present my small presentation, I would like to second the previous speaker in the fact that is it my true belief that Israeli-Arabs should be involved in the cooperative project between Egypt and Israel with an overview of making peace between the two nations and in addition view to the future to bridge also between Israel and other Arab neighbors which surround us.

I would like to clarify a few conceptions that exist here in relation to the goal of this exercise that we are involved in.

We have heard here about scientist exchange, papers, solving scientific solutions, et cetera, but this is not the real goal. The real goal of this exercise is one and very simple. It is to rectify the peace treaty that was signed in Israel and Egypt and to make it work.

In order to do that, there is only—no, there are many ways, I am sorry—but one of the ways that is, I believe, the most important one, is to serve the people of Egypt and Israel, and that it would pay them better in the long run to cooperate rather than to fight each other.

And therefore I believe the targets of this project that we are all involved in should be geared towards making of projects that will show the people in our two countries that what we can achieve in cooperation is much greater than what we can achieve in war.

Another point is a little bit of clarification about scientists and scientist participation. All the projects that we are now involved in this cooperative program between Israel and Egypt are problems of utmost applicability. We are scientists. We are dealing with scientific topics but the input in applicability.

In the project of agriculture, what we want to achieve is development of the Negev Desert. On the one hand, development of the Delta, development of the agriculture in the Alexandria area, in the area of the western desert.

In the project of health, we want to improve the health situation in Israel and in Egypt.

In marine biology, this is not just plain research, this is production of fish for food for feeding people. This is prevention of erosion of the Egyptian coast. This is all based on science, but it has a definite application to the people of the two countries, and last of all, firming of what I just said now, the visibility since we are trying to deal in our very small way in improving the life of the people in the two countries, it is important to have the visibility of this project shown.

A main constraint for showing visibility is like the previous speakers say, the fear of the participants which are fearless for their own physical and not just physical but also disability of handicapping of other activities that they are doing.

There are ways and there are means that we can and we should make this thing visual. And I think—and the last word, after the yellow light went on—I think that there is only the cooperative projects between Egypt and Israel are almost the only success that has been going on since the signing of the peace.

I think the emphasis, we are able, and by we I mean mostly of all, the United States Government and the people that are participating in the project, to show a mechanism in which we can cooperate and expand and rectify the peace. It is of utmost importance to increase it and to expand it.

Mr. GILMAN [presiding]. Thank you, Mr. Pasternak. I want to thank the entire panel. We have a limitation of time; we were supposed to wind up by 11:00 and for that reason I am going to ask our remainder of our questioners and witnesses to be as brief as possible.

We have three documents that have been offered for the record. A document entitled Our Common Ecosystem Intrinsically Calls for Cooperation, a Statement by Professor Sam Pohoryles, dated May of 1986, a statement entitled Patterns of Agricultural Technology Exchange and Cooperation in a Similar Ecosystem by Dan Yaron from Hebrew University of Jerusalem, and a statement by the San Diego State University Foundation, all have been submitted for the record.

Without objection, I will make them part of the record. If there is no objection, they are admitted to the record.[1]

[1] See appendix 1.

Mr. Darwashi had mentioned some projects that he had in mind. If you could submit any specific projects that you have in mind and submit whatever organizations you believe might be available for some funding and sponsorship of these programs, we would like to make them part of the record, Mr. Darwashi. If you could submit that following the hearing today, we will make them part of the record at this point in the record.

Mr. GILMAN. Does the gentleman from California, Mr. Waxman, have any questions?

Mr. WAXMAN. Mr. Chairman, I have no questions. I just want to commend the members of this panel for their insights and their suggestions as to how to make these programs even more successful.

Mr. GILMAN. Thank you, Mr. Waxman. If any of the panelists have any ideas on how these programs could raise more funding from the private sector, we would welcome those suggestions being put in writing so that we can make them part of the record as well. And without objection we will make that part of the record.

Mr. GILMAN. At this time we would like to call our final—

Mr. EL-ASSAL. Sir, following your suggestion, we have some ideas for a speaker that is supposed to appear on this panel. He has some comments here and we would like to submit it.

Mr. GILMAN. Yes, would you identify yourself?

Mr. EL-ASSAL. My name is Mohammed el-Assal, the coordinator of the Caylor program.

Mr. GILMAN. Without object we will make that part of the record if you will submit it to the clerk, please.

If there are any additional papers that individuals would like to submit, please submit them to the subcommittee. We will keep the record open and make them part of the record.

Again, we thank these offers of material and recommendations. They will be very helpful to the subcommittee.

HISTORICAL BACKGROUND OF REGIONAL COOPERATION

Mr. ONTELL. I would like to make a brief historic note. In May 1979, seven years ago, President Sadat and Prime Minister Begin met, and the subject of discussion was how to work together in the desert.

It was Sadat's suggestion that since both countries had enormous experience in living in very dry land that one thing they might work on together was to push the process of research in this area for the common benefit of both countries. And this got international publicity. This is on the publicity questions that have come up today. There was no effort on anybody's part to hide it.

Number two, the figure for doing this was set at $100 million and nobody objected and thought it was too much or too little. That is in reference to how efforts, at what level efforts of cooperation should be funded in comparison to what we do today, which represents one-twelfth of one percent of the total budgets that we allocate to Egypt and Israel annually.

Mr. GILMAN. Thank you, Dr. Ontell.

Mr. DARWASHI. I think one more point that I want to add which is the participation of Palestinians from different groups from the

West Bank, and that are part of the Middle East and I think we have to recognize the serious problems.

Mr. GILMAN. Thank you, Mr. Darwashi. Again, we thank the panelists for taking the time and presenting their exper testimony today.

I now call the fifth panel, Dr. Gerald L. Kamens, Director of the Office of Middle East and European Affairs, the Bureau for Asia and the Near East in the Agency for International Development. Dr. Kamens, would you please summarize your statement, since we are running into a time constraint.

STATEMENT OF GERALD L. KAMENS, DIRECTOR, OFFICE OF MIDDLE EAST AND EUROPEAN AFFAIRS, BUREAU FOR ASIA AND THE NEAR EAST, AGENCY FOR INTERNATIONAL DEVELOPMENT

Mr. KAMENS. Thank you, Mr. Chairman, Mr. Waxman. I am Director of the Office of Middle East, Europe and North Africa Affairs. I have no prepared statement.

I can add very little to what has been said on the scientific developments here. I am prepared to answer your questions on budget, publicity or anything else you have, but I would like to make a few very brief remarks about the cooperative and human aspects of this program.

The people who have been in this program, I have come to know as associates and friends and certainly they have come to know each other as professionals.

I have seen them come together in conferences when they have never met another Egyptian or another Israeli, they have come to know each other and respect each other as professionals, as people, they come to visit each other, go in each other's homes.

It is a very fascinating experience for them and for me a very moving experience. We intend to continue to support this program. It has had its ups and downs politically, periods of euphoria, periods of downs. It has been a good partnership between us and with you and we want to do all we can to support this program, and I will be glad to answer any questions you have.

FUNDING FOR THE PROGRAM

Mr. GILMAN. An immediate question is what offer of additional assistance do you have, having heard all of these worthy statements today?

Mr. KAMENS. Frankly, as I have pointed out to some of these gentlemen in the last two days, we spent only $25 million since this program started and several years we had to turn back money, not to the Treasury, that is, we didn't have projects.

It may be, sir, that for the first time, in fiscal year 1987, we will have more good projects than we have money. I don't know. I talked about this with Peter McPherson yesterday when he was here.

As you know, we had to cut the program this year. We did not cut individual projects 50 percent. That was an unfortunate miscommunication, but we were able to work with each of the ongoing

projects and we got their agreement that we could give them IOU's to stretch out their project for fiscal year 1987.

In the next fiscal year we have a mortgage of about $3.8 million. If we get the $5.8 million that we are requesting from you, we will have $2 million for new projects.

The only new project, frankly, sir, that I am aware of and has been mentioned today are from NIH and one on nutrition. We have not seen these. I appreciate the enthusiasm of the people working with us. These projects have not come to us formally. They have been discussed with us. They can come to us tomorrow if they want and we will take a look at them, not for funding this year but for funding next year.

We will have $2 million. I don't know what their projects will require. I would imagine the first year funding for those projects will be several million dollars.

PRIVATE SECTOR SUPPORT

Mr. GILMAN. What is the possibility of getting some more support from the private sector to help supplement this budget?

Mr. KAMENS. We would like to see it. We would like to see other countries involved as well. I am not sure what AID could do. I think it was mentioned to the administrator of AID yesterday. I have no specific ideas, but we intend to look more into what we can do.

We know that there are Jewish-American and Arab-American businessmen in this country who are interested in helping the peace process. We think that they may be willing to contribute to this activity.

Mr. GILMAN. Isn't there a bureau within your agency for private sector support?

Mr. KAMENS. There is a private sector bureau. It is doing something in Egypt. It is doing something in the West Bank where we are starting private sector activities. It is possible, if that is what you are suggesting, that they might be able to use their contacts and even put some funding into this, but we have not explored this and I couldn't make any commitment.

Mr. GILMAN. I would hope you would explore that. I think that these programs are certainly worthy of attention by that bureau and I think it would be extremely helpful to supplement their budgets.

Do you have any reaction to Mr. Darwashi's comments?

Mr. KAMENS. I am very interested. I have met him and talked to him. I haven't seen his specific proposals. I understand his frustration.

This is a very small program we have. It has been very successful. We cannot run the whole Middle East peace process through this very small program. We are doing our bit and our colleagues are. I would like to see his proposals and see what he has in mind.

Mr. GILMAN. Thank you. Mr. Waxman.

REDUCTION IN FUNDING

Mr. WAXMAN. Thank you, Mr. Chairman.

Mr. Kamens, I am pleased that you clarified that the cut was not 50 percent of each program, but there was a 50 percent, close to 50 percent cut in this particular overall program in 1986, and I could never understand why that was the case when the Gramm-Rudman law required a 4.3 percent cut across the board. Can you explain that to me?

Mr. KAMENS. I will try, as best as I can.

You have heard Mr. McPherson tell this committee and others of his agony. The agonies are not just Gramm-Rudman cuts. The agonies were that the request we made to Congress for the ESS program in fiscal year 1986, what we got finally from the Appropriations Committee was several hundred million dollars less.

A number of cuts had to be made in my office alone, and I handle a number of Arab countries. Our Jordan and Oman programs were cut by 50 percent. The cuts were not made primarily for Gramm-Rudman sequestering purposes. They were made because we had more candidates for money than we could fund.

We agonized over this. I didn't like this particular cut, I can assure you, in this program, but because we did not anticipate new projects, and we still have not had new projects this year, whereas in many of our other programs, we were also fully programmed, we felt we could work out with our four ongoing projects, which we did, an agreement.

In the case of one of them, NIH, since it was the last year we fully funded them. In the case of the USDA project, we discovered that they had been funded late in the previous year, did not, fortunately for us, need any new money. In the case of the San Diego State University Caylor Project, we cut them by 12 percent, and the case of marine sciences, who took the biggest cut and was very cooperative with us in postponing activities until next year, we had to cut them, I think, about 30 percent.

But all of our contractors, though unhappy about it, has said they could live with it. We certainly have assured them we will try to restore these cuts in the next year. But it is true. There is a 50 percent cut in the overall program, most of which was translated into the fact that we could not finance any new projects.

Mr. WAXMAN. Now that 50 percent cut, was that because other programs were earmarked and this was not earmarked?

Mr. KAMENS. To some degree. That is, as Peter McPherson has said, 70 percent of the ESF programs are either earmarked, or large programs such as Egypt and Israel, much smaller programs such as Cypress. The remaining 30 percent, when the cut comes, that is, when the Congress cuts our programs, we have to make reductions somewhere and a number of unearmarked programs were cut and this was one of them.

Mr. WAXMAN. This program becomes vulnerable because it was not singled out the way others are.

Mr. KAMENS. As does every other unearmarked program.

ROLE OF AID

Mr. WAXMAN. Now, let me ask you, you talk about no new projects or a limited number of projects that have come in and are requesting funds. Why is that the case? This is a successful pro-

gram. Is it because AID is not reaching out to encourage more applicants to come in and take advantage of the kind of regional cooperation that Congress intended?

Mr. KAMENS. I will try not to give you a self-serving answer. I don't know about publicity. We discussed the last few days, this is one of the things we wanted to see come out of this conference.

I think there is some differences, as has been made clear between the Israelis and the Egyptians on the amount of publicity.

It is quite possible AID should do more, but to the best of my opinion, and I have talked to a lot of people about this, the pace of projects coming to us for approval does not depend on our funding level, particularly, does not depend on publicity. It depends, frankly, on the overall status of the Egyptian-Israeli political relations. That is what we understand.

Mr. WAXMAN. Mr. Kamens, I want to thank you for your testimony and the work you have done in this area. I think you have done an outstanding job and we want to work with you to make this program even more successful than it has been in the past, and to make sure that the funding levels will be there so that those who are working in this area will know that we stand behind the commitments of not only one year, but year after year for their efforts.

Thank you very much.

Mr. GILMAN. I thank the gentleman from California, and I want to assure the gentleman I will be working with him in that direction, as well, and with Mr. Kamens.

OTHER SOURCES OF FUNDING

Mr. Kamens, just one more question. Are any projects funded by any other nation or international agency besides our own AID?

Mr. KAMENS. In regional cooperation?

Mr. GILMAN. Yes.

Mr. KAMENS. Not that I am aware of. Not any public project.

Mr. GILMAN. Is any joint research in general funded by any other?

Mr. KAMENS. Involving Israel and Arab countries?

Mr. GILMAN. Yes.

Mr. KAMENS. Not to my knowledge. My colleagues back here might know. I am not aware of it.

Mr. GILMAN. And is there anything that we can do to assure the continuity of these research projects so that they won't be confronted with short-term funding commitments?

Mr. KAMENS. You mean a current ongoing activity?

Mr. GILMAN. Yes.

Mr. KAMENS. I should add one point. We love these projects. They are very good. But we would like to see some new players, too. We would like to see new people, new institutions. We want to broaden the circle of Egypt and Israel. We think that is the purpose of the program.

It is not our intention, frankly, to perpetuate the existing programs indefinitely. They can compete with new projects. If you give us the funding we need and if our program is not cut as horren-

dously as has been this year, we want to do the best we can, and I hope to see the program expand.

Mr. GILMAN. Thank you, and I thank you for appearing before the committee.

At this point in the record, I would like to introduce a letter that was directed to Mr. McPherson in regard to the further funding. It is signed by my colleague from California, Mr. Waxman and myself and a number of our colleagues in the Foreign Affairs Committee and throughout the Congress, and the response by the Agency for International Development, dated May 5, 1986, and without objection, they will be made part of the record.

[The letter follows:]

Congress of the United States
House of Representatives
Washington, D.C. 20515

April 7, 1986

Mr. M. Peter McPherson
Administrator
U.S. Agency for International Development
320 Twenty-first Street, N.W.
Washington, D.C. 20523

Dear Mr. McPherson:

As members of the House Foreign Affairs Committee, the House Appropriations Subcommittee on Foreign Operations, and other interested Members of Congress, we write to you and Secretary of State Shultz today out of deep concern for a small but important program. It is your Asia/Near East Bureau's Middle East Regional Cooperation program.

For the last five years, this program has catalyzed and funded a variety of joint projects among Egyptian, Israeli, and American scientists and institutions. It has slowly and with little fanfare grown into an outstanding success--despite the serious strains that events have placed on Israeli-Egyptian relations over that period.

The four major projects in this program--in epidemiology, oceanography, and arid zone agriculture--have produced impressive science. For example, scientists in the epidemiology project quelled an outbreak of leishmaniasis in Egypt in 1982. An arid lands project has developed a strain of tomatoes suited to the brackish, saline water so common to the region. Another has engineered a high-protein strain of fodder for sheep and goats that thrives on dryer land than any previously known strain. The marine science project has stocked lakes with new strains of fish that eat deadly weeds.

Despite these tangible technical achievements, we believe the non-scientific facet of the program is at least as important. After 30 years of complete scientific isolation between Egypt and Israel, the program has brought together approximately 1000 scientists from the two sides. Many warm, personal relationships have developed among them. That is the kind of progress on which real peace is founded; unlike a peace treaty, it can never be subverted or abrogated.

We write to you now because AID has recently announced it will not fund the program at $5.8 million for FY '86, as it originally planned, but at only $3 million, or $2.89 million after the first round of Gramm-Rudman cuts. This cut means not only that worthy new projects must be shelved, but that the continuity of on-going projects, so vital with scientific research, will be broken.

We do not understand this action, especially in light of your assurance in a letter last fall to Congressmen Hamilton, Gilman, and Waxman that you would make every effort to reserve $5.8 million for the program. We know that Middle East Regional Cooperation competes for funds with many other useful AID projects. We also understand better than anyone the budgetary situation this year. But for the following reasons, we believe this cut is unwise.

First, since Camp David, Egypt and Israel have become the highest priorities of the U.S foreign aid effort. The purpose of our generosity is to try to persuade these nations that peaceful relations are more advantageous to them than hostile ones. Yet of all the aid, this small program is our way to demonstrate the enormous benefits of cooperation.

Second, the program is the only component of our aid to Israel and Egypt aimed at building a long-term foundation of peace, rather than simply providing a short-term pay off to the two governments. The benefits of this investment will long outlast the program.

Third, despite its advantages and achievements, this form of aid accounts for a mere one tenth of one percent of total aid to Egypt and Israel. This percentage is arguably too small, so it seems especially inappropriate now to cut the program in half.

Fourth, as you know, this is a fragile and sensitive time for Middle East peace. After a long period of back-sliding after Camp David, Egypt and Israel may be moving forward. Scientists from several other moderate Arab nations have recently approached project participants about joining on a quiet, unpublicized basis. This would provide the beginning of a structure to support region-wide peace efforts. Given the fluid and delicate climate, we believe cutting regional cooperation now and undercutting participants who have taken risks on its behalf is misguided.

Finally, we believe the program's record as an effective tool for advancing U.S. interests indicates that its approach could be tried in other regions where the U.S. enjoys friendly relations with traditional enemies. If it were, this program would serve as an important model. It can hardly fill that function, however, while being slashed by the very organization charged with nurturing it.

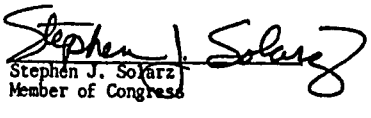
We respectfully request an explanation of the cut and an assessment of whether some or all of it can be restored. We also anxiously await your response to hearing questions from several of us regarding the integrity of the FY '87 budget request for this program. As several of us have indicated, without an explicit assurance on this, the likelihood increases that funds will simply be earmarked for the program.

We thank you very much for your attention to this matter and look forward to your response.

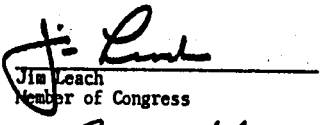
Sincerely,

Henry A. Waxman
Member of Congress

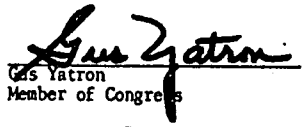
Benjamin A. Gilman
Member of Congress



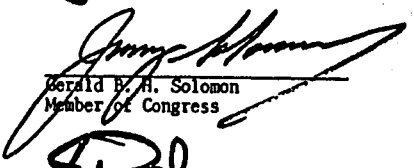
Stephen J. Solarz
Member of Congress



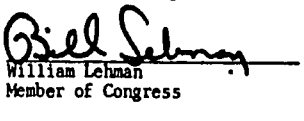
Jim Leach
Member of Congress



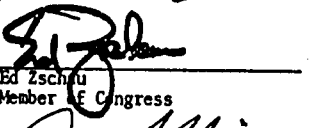
Gus Yatron
Member of Congress



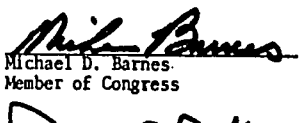
Gerald B. H. Solomon
Member of Congress



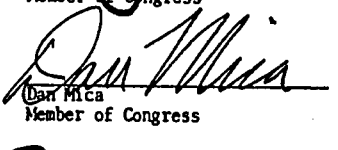
William Lehman
Member of Congress



Ed Zschau
Member of Congress

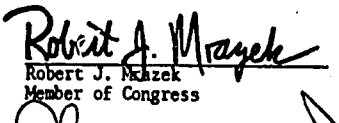


Michael D. Barnes
Member of Congress



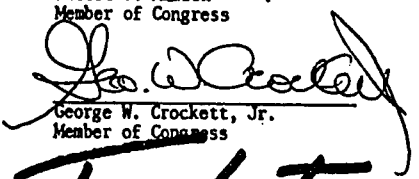
Dan Mica
Member of Congress

Julian C. Dixon
Member of Congress



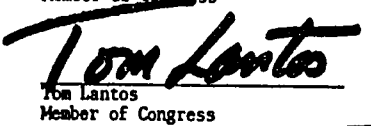
Robert J. Mrazek
Member of Congress

Howard Wolpe
Member of Congress

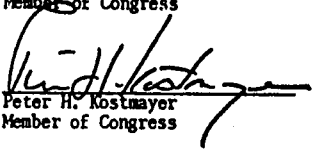


George W. Crockett, Jr.
Member of Congress

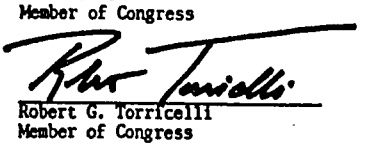
Mervyn M. Dymally
Member of Congress



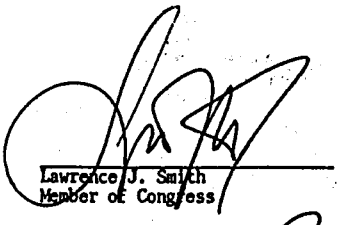
Tom Lantos
Member of Congress



Peter H. Kostmayer
Member of Congress

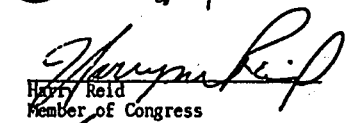


Robert G. Torricelli
Member of Congress

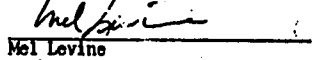


Lawrence J. Smith
Member of Congress

Howard L. Berman
Member of Congress



Harry Reid
Member of Congress



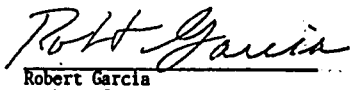
Mel Levine
Member of Congress

Ed Feighan
Member of Congress

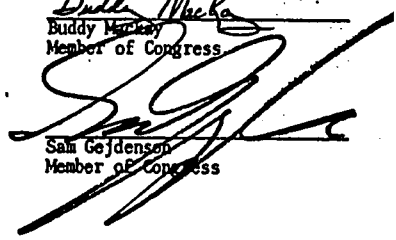
Ted Weiss
Member of Congress

Gary Ackerman
Member of Congress

Buddy MacKay
Member of Congress



Robert Garcia
Member of Congress



Sam Gejdenson
Member of Congress

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

May 5, 1986

THE ADMINISTRATOR

Dear Congressman Gilman:

Thank you for your April 7 letters to Secretary Shultz and me regarding the reduction in the Regional Cooperation program funding for FY 1986. I share your high regard for the program and its accomplishments, and for the excellent cooperation between Israeli and Egyptian scientists that has developed.

The main significance of the reduction in FY 1986 funding is that we will not have funds for new regional cooperation projects this year. I am sure you will understand our decision not to take funding from other ongoing ESF programs (all of which have been reduced in some degree this year) to support potential Regional Cooperation projects in the event that suitable proposals were received.

The following table breaks down the original request level and shows how the funding available this year has been allocated:

Project/Implementing Agent	1986 Request (000)	1986 Funding (000)
Epidemiology - National Institutes of Health	$ .528	$ .528
Arid Lands - San Diego State University	1.250	1.100
Marine Sciences - New Jersey Consortium	1.764	1.242
Technical Exchange - U.S. Department of Agriculture	.636	-
Small Grants - Embassies/Tel Aviv & Cairo	.100	-
Total - Ongoing Programs	4.278	2.870
New project activities	1.522	-
Total	$5.800	$2.870

The Honorable Benjamin A. Gilman
House of Representatives
Washington, D.C. 20515

The project implemented by NIH will be fully funded during FY 1986 for the final year of current project activities. In reviewing its budget for the agricultural technical exchange project, USDA found that it had sufficient funds to carry project activities into FY 1987, so this project was dropped from the FY 1986 funding list. The contractors for the other two projects have been advised of the funding available and have told us that it is acceptable and that no activities will be eliminated or seriously affected.

We strongly oppose earmarking funding for this or any other program. If the Congress approves the Administration's requested ESF budget for FY 1987, and another sequestering is not required, you can be assured that Regional Cooperation will receive the requested amount.

Earmarking is a particularly serious problem for this program because it is based on unsolicited proposals. While we anticipate having in hand a number of satisfactory proposals next year, we prefer not to be in a situation where we would be forced to accept proposals that do not meet Regional Cooperation criteria simply to fit an imposed dollar target.

The cuts in the Regional Cooperation budget were necessitated by the fact that the FY 1986 Economic Support Fund (ESF) appropriation is far less than was requested by the Administration. Recognizing the serious implications of making deep cuts in the Regional Cooperation and other ESF funded programs, we worked closely with our State Department colleagues in January to find a way to soften the blow. Our goal has been to meet our most important foreign policy objectives and to preserve successful ongoing programs.

Agreement was eventually reached permitting us to fund the overall Regional Cooperation budget at $3 million. The 4.3 percent reduction required by Gramm-Rudman-Hollings sequestering reduced the total available this year to $2.87 million. This amount is sufficient to fund program activities through this difficult year of budgetary

constraints for two reasons: (1) we have received no new proposals for worthwhile projects; and (2) most of the ongoing projects were funded late last fiscal year.

Your letter also mentioned that you were awaiting my responses to the questions received following the February 27 House Foreign Affairs Committee hearing. My responses were submitted to the Committee on April 8.

If I can be of further assistance, please let me know.

Sincerely,

M. Peter McPherson

Mr. GILMAN. I would like to note to our panelists that the transcripts of today's testimony will be submitted to you in the mail, giving you an opportunity to make any technical corrections you may wish to make, and the record will be open for a two-week period for any additional statements.

We are confronted with a Gramm-Rudman limitation of seven pages on any statements you may wish to offer, but please take advantage of that opportunity.

If there are no further comments, the hearing stands adjourned and we thank our panelists for their time and comments.

[Whereupon, at 3:25 p.m. the subcommittee was adjourned.]

APPENDIX 1

STATEMENTS SUBMITTED FOR THE RECORD

STATEMENT BY SANFORD F. KUVIN, M.D.

My name is Dr. Sanford F. Kuvin and I reside in Palm Beach, Florida. I am the Founder and the Chairman of the International Board of the Sanford F. Kuvin Center for the Study of Infectious and Tropical Diseases at the Hebrew University Medical School-Hadassah Hospital in Jerusalem, Israel.

Much has been written about the technical and financial assistance for health in the Middle East and other areas of the world through such world bodies as WHO, UNICEF, UNDP, The World Bank, and the many Private Voluntary Organizations and other International Organizations involved in international health. Very little, however, has been articulated about the distinct advantages or mechanisms of regional cooperative projects with regard to their immediate effectiveness on the health problems of the region, their pooling of complimentary talents, their cost effectiveness and their longer term impacts-medically, socially, economically and culturally. Because of a deep and genuine desire to cooperate in these regional projects, I do believe that we all feel that these projects have the ability to be a model for other regional cooperative projects in the world. It may not be just coincidental that Egypt developed the very first organized system of medicine several thousands of years ago, and that Israel through its Mosaic laws contributed to the first system of public health. Since that time, the world has grown to 4.9 billion people, with tropical and infectious diseases affecting over half this population with enormous medical, social, economic and political impacts. The world has certainly refined the original Egyptian system of medicine and the Mosaic system of public health, but perhaps it is time again for this region to show how to best use its finest brainpower in a complimentary fashion just as this project has done in these Regional Cooperative Projects.

To place medicine and the diplomacy of regional cooperation in the same equation is neither new nor novel. The diplomatic records of the ancient land of Egypt show that some 29 centuries ago, the famous Egyptian physicians of the Nile Valley accompanied Egyptian missions to neighboring countries to act as ambassadors. Over a thousand years later, it was recognized, during the Crusades, that Christian leaders appealed for Arab physicians, whose skill

was superior to anything Europe knew. This ancient connection between medicine and diplomacy reflects the fact that health even more than wealth is a prized commodity particularily at the national level. What we are really asking is whether there is a new diplomacy in regional cooperative and coordinative projects clearly based on the recipient countries priorities which creates a new role for the medical and related public health professions in both the donor and the recipient countries.

A distinguished Egyptian-Jewish physician was Moses Ben Maimon or Maimonides (1135-1204), otherwise known by the acronym, The Rambam. In his Book of Counsel, he includes a talk on the "worthlessness of riches" and the "importance of character". The importance of character is not to be disputed, but the worthlessness of riches is subject to heated debate.

It is the usefull and prudent application of the riches of the United States government, coordinating the enormous efforts of NIAID and USAID which makes regional cooperatiave projects, such as these, possible. In fact, the medical facts of life today necessitate a working relationship between the scientist, the politician, the diplomat, and fund giving organizations if improvement in regional and global health care is to be our true goal. We in these regional projects have been able to transcend national borders, for the common good. However, if we remain within the confines of academia, or if we take refuge from reality behind the privileges of our profession or appointments, we cannot hope to have a significant impact on future health in these regions. It is clear from all objective studies carried out by all international fund giving organizations as well as fund lending organizations such as the World Bank, that the economies of developing countries are directly related to their prevalency rates for tropical and infectious diseases. In actual fact, these tropical diseases cause more death and disability in the world than all other diseases put together. Investment in regional co-operative projects such as these prove to be extremely cost effective to both the donor and the recipient countries because a healthy work force contributes enormously to the gross national product and the economy of the two countries concerned, with enormous economic, political and social gains.

Egypt and Israel lie in a very central position geographically, at the cross roads between Africa, Asia and Europe. To the west, Egypt faces the Mediterranean and North Africa, while its southern border with the Sudan is an opening to Central Africa. To its east, lies Israel and the rest of the Middle East. In this unique location, Israel and Egypt have long shared common health problems, and are now experiencing a wave of new and reintroduced diseases.

Neither country is, as it were, vacumn packed, both have open borders, a Jumbo Jet arrives from other tropical countries every fifteen minutes, and the mosquito has a long flight path and is not capable of recognizing an international border when it sees one. In fact, viruses, bacteria and parasites need no passports or visas. Therefore, Rift Valley Fever, malaria, and leishmaniasis were chosen for this project because of the serious threat they posed to the inhabitants, the livestock and the economies of this region and because they were all transmitted by flying insects and because Rift Valley Fever and leishmaniasis may share common vectors and resevoir hosts.

The Egyptian epidemic of Rift Valley Fever in 1977 and 1978, unlike previous Rift Valley Fever outbreaks was of new and great significance. The high epidemic potential of Rift Valley Fever was recognized as a threat not only to this region and to its human health and economy, but also to the countries of the Eastern Mediterranean and Southern Europe. Indeed, the Rift Valley Fever story is a splendid example of all the energies of regional cooperation being harnassed in cooperation with world resources in a successful effort to prevent a pandemic occuring which could have had disastrous world effects.

Clearly then, the scope of our cooperation should extend well beyond this program. As a cooperative and coordinative venture, we are in place and functioning very well. Indeed, this initial cooperative venture should serve as a model and base for studies continuing well beyond the terms of this proposal. I know that all of you here today share with us and our colleagues the hope for continued success at regional cooperation and coordination in health, that will transcend national borders and affect all mankind.

Our Egyptian colleagues at Ain Shams University and the Egyptian Ministry of Health have not only become good friends and co-workers over the past five years, but they have demonstrated their capacity to share in the benefits of their excellent work with the Kuvin Center scientists and their co-workers at the Hebrew University of Jerusalem and the other Universities and ministries, which will certainly benefit the entire region enormously, and will also transcend national boundaries. Clearly, this sharing of regional brainpower in a complimentary fashion will have clear cut medical, economic and social benefits and should act as a model for other such regional projects utilizing this splendid formula for cooperation and coordination.

Today, we are not only pleased with the sharing of talents between these nations, but I know we all would like to thank the United States government and its cooperating agencies for allowing this historic project to take place.

Statement of PROF. SAMUEL POHORYLES

Mr. Chairman, Ladies and Gentlemen

Distinguished Colleagues!

This unprecedented and hope raising workshop, has attracted us, people of vision and goodwill, to come here from the Middle East and from the American Continent and to lend a hand, put together our heads and open up our hearts to a worthy cause, conducive to peace in that part of the globe, which needs nothing more than a peaceful and productive future, for the welfare of those who inhabit this area.

Our contribution toward this end, is this workshop, in which we shall discuss and strive to promote and to encourage a mutual development cooperation in the Middle East.

I have had the great honor and privilege to be involved personally in this theme since as far back as 1973(!), 4 years before the historic visit of the late President Sadat to Jerusalem and before the Camp David Agreement, which was designed to orientate the Middle East towards the much desired goal of peace (till now, alas, only Egypt and Israel).

In a chapter "Israel's Agriculture in the Regional Context of the Middle East", of my book, published in 1973, I analyzed the economic significance of peace, including an "utopian" in those days call, for the establishment of a Middle East Common Market. The ideas brought to light in that book, were discussed later at a meeting with the late President Sadat at his Abou-El-Kum home. That meeting, incidentally, was also attended by President Moubarak (at that time - Vice President). Another two useful talks with President Sadat took place later, and in the course of those meetings, the problem of agricultural strategy was discussed.

Ladies and gentlemen,
Our common ecosystem, and its arid or semi arid character, quite naturally, demands the highest possible degree of cooperation between all those who inhabit the area. Ours is mostly a desertic region and as such, requires the full application of human thought, inventiveness, the exchange of know-how and joint efforts in

extensive development projects, which could convert this inhospitable and foreboding desert into fertile, green fields.

The ancient histories of both Egypt and Israel, are replete with references to agriculture as a source of national pride and as an important instrument in international relations. I am referring to times as far as 5000 years ago, long before Colombus undertook his historic voyage to discovery, thanks to which, we find ourselves right here, right now.

The Old Testament tells us that Jacob and his sons received a great amount of wheat from neighboring Egypt, even though that country was in the throes of a horrible, merciless draught. On the other hand, upon his arrival in Egypt, Joseph offered his unique talents and capabilities to Pharaon, King of Egypt.

How would we call the above in our modern technology! Of course your answer is correct, ladies and gentlemen. The Egyptians and the people of Israel have in those days engaged in mutual cooperation in development, through the exchange of mutual experience and ideas.

Five thousand years later, the formal, legal and institutional infrastructure for cooperation, was expressed in a Memorandum of Understanding, signed on March 24, 1980 between the Ministries of Agriculture of the Arab Republic of Egypt and of the State of Israel.

Mr. Chairman, with your permission I would like to mention two axiomas or quasi axiomas related to general development cooperation strategy.

1. The first: Food shortage in developing countries (and in the other extreme food overproduction-explosion) - in its essence is not a natural disaster. Food shortage is not even a problem of agricltural potential capacity. In a short term view it is a problem for politicians and policy makers - it is a problem of agricultural philosophy.

   In the long term however, it is a T.T. problem, transfer of technology, progress of agrobiology, genetic improvements, planning and organization, and above all, a human factor and a human problem.

2. The second: Even in less favoured areas, a significant agricultural emancipation and a relative agrobiologic and technological independence could be reached, by creating by means of research, a new "factor mix" of the agricultural input basket: - increasing

the share of intellectual investments as a dominant production factor.

3. Not less important is the process of optimization of the crop structure. Compensation in this case may be attained by finding a basket of crops that, on one hand, meets the domestic and export demand - and on the other - makes the best use of production factors - land, water, capital,etc.
It seems to me, that we have to consider a different approach to selfsufficiency: not a physical autarkia but an economic self-sufficiency.
If through research we are able to develop a relative advantage for some crops or livestock products - their export will permit to pay the complementary import.

Mr. Chairman, research and technology-oriented agriculture is no longer a stepdaughter of nature (the generally accepted traditional view was, that agriculture is nature's stepdaughter and a favorite child of governments).
Research oriented agriculture copes fairly well with nature's hardships, whereas contemporary governments' affection cannot be taken for granted.

It seems to me that the Memorandum of Understanding (we in Israel call this document 'The Green Agreement') expresses very well this strategy well in its five modalities of cooperation:

The parties have come to an UNDERSTANDING as follows:

1. Joint project identification and preparation
Each party may suggest the development of a project for possible cooperation involving in the first phase a joint appraisal of potentials and problems to be solved.

2. Joint activities in operational projects.
Both parties agree to cooperate in implementing operations projects for which the parties have competence and experience. Such projects may then be considered initial phases of a pilot or pre-development character.

3. Joint applied research programs.
Recognizing the research skills and experience of both countries the parties agree to undertake joint research programs in fields of mutual interest, including the exchange of scientists, joint seminars and symposia and exchange of research information.

4. Extension and transfer of knowledge
Recognizing the importance of extension methods and transfer of technology to reach the farmer, both parties agree to place emphasis in cooperating to develop new approaches in transfering know-how and skills.

5. Exchange program and training fellowships
Both parties agree to arrange training facilities offered by the respective international training and fellowship agencies in each country.

The outline of the previously mentioned five modalities are contained in the Annex of this Memorandum which constitutes an integral part of the Memorandum of Understanding.

Implementation:

1. For the implementation of this Memorandum, a Joint Commission will be set up within which professional work-groups will elaborate detailed plans of cooperation for each sphere of activities mentioned.

2. Bearing in mind the fact that some additional subject of mutual interest such as irrigation, land reclamation, regional development, etc. do not always fall in the competence of the two ministries, it is agreed that each party will offer its good services to coordinate and initiate relevant contacts for a wider coverage of subjects of common interest.

This Memorandum of Understanding will enter into force upon signature of both parties and its implementation will be in accordance with the laws and regulations prevailing in each country.

Following the signature on the Memorandum of Understanding, the implementation of the different aspects of this Agreement began.

In a retrospective balance of the last 6 years, we find today the following "state of art":

a) Two trilateral research projects:

1. Development of Arid Zones - CALAR, successfully in operation for 4 years already and conducted jointly by the Ben-Gurion University, San Diego State University Foundation and the Egyptian Ministry of Agriculture; and

2. A more recent project (second year) - Patterns of Agricultural Technology Exchanges in a Similar Ecosystem - administrated by the USDA and operated by the Faculty of Agriculture of the Hebrew Unitersity and the Egyptian Ministry of Agriculture.

My friends Harry Albers, Dov Pasternak, Dan Yaron, Adel El-Beltagy, David Kincaid will tell us about these projects and probably, in far greater detail. I would only like to stress that the trilateral projects have created an internal dynamics of scientific and personal relations in the whole complex of the mutual cooperation with Egypt; and it seems to me, that in this field a deep and irreversible infrastructure was formed, which will lead to the extension and acceleration of the entire process.

b) In addition to these two great projects, a 4 years cooperation in development of the GEMEIZA farm based of modern agricultural technology exchange continues - and a few months ago an additional agreement was signed for the development of a sophisticated high genetic seeds farm in the Nubaria districted, based on the contribution of genetic engineering to introduce high yielding varieties of vegetables and other crops.

c) Another item also belongs to the field of cooperation and namely the introduction of Israelheifers for the development of a modern dairy farm in the Salhia Region, and based on a milk production which is one of the highest in the world.

d) Joint seminars were held on the subjects of soil, water and vegetables (as well as the transplanting of some varieties of vegetables to Nueiba in Sinai). The preparation of a World Congress on Citriculture with the active cooperation of Israel and Egypt is now in progress.

e) I should like to mention, that during the last year we experienced a significant increase in technology and knowhow exchange activities. Israeli experts are at present, engaged, together with their Egyptian colleagues in diagnosticating and overcoming of the Fireblight disease of pears in Egypt.

f) An Egyptian group of cotton experts is now expected in Israel to jointly consider the possibilities of cooperation in cotton trade, based on the impressive achievements of Egypt in that field.

g) Various additional patterns of development cooperation, started recently through private channels, including equipment, inputs intertrade, field crops, poultry, etc.

Indeed many joint projects were under consideration and some were actually about to be initiated. I refer to the Maidan Fayun Project, product of President Sadat's initiative. The Project had been put under the care of the Minister of Rural Communities and its object was to be the development of agriculture and agroindustry in the area.

Negotiations lasted a few months and visits by experts in irrigation, soil and marketing, etc. took place. For reasons, none of which were professional, nothing came of this venture.

Another Project, also promoted by the initiative of the late President, was the Farafra Project, which was given very serious consideration. After a preliminary exchange-of-views meeting, which took place in the President's office with the participation of the then Minister of Foreign Affairs, Mr. Kamal Hassan Ali, it was decided to visit the area of the proposed Project. Mr. Hussni Moubarak placed at our disposition his private aircraft towards that end, the project area being located in the Western Desert, some 1,000 km from Cairo. In spite of very intensive activity, this project as well did not materialise.

Yet another project, in fact the very first one to have been considered during the first stages of peace relations between the two countries, was the "SALHIYA Project". President Saadat was personally involved in this project and the then Prime Minister, Mr. Mustafa Khalil was given the executive responsibility. The investment in this Project was to be to the amount of $3 billion. The detailed plan for the Project was prepared and presented to the President.

Furthermore, a possibility of cooperation in an intograted export marketing system, through our export company Agrexco, was thoroughly discussed.
Another project considered, was the possibility of joint development ventures in third countries.

What I want to say, is that in the primary idea dimension, various possibilities and options were considered on a wide range of subjects, many of them quite bold ones. A great part of these project ideas were found entirely feasible and funds were obtainable for their implementation.

The fact, that the Projects were after all not undertaken, did not stem from reasons, which could be in any way related to the nature of these potential ventures...

It should be pointed out, that the areas of cooperation referred to above, are far from encompassing all the possible potential for the strengthening of the agricultural relations, agro-industry, marketing and export, fisheries, regional development, irrigation, drainage, etc.

Ups and downs marked the period, following the signing of the Agreement, due to the influence of political developments. I must, however say that in the field of Agriculture, during these difficult times, a relative stability was kept in cooperation and even a slow but steady advance was achieved, thanks to the personal initiatives of H.E. Prof. Y. Wally, Deputy Prime Minister and Minister of Agriculture (former co-chairman of the Joint Agricultural Committee Egypt - Israel.)

At this point, I should like to tell you a curious but true story. In 1978, a short time after President Sadat's visit to Israel a nice lady television correspondent from Holland, on her way from Cairo

contacted me and asked about my opinon on a TV report she had prepared at the Egyptian Ministry of Agriculture. The filmed interview shows a meeting of the Heads of the Ministry of Agriculture discussing the future of Egyptian agriculture and the role of technology in overcoming crucial problems of food security.
There appears a person who eloquently analyses the needs of Egypt and says:"Egypt must switch quickly to the era of modernization - and beyond our border there lives a neighbour who excells in a developed and already world famous agricultural technology,so that instead of searching in distant places - a cooperation in such geographical vicinity would contribute greatly to the two countries." The speaker was no other than Dr. Y. Wally, then Professor of Ein Shams University and advisor to the Minister of Agriculture - today Deputy Prime Minister and Minister of Agriculture of the Arab Republic of Egypt. This philosophy guides his activities until this day, and found its operative and logistic interpretation in his prominent executive nomination.

With your kind permission, I shall now take the liberty to raise two subjects of a strategic nature, which, in my opinion, can contribute considerably to the promotion of development in the Middle East on the whole and of the relations with Egypt in particular.

1. The idea of a Middle East Common Market - even though it appears unrealistic today, may come true following a series of historical processes, if we prepare the foundations for it. Cooperation between Egypt and Israel concerning agricultural export was and is considered seriously and may prove the first step in this direction.

   The idea of a regional common market in the Middle East is not a new one, having already been conceived, more than a decade ago, by various Mideastern countries.

   The development of integrated regional agriculture brings us first of all to the question of the market for agricultural produce.

The idea of a Mideastern Common Market may be summed up in the following manner: Observing the benefit gained by the European Community through its Common Market, it would be quite reasonable to predict, that the introduction of a Common Market to the Middle East should bring about economic progress and prosperity for the entire region.

I well understand, that the entire subject is not feasible as yet, but then again, who thought in 1976, that a year later a new era would begin in the relations between Egypt and Israel.

I should suggest not to belittle the importance of phenomena originated in a deterministic way if we are to contribute to their breakthrough.

2. Egypt is located in a geographically strategic position in relation to Africa which is struggling with problems of food and agriculture.

It should be considered an idea to establish in Egypt an institutional, logisti. and technological storage center for solving food problems in Africa and to create there a technical reservoir of food security for Africa.

Israel can contribute to this noble venture with its knowledge, technology, organization and planning. The idea can be based on the technology of development of arid areas, as well as on achievements in science and research updated to the year 2000.

The relevant new technologies of increasing production are:

1) Genetic selection of crops (genetic engineering)
2) Water and fertilizers management
3) Crops pest control strategies
4) Development of controlled environment of greenhouse agriculture (to compensate land and water constraints).
5) Multiple and intensive cropping - multicropping
6) Bioregulators
7) New crops - conventional crops (tissueculture, aquaculture - desert crops, etc.).
8) Bioprocessing

10) Development of desert plants which withstand drought
11) Twinning - multiplying births in beef cattle

It seems to me that the problem of arid development - because of this scale and intensity - should be an important autonomous component of contemporary activity.

The immediate step to be taken for creating this center is to use the technology of grain storage for food transfer to Africa. The geographical location of the food reservoir in Egypt would also suit the characteristic of the environment and the climate.

Agricultural strategy in the third development decade must take into account the fact that in 10-15 years time agriculture will be totally different from what its is today - and the main problem, is the need to find such technological economic, social and institutional means, that will enable agricultural policy to shape the new form. This means comprehensive integrated development of rural areas, and Israel has accumulated a unique experience in development of less favoured areas.

Mr. Chairman, Israel is a classic example of unjust geographical distribution of natural resources.

Climatically, Israel is classified as a semi arid zone with an average annual rainfall of 500 mm. Over half of Israel's area receive less than 180 mm. precipitation.

One of the typical features of semi arid zones is lack of geographical proximity between two main natural production factors: land and water (water in the north, land in the south).

Let us recall that Middle East experts of FAO, have evaluated that this region, poor as it is in the fertile land and water, requires a whole generation (25 years) to double its food production. This is for example the case of Egypt.

During this same period of 25 years, one generation, the agricultural production in Israel increased twelvefold in real terms. This means an annual growth rate of 10% in very difficult natural conditions.

It seems to be an interesting antimalthusianic case of agricultural emancipation.

Finally a detailed list of subjects and fields of agricultural cooperation could be based on issues agrred during the Memorandum of Understanding negotiations:

1. Field and horticultural crop development Both parties agreed to cooperate in promoting field crops, vegetables, fruit, floriculture, spices and medicinal plants production. The cooperation would also involve activities to improve agro-techniques and multi-crop practices.

2. Animal production: Poultry, dairy, sheep and goats with emphasis on breeding, nutrition and management as well as the organization of artificial insemination.

3. Fishing and Aquaculture: Study of Pelagig fish population; survey of off-shore fishing ponds leading to the improvement and efficiency of their production; improving the stock and catch of other fish.

4. Veterinary Services:
   a. Efforts to prevent, control and eradicate the animal diseases affecting the animal population of the two countries;
   b. Veterinary certification of animals and animal products;
   c. Development and manufacture of veterinary pharmaceuticals and vaccines.

5. Plant Protection: Coordination of plant quarantine inspection procedures and phytosanitary measures of direct interest to both countries as well as the exchange of knowhow, materials and methods to control crop diseases.

6. Post harvesting and processing activities including technologies related to production and cleaning of seeds, grading, packing houses, pre-cooling, grain storage, cotton gins, slaughter houses, feed mills, etc.

7. Cooperative organization for the supply of inputs, production and marketing.

8. Agricultural planning and integrated farm development: Exchange of experience in agricultural planning methodology and practices; this would include methods and techniques of integrating production and post harvest activities both at the farm and on other levels.

Both parties agree that subject to further consultations in their respective countries a list of priorities would have to be agreed upon to initiate specific cooperation activities, bearing in mind the mutual desire to attain early practical results.
This subject matter priority should be finalized in future meetings of the two delegations.

II. Agricultural Extension Methods and Transfer of Technologies.

The parties shall promote joint programs and exchange of experience, methods and knowhow between the respective agricultural extension services and institutions:

Possible areas of joint work and exchange are:

1. Methods of organizing extension services nationally, regionally and locally to meet the needs of farmers at all levels;
2. Methods of extension most effective in working with farmers using individual, group and mass methods;
3. Pre-service and in-service training of extension workers;
4. Means and methods of adopting agricultural technology to local needs;
5. Methods of organizing and of training farmers to be receptive of extension advice;
6. Monitoring and evaluation of extensive techniques.

III. Joint Research Program:

The parties will establish programs of cooperation such as:

1. Improvement of the management and exploitation of integrated intensive and extensive agro-ecosystems;
2. Joint applied agricultural arid and semi-arid zone research;

3. Plant breeding and production of field crops;
4. Plant breeding and production of selected vegetable crops;
5. Environmental conditions for seed production;
6. Survey of wild species, breeding and improved cultural practices of medicinal plants;
7. Biological control of pests in field crops and orchards;
8. Epidemiology and control of fungi, bacterial, viral and nematode disease in crops;
9. Endogenous factors controlling rooting of fruit tree cuttings;
10. Clonal selection of fruit crops for growing under high temperature, salinity and pH;
11. Breeding and husbandry of high producing poultry and ruminants under climatic stress conditions;
12. Nutrition of high-producing poultry and ruminants, including the use of industrial and agricultural waste products;
13. Breeding and management for increased production in aquaculture;
14. Improved methods of disease and pest control in grain storage.

ANNEX: COOPERATIVE DEVELOPMENT IN THE MIDDLE EAST
WORKSHOP-CONSULTATION - Washington, May 1986.

POSSIBLE CONTRIBUTION OF ISRAELI TECHNOLOGY

1. Israeli relative advantage

The advancement of world food production has become a most vital topic, as in many countries "food security" has been redefined as a top-priority target. Emerging against this background there is a new agricultural policy based on intensive farming and high capital investment to an extent quite unprecedented in the field of agricultural production. Hence the growing demand for agricultural knowhow in all farm production scopes. This demand for agricultural production knowledge, is partly supplied by governments and commercial factors endeavoring to aid the farming sector and private entrepreneurs, who attempt to acquire knowledge directly.

Israel has a relatively advantageous knowledge reservoir relating to agricultural and rural development, encompassing the scopes of technology, research, planning and organization. Also, ample experience has been accumulated in this country concerning knowhow transfer and application in foreign countries.

Israel agriculture has been undergoing an obvious scientific progress. Branch managers in kibbutz farms are mostly university graduates. Future difficulties may arise in fitting employment requirements to specialists' potential. This potential of knowledge and experience constitutes and important reservoir for expanding our international aid activities.

The present Israeli system of knowledge transfer includes the following components:

National and regional staged development programmes based in the first stage on a minimum input, rainfed farming campaign in all but the completely arid regions as a pre-irrigation development strategy with emphasis on rural software agricultural extension training, and farmer organizations for credit and marketing.

Development of local water resources such as groundwater, regulated diversions and small dams, with subsequent integration of these schemes - as the farmers progress towards the entrepreneurial state - into larger schemes based on major river impoundment and transfer schemes involving investments which can be justified by the farmers' ability to profitably use all the water provided.

Consolidation, rehabilitation and expansion of existing dilapidated systems including the on-farm works required to ensure beneficial utilization of the water supplied.

National and regional agricultural extension campaigns based on the Training and Visits Method and gradual intensification of the farmer community service aspect of the programme to spurt the development of the farmers of the entire spectrum of supporting services - credit, input supplies, marketing, agricultural processing industries, etc.

Comprehensive village development programmes to provide potable domestic water, sewerage, and even non-conventional energy sources providing low-cost immediate solutions and schemes which are within the capacity of the village to finance, operate and maintain.

Development of rural agro-industrial centres and housing, agro-industrial and community welfare construction projects providing employment for the non-farm population and off-season employment for the farmers and farm labourers.

Planning and implementation of development programmes with maximum use of local manpower, with the object of developing a cadre of professional and technical personnel for operation and maintenance of agricultural and industrial plants and infrastructural works.

A more detailed description shows the following concretization:

(a) Export of science-involving production means:

- (a.1) Breeding materials: chicks, heifers, ewes, seeds, bulbs;
- (a.2) Plant and animal protection materials;
- (a.3) Chemical fertilizers;
- (a.4) Livestock feeding;
- (a.5) Veterinary materials;
- (a.6) Irrigation equipment

(b) Irrigation Planning:

- (b.1) For the national level;
- (b.2) For the regional level;
- (b.3) For the individual farmer.

(c) Settlement planning and implementation;

(d) Agricultural extension;

(e) Co-operating in agricultural research;

(f) Consulting on the management of agricultural projects;

(g) Consulting to internationally sponsored projects (World Bank);

(h) Management of agricultural projects;

(i) Planning and implementation of agricultural projects;

The following classification expresses the relative advantages of Israeli technology:

(1) Land:

- 1.1 Land survey
- 1.2 Land conservation
- 1.3 Land preparation
- 1.4 Land drainage
- 1.5 Land reclamation
- 1.6 Planning of soil basins

(2) Water:

2.1 Hydrology
2.2 Developing water sources
2.3 Operating water enterprises
2.4 Irrigation enterprise planning
2.5 Field irrigation planning
2.6 Water systems maintenance
2.7 Reservoir construction
2.8 Sewerage water utilization
2.9 Sewerage handling facilities

(3) Forestry:

3.1 Forest planting
3.2 Forest maintenance

(4) Grazing:

4.1 Pasture utilization
4.2 Pasture reclamation
4.3 Livestock grazing combination

(5) Field crops:

5.1 Wheat
5.2 Grains
5.3 Fodder crops
5.4 Industrial crops
5.5 Seed improvement
5.6 Plant improvements
5.7 Vegetable farming
5.8 Flower cultivation
5.9 Decorative plants' planning

(6) Plantations:

- 6.1 Citrus
- 6.2 Subtropicals
- 6.3 Olives and vines
- 6.4 Deciduous fruit

(7) Plant protection:

- 7.1 Entomology
- 7.2 Pathology
- 7.3 Virology
- 7.4 Herbs control

(8) Storage and marketing:

- 8.1 Fresh produce
- 8.2 Grains
- 8.3 Dry products

(9) Food technology

(10) Farming under cover:

- 10.1 Hotbeds
- 10.2 Nurseries
- 10.3 Net covers

(11) Livestock:

- 11.1 Dairy herd
- 11.2 Meat cattle
- 11.3 Dairy sheep and goats
- 11.4 Meat sheep and goats
- 11.5 Poultry - eggs
- 11.6 Broilers
- 11.7 Turkeys

(12) Veterinary services:

12.1 Disease prevention
12.2 Cure

(13) Agricultural research:

13.1 Research management
13.2 Regional research
13.3 Special research

(14) Agricultural extension:

14.1 Extension methods
14.2 Training and advanced courses

(15) Physical agricultural planning:

15.1 Overall economic planning
15.2 Farmhouse planning
15.3 Regional infrastructure planning

(16) Agricultural economic planning:

16.1 Settlement planning
16.2. Overall regional planning
16.3 Detailed planning
16.4 Overall branch planning
16.5 Agricultural macro-economic planning
16.6 Regional enterprises planning

(17) Financial management:

17.1 Accountancy
17.2 Cash keeping
17.3 Credit methods

Some Intermediate Reflections and Comments on Regional Cooperation Based on the Project "Patterns of Agricultural Technology Exchange and Cooperation in a Similiar Ecosystem"

by

Dan Yaron

The Hebrew University of Jerusalem

Introduction

As a framework for my comments, let me first present to you the basic concepts underlying our project. The project commenced 18 months ago and my comments are based on this period and the period of negotiations and draft writing which had preceded it. The general idea of the project was conceived by Professor Yousef Wali, now Deputy Prime Minister and the Minister of Agriculture and Food Security of Egypt and by Professor Pohoryles, when they both served as co-chairmen of the Joint Egypt-Israel Committee on Agricultural Cooperation. I was asked to join them at a later stage, and jointly with our Egyptian partners I was involved in designing the project in detail.

The overall goal of the project is to promote progress in the agriculture of the participating countries (primarily Egypt and Israel) through development and exchange of innovative technologies suitable to the agricultural-social and economic environment. It is expected to achieve this goal by:

1. Selection of technologies that are good candidates for exchange through agricultural technical and economic studies.

2. A study of farm types of greatest potential for practical implementation of the selected technologies.

3. A study of factors promoting or inhibiting adoption and diffusion of the new technologies and of measures to overcome inhibiting factors.

To these three goals, listed in our original and official research project I would like to add now another one which has emerged during the process of our work:

4. Preparation of the technological building blocks and the technological background for new development projects in the region.

The overview of the project is presented in Figure 1, with the agrotechnical studies being:

1. Intensification of Farm Production:

   a) Double and multiple cropping.
   b) Evaluation of on-farm irrigation systems.
   c) Dairy production.

2. Medicinal Use of Desert Flora.

3. Solar Heating of Soils for Disease, Pest, and Weed Control.

Double cropping means growing two crops per year on the same land thus increasing its productivity and income. Experiments conducted by our colleagues in Egypt have shown that 15 tons of grain per hectare (wheat and corn) can be achieved by applying proper technology and that is probably not the limit yet.

Solar heating of soils by covering them with plastic sheets for a period of several weeks is a means of thermal disinfection of the soils and potentially a good substitute for disinfection by chemical materials which may have undesirable environmental effect.

It is an applied R and D project centering on (a) agricultural technical testing of technologies with potential for exchange and (b) evaluation of the adaptability of these technologies to the existing and new farming systems (in the Negev and the new lands of Egypt) from the point of view of economic, social, and institutional environment.

The project consists of the following components:

1. Agricultural experiments.

2. Economic evaluation of the experimental results.

3. On-farm testing and demonstrations of selected technologies.

4. Evaluations of on-farm results and the study of the effects of the institutions supporting production and marketing.

5. Commercial applications and follow up.

The project employs a comprehensive approach incorporating agricultural experiments, farm tests and demonstrations, and economic and social evaluation.

Modes of Cooperative Projects

Most cooperative projects can be categorized as 4 general types:

1. Working in parallel on mutually agreed subjects, with periodical (annual or semi-annual) discussions of results.

2. Working jointly.

By "working jointly" I mean joint development of concepts and working plans; joint evaluation of intermediate results and planning further steps. This implies considerably more personal contact than working in parallel.

3. Mix of (a) working in parallel with: (b) working jointly.

4. Economic enterprises jointly owned and operated (e.g. agricultural and industrial joint production, touristic packages; an example: jointly owned and operated farm).

In our project modes of cooperation (1) through (3) are employed depending on the particular subproject, with the general intention being to move towards the more closely cooperative modes of work. In an application oriented research effort such as ours (as opposed to a basic research project), the closer the cooperation the higher the chances for success would be. The feedback from the farmers to the researchers is very important. Farmers know best what their needs are; sometimes the researchers are not fully aware of the farmers' needs and the restrictions they are subject to.

In my opinion, at this stage of the relations between our countries, the time has not come yet for joint economic enterprises. However, setting forth ideas and working out designs could soon become an extension of the Egypt-Israel-U.S. cooperative projects.

Appropriate Projects and Conditions for Success

Noting that my remarks apply to implementation-oriented research projects, I would like to suggest the following as criteria for appropriate projects:

1. A vision of long-run (10-25 years) objectives and potential achievements.

2. Intermediate (5-10 years) and short-run potential benefits.

3. Potential for cooperation in the near, intermediate, and far future.

4. Flexibility in design and execution.

In the case of our project, the "vision" was inspiringly outlined by Professor Yousef Wali, the Minister of Agriculture and Food Security of Egypt.

While such a "vision" provides a drive to nearly any research, it is essential to a project as complex and ambitious as ours.

The "vision" can be either in terms of:

(a) professional achievements of world-wide importance (e.g., technology designed to economically produce staple crops, with two or three crops per year in arid zones using capital-intensive and watersaving technology; solar heating for soil-borne diseases and pest control as a substitute for chemical treatments).

(b) large-scale regional joint enterprises.

The balance between the long-run and short-run potential benefits from the project is important. On the one hand "visible," quick results are sought; on the other hand no appreciable results can be achieved in a period shorter than 3 years. Agriculture is a field with a high potential for short-run and long-run benefits.

International cooperation is essential; the higher the potential for cooperation in the mid-term and far future, the higher the accumulated benefits from the project would be.

Flexibility in project design and execution is essential in view of the uncertainty in the socio-political background and environment which affects project execution.

Strategic Considerations Related to the Selection of Projects and Subjects

An extensive literature covers the evaluation of strategies for agricultural development with respect to various conditions. For brevity I will mention only a few and omit their discussion:

1. Aiming at evolving versus revolving technological changes (i.e. gradually developing versus quick and drastic changes.)

2. Development of traditional agriculture versus development of new regions.

3. Emphasis on efficiency (maximal agricultural production) versus emphasis on income distribution.

4. Emphasis on purely agricultural versus a multisectoral comprehensive development of a region.

Note that some of these strategies are interdependent. (Several other strategies can be enumerated, as well.)

Strategic considerations of this sort are the concern of each cooperating country on its own. Their effect is likely to be expressed in the selection of the projects for cooperation and has to be taken into account along with the criteria mentioned in the previous section.

Cultural Differences and Communication

Any cooperative project, even between two persons working in the same department, implies a mutual consideration of the personal characteristics of the partners. In the case of cooperative Egypt-Israel-U.S. projects learning and appreciation of the cultural, social, economic, institutional, and political environment of the partners and the restrictions they are facing is an essential prerequisite for the development of mutual understanding.

The ability to develop cooperative relationships is basically a personal attribute. However, some planned and organized activities can be helpful:

1. Resident Researcher, as a link of communication between the binational teams.

In the case of our project the residence of Mr. Ovadia Kedar, an Israeli agronomist in Cairo and at the Government Experimental Farm at Gemeiza, is a very valuable attribute. Mr. Kedar serves now as a consultant to the manager of the Gemeiza Farm where some of the experiments of our project are executed and agricultural technologies practiced in Israel are tested. Gemeiza farm is one centre of our project activities in Egypt.

Farm testing and demonstration plots in 10 villages around Gemeiza is now being planned to commence this fall with emphasis on drip irrigation, fertilizer

application, and disease and pest control. A comparable center is the Lachish farm in the South of Israel.

An Egyptian Resident Researcher in Israel would be an important attribute to the project.

2. Informal activities, such as joint field trips, coffee breaks, and meals, and finally visits at homes are a good means for developing personal relationships which are so important.

As a personal remark, let me comment that my attitude towards our Egyptian colleagues has undergone a thorough change during the period of our negotiations and cooperation. The feeling of curiosity and strangeness has completely faded away, being substituted by personal appreciation and the feeling of cordial and friendly cooperation with real people - scientists and administrators - with whom we share a joint responsibility for our undertaking as colleagues.

A Vision and Plans for Economic Development for the Region

It appears that an increasing number of leaders and people from different strata in the Middle East have come to realize that a peaceful solution is the only viable alternative for this war-stricken region. Those who work towards a peaceful solution should be provided with a long-run vision and plans for the economic development of the region.

The imbalance between the magnitude of international aid funds appropriated to weapons and those appropriated to development projects in our regiona is striking. Note that one modern airplane fighter costs between 15 to 20 million

dollars while the cost of a new irrigation oriented project is in the range of 5,000 - 20,000 U.S. dollars per family. One airplane fighter is roughly equivalent cost-wise to the settlement of 1,000 - 3,000 families.

We have to provide the leaders and the people of the region with ideas and plans concerning the economic potential for development in the region, intentionally ignoring the current political restrictions. Projects which may now appear to be completely imaginary politically, should be included in this list, for example, a Common Middle East Market. A long-run vision for the region is needed in order to illuminate its potential for peaceful economic development.

The Involvement of the USA

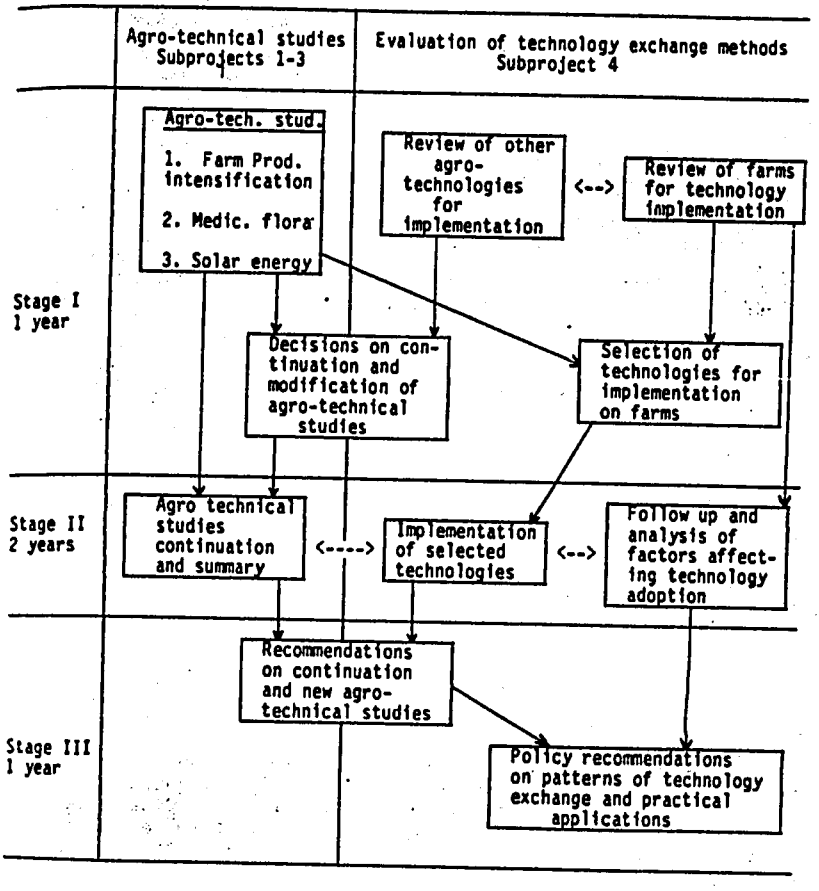
The involvement of Americans in this project is important in the first place, because (as it seems to me) it is now politically and personally easier for our Egyptian partners to cooperate with Israel in a trinational rather than a binational project. Secondly, our U.S. partners have been and continue to be very helpful at various stages, such as the initial negotiations, specifying the budget details, and currently in administrative coordination. Thirdly, the United States commands a very rich stock of scientific knowledge and technical skills. Along with the fact that many of our Egyptian partners and many Israelis were trained in the U.S., the above circumstances create the conditions for contributions by American scientists to the project.

At the same time, I feel that the center of gravity of the project's activity should be in the region. My feeling is that our Egyptian and American partners share this attitude.

I wish to take this opportunity to express our appreciation to our U.S. partners, the staff of USDA/OICD, for the devoted and efficient way in which they have cooperated. I am confident that our Egyptian partners share this feeling.

If, in the activities mentioned above, the involvement of the U.S. is important, its participation is <u>essential</u> in the stage which I think should follow -- the fruition of the long-run vision and development plans for the region. The United States has been the only superpower active in the promotion of peace in the region since 1973. It has the financial capacity to contribute as well as to influence other nations to join in promoting peace through economic development and regional cooperation.

Figure 1. Overview of the project



April 29, 1986

STATEMENT BY HARRY R. ALBERS

DIRECTOR, SAN DIEGO STATE UNIVERSITY FOUNDATION

The regional cooperation program in arid lands agriculture established at San Diego State University is unique. It is the result of a highly improbable chain of events involving a bequest, private citizens of San Diego, faculty and staff of San Diego State University, agricultural experts from across the United States, the Agency for International Development and, most importantly, scientists and governmental officials from the ~~United~~ Arab Republic of Egypt and Israel.

The prime components of the program are:

- Research dedicated to the use of saline water in crop production,
- the development of arid lands plants of high nutritive value which can be grown with minimal amounts of water under low rainfall conditions for use as fodder for small farm animals; and
- the development of new arid land species which show promise for use as economic crops.

Underlying the research agenda is the vital topic of cooperation. Research is proceeding in Egypt and Israel through a high degree of interaction among all scientists and visitations to the research sites in both countries.

In fact, the program has been so successful that, after a mid-term review by USAID in 1984, the original five year program was extended for three additional years and the funding was increased from $1,000,000 per year to $1,250,000 per year. This result was very important to all program participants in that it validated their belief that in an uncertain world and despite constantly changing political events in the Middle East, the three countries could surmount obstacles to achieve important goals. This has not been easy...it has not been without risk, but the hard work and risks have been accepted so long as worthwhile results are being achieved.

On January 16, 1986, however, one of the basic underpinnings of the program was unilaterally withdrawn. San Diego State University received a telephone call from USAID that the budget for the program would have to be cut immediately by as much as fifty percent. While a cut of this magnitude would have made the program untenable, of even more importance, this sudden withdrawal of support gave a strong signal to all parties that the United States was no longer interested in a highly successful effort that was making substantial strides both in addressing agricultural concerns of Egypt and Israel and in cooperation. From the point of view of program participants this action was puzzling amd unwarranted. The only explanation that could be

elicited from USAID officials was that ..."regional cooperation programs had not yet built a strong enough base of political support in the Congress to sustain them in a time of tight budgets..."

At San Diego State University this was the first time we had any intimation that one of our tasks was to build political support, however, we undertook the responsibility and with the intervention of Representative Henry Waxman, Senator Richard Lugar and others, we were able to work to help restore most of the funds threatened to be cut.

San Diego State University Foundation, as the administrative agent for the Cooperative Arid Lands Agriculture Program, hopes that one of the outcomes of this Intersect meeting will be a better understanding between USAID and the contractors of the regional cooperation programs on the importance and priority of these programs to the United States. If our program is any example, the time, effort and dedication of resources to make the Cooperative Arid Lands Agriculture Research Program successful is far and above what is required of a typical grant between an American University and a federal agency. Likewise, the contributions of resources and the efforts and time of scientists and high governmental officials from Egypt and Israel is remarkable when one considers the truly modest funding for this program. It is clear that the only reason for the outpouring of resources and efforts the participants is that the program represents an opportunity for cooperation and a contribution to peace. This cannot and should not be taken lightly.

Participants in the Cooperative Arids Lands Agriculture Research Program will lend all of their efforts to working with USAID to avoid a reoccurrence of recent events. In addition, we would like to work with USAID to garner more support and more funding for these programs. If a plan of action to accomplish these results can emerge from the Intersect discussions, San Diego State University will deem the meeting a success.

Early in the paper I mentioned that the Cooperative Arid Lands Agriculture Research Program is unique. As background for how this program developed out of the community of San Diego an article has been appended.

83-631 117

Harry R. Albers, Director
San Diego State University Foundation
April 29, 1986

COOPERATIVE MARINE TECHNOLOGY PROGRAM FOR THE MIDDLE EAST

Testimony prepared for Hearings conducted by the
Subcommittee on Europe - Near East
Committee on Foreign Affairs, U.S. House of Representatives
Tenth Congress, First Session, May 6, 1986

- Robert B. Abel, President
N.J. Marine Sciences Consortium
Fort Hancock, New Jersey

Mr. Chairman, Members of the Subcommittee. I appreciate the opportunity to submit this testimony for your Special Hearings on Regional Cooperation. My comments will be directed solely to the Regional Cooperation Program, with particular reference to the Cooperative Marine Technology Program for the Middle East.

In September, 1978, the United States Congress passed and the President signed, the International Security Assistance Act of 1978, PL94-224, Section 48 (C) (5), amending the Foreign Assistance Act of 1961. This legislation included for the first time, establishment of a program and fund for Regional Cooperation in the Middle East. It became known as the "Regional Fund" and was directed to cooperative projects between Israel and her neighbors. Responsibility for the Program's implementation was assigned to the United States Agency for International Development.

During the period October 1978 - August 1980, a small group of American, Egyptian, and Israeli oceanographers developed a Cooperative Program of Science and Technology which became known as "The Cooperative Marine Technology Program for the Middle East." The program was officially accepted by the United States Agency for International Development (AID) on August 23, 1980, as the first endorsed enterprise under the Regional Fund's auspices. Actually, on that date a group composed of a dozen scientists each from Israel, Egypt, and the United States was quietly conducting an historic meeting in San Diego.

In June, 1982, the group submitted its first annual report to AID, covering the work to that date. The second report followed in May, 1984, and the third a year later.

The program is primarily based on fundamental needs: food, water, and shoreline protection; it includes specifically, ocean productivity, toxins, aquaculture, waste water usage, shoreline protection, and lakes management. Teams of scientists and engineers from two dozen institutions in the three countries have arrived at a state where all projects are conducted cooperatively. Coordination points are the Egyptian Academy of Scientific Research, Ltd., the Israeli Institute for Oceanographic and Limnological Research, Ltd., the New Jersey Marine Sciences Consortium, and Texas A & M University.

This Program differs significantly from conventional AID Programs in that social progress (i.e. cooperation between Egyptian and Israeli scientists and institutions) is at least as important as the economic and intellectual accomplishments. A few highlights of cooperation may serve to demonstrate the Program's success:

1. The Egyptians and Israelis have conducted to date, fifteen joint planning and reporting conferences, mainly in Cairo and Alexandria. With a few exceptions, American participation has been limited to the program coordinators, Drs. El Sayed and Abel. Planning and operating procedures have been developed increasingly by representatives of the Israeli and Egyptian Institutions.

   At this point in time, 40 Israeli person-trips have been made to Egyptian laboratories where the scientists have cooperated in the research and have assisted in classrooms and with graduate students. A visit to Israel by the Egyptian Undersecretary of State for Aquaculture, Ahmed Shoukry produced dramatic gains in understanding.

3. Two visits to Israel by the Egyptian aquaculturist, Ali Khater, and several visits by the Israel aquaculturists, Gideon Hulata, Hillel Gordin, and Giora Wolfarth, have resulted in trading of the fish, Tilapia, for cross breeding purposes.

4. Overall, management is provided by the New Jersey Marine Sciences Consortium, specifically by its President, Dr. Robert B. Abel. This management role has included maintaining communications among all laboratories in the Program; maintaining of communications with the Agency for International Development; allocating funds among the individual projects, generating and processing the reports, and generally identifying, locating, and recruiting scientists into the Program; procuring ships, vehicles, and equipment for the Israeli and Egyptian laboratories; collaborating with the Egyptians and Israelis in planning the conferences; and assisting in arranging meetings among the individual scientists.

5. The Program's chief scientist, Dr. Sayed El Sayed of Texas A & M University, has maintained responsibility for the annual reports and has assisted Dr. Abel with the program proposals. Dr. El Sayed is also Principal Investigator for the biological productivity project.

6. Dr. Colette Serruya, Director General of the Israeli Institute of Oceanographic and Limnological Research, Ltd. (IOLR), acts as coordinator of the Israeli program. While

the new doctrine embraces several institutions in Israel, their consensus is to continue Dr. Serruya in her role as General Coordinator for the State of Israel. Other institutional representatives collaborate with Dr. Serruya as needed.

7. Dr. A. R. Bayoumi, Director of the Division of Oceanography and Fisheries of the Egyptian Academy of Scientific Research and Technology, is coordinator of the Egyptian Scientific teams. He is responsibile for allocating personnel to the individual projects and monitoring their progress. For funding purposes, the Consortium also deals with the Chairman of the Department of Oceanography of the University of Alexandria, Dr. Naim Dewidar.

8 Dr. A. A. Latif, Executive Vice President of the Egyptian Academy of Scientific Research and Technology, has assumed an increasingly prominent role in the Program, with particular reference to policy formation. Much of the Program's new doctrine is owed to his personal contribution and overview.

9. Within the Primary Productivity Project, the first coauthored publication is currently in process.

10. Joint training of Egyptians and Israelis has been conducted in the United States under the Shore Processes and Tilapia projects.

11. At the Egyptians' (Dr. Latif's) suggestion, there has been general agreement to use this Program as a conduit for much cooperative technology between the two countries, appending new projects and tasks as desired.

12. Also at the suggestion of the Executive Vice President of the Egyptian Academy of Sciences, Drs. Latif and Bayoumi (Egypt), Serruya (Israel), and El Sayed and Abel (United States), constituted themselves as the steering committee for the overall Program. Assisted by colleagues as required, this group has, and will continue to, assess priorities and proposed projects to form the proposal packages for AID.

13. These last two initiatives were put into practice in a combined conference at the Egyptian Academy of Scientific Research and Technology during April 14 and 15, 1984. Primary result of the conference was the coordinated proposal for Phase III of the Program to be submitted as a package to AID.

14. In accordance with general agreement between the two countries and under AID guidelines, the Program seeks to increasingly subordinate oceanography to more traditional technologies in food resources and health control. The

latest proposal, i.e. for Phase III, reflecting these departure points, included toxins and pesticides, nutrition, and unconventional uses of waste-water.

15. During August, 1983, the entire Israeli team visited Alexandria and together with the Egyptians reviewed past progress in the Program and developed new projects for the Program's Phase II. In effect, the proposal was fashioned during that meeting. It was later submitted to AID and accepted, in large part. Most of the projects, therefore, have been continued.

16. Perhaps the highlight of the Program, to date, occurred during September, 1983, when Dr. Bayoumi and Admiral Ben Nun (original Israeli coordinator) were honored for their contributions to the Program by being designated as the first co-recipients of the International Compass Award given by the Marine Technology Society for distinguished service in international marine affairs. In August, 1985, Dr. El Sayed received the Distinguished Service Award from the American Institute of Biological Sciences, for his role in developing the Program.

The other projects conducted under the auspices of the Regional Cooperation Program include arid lands agriculture and infectious diseases. They have been and will be discussed by my colleagues today.

Our future aspirations include:

1. Adding new technologies, institutions, and people to the Program, to spread its beneficial influence throughout as many communities as possible in the two countries;

2. Encouraging as many Egyptians as possible to visit Israel; Dr. Shoukry is attempting to form a committee for this purpose;

3. Conveying the Program's benefits to other Middle Eastern and African countries in an effort to persuade them to join the Program; and,

4. Persuading U. S. Government officials that this Program's charter, motivation, and progress merit at least one fifth of one percent of what this country spends on aid to the Middle East.

The large number and variety of issues attendant upon any program of this unusual nature and sensitivity make these hearings especially propitious at this time. Just as obviously, the first and most important issue relates to the fundamentality of the Program itself: in other words, is it really worth doing?

Owing to seven years of constant and close contact with all of the players in this game, my approach is almost evangelical. I believe more deeply in this Program and what it holds forth than in any enterprise with which I have ever been connected.

Following such a statement, the second issue must relate to that of size: in other words, how large should such a program be? Or, as the office of Management and Budget always asks in the skirmishes attendant upon making up the President's budget, "how much is enough?"

The two governing factors in this case relate first - to Congress' sense of how much money they intuitively feel can be spared for such excursions and secondly - how much can be spent usefully? Treatment of the the first question is beyond my ken because only the Congress can fit each individual enterprise into the overall mosaic of the public budget.

The second question, relating to just how fast and far a Program like this can be pushed is perhaps somewhat less complex and can be handled jointly by the implementing agency, A.I.D. and those of us who have been immersed in the Program long enough to know what is good science and what is of lesser quality, and what is good politics and what is less efficacious. From my present understanding of the situation, I would judge that all of the money that is being spent in the Program right now is in the Program's best interest. I also have a feeling, for instance, that tripling the size of the Program would not triple its effectiveness, at least for the time being, until enough additional good players can be recruited to the game.

This last is really a third, separate, issue all in itself. Are there really enough competent scientists and engineers in the two cooperating Middle East countries who are really interested in joining this Program and who would subscribe wholeheartedly to its fundamental tenets of useful cooperative endeavor? At this point in time, the answer is probably "a few".

I feel very strongly, however, about one of the subordinate issues, relating to the younger folks. One can't help but wonder whether all of us are making the strongest possible effort under the circumstances, to search for, identify, and recruit willing and competent graduate students into this Program. The success of our Program must lie with this next generation. While the cadre of eminent scientists who have chosen to devote their careers to peace in the Middle East is, of course, the sine qua non of our Program, without whom we could never have gotten started, expansion to a recognizable regional effort will rest with the kids.

This, in turn, leads naturally to the fourth issue, often debated by my colleagues. Some of us feel that for the Program to reach its objectives, it is necessary to search constantly and recruit into the Program new institutions, new people, and new topics. Others of us feel that the best cooperation will be achieved with the old hands who have learned to work with each other. My personal feeling is in favor of an optimal combination of the two, i.e. a continual blending of new subject areas and new organizations, with a constant leavening of people experienced in the Program's unusual philosophy and who have learned to work well with one another. This is evidenced in the recent history of the "Marine" Program.

A fifth issue concerns the relative effectiveness (towards the Program's fundamental goals) of the individual project vs. the packaged Program. The "Cooperative Marine Technology Program for the Middle East" has to date encompassed nine separate and distinct projects. In theory any one of them could have been funded, sponsored, and managed directly from A.I.D. In one sense, therefore, the New Jersey Marine Sciences Consortium, which managed these projects, could be considered dispensible. This is not really a clear cut issue. Were the Program's goals purely technical, i.e. breeding better fish; establishing better erosion control, etc. there's really not much reason why the A.I.D. staff couldn't administer each project separately. In turn this would depend to a degree upon the wishes and philosophy of the Egyptians and Israelis.

Because the Program's fundamental goals are at least as much social as they are technical, however, we believe that the Steering Committee composed of the Program's managers, who conduct the communications, coordination, advanced planning, and composite reporting, play a necessary and beneficial role in the Program's development. As the Program progresses, however, and its personnel grow to know each other and to attain comfortable working relations, management's role probably ought to diminish somewhat, and in terms of funding, probably to one-half to three-quarters of existing levels. Of course, this ignores management's function in seeking out new topics, new players, and (hopefully) new countries to involve in the Program. Put another way, our "technicians'" roles ought to diminish in time; our "ambassadorial" roles ought probably never to be relaxed.

A sixth closely related issue concerns the relative importance of the Americans vis-a-vis the Middle Easteners in the Program. Our Program began as a parallel bilateral operation with the American role dominant as it was necessary to relate to the Egyptians and Israelis partly independently. As working relations rapidly improved, however, the trilateral aspects became more important, and more recently, as we have achieved bilateral -- between Israel and Egypt -- relations, the American role has diminished to that of consultants. In any case, regardless of how a project is organized at the start, the American role should be progressively reduced as the project develops.

The seventh issue of local management probably ought to depend on the respective programs' individual styles. In our own case, Dr. Serruya of the Haifa

Institute, Dr. Bayoumi of the Egyptian Academy, Dr. El Sayed from Texas A&M, and I have informally constituted ourselves as the Program's Steering Committee with Dr. Latif, the Executive Vice President of the Egyptian Academy, tacitly accepted as our Chairman. We have found this arrangement to be convenient and effective in screening original projects to a workable package to be sumitted to A.I.D. Perhaps looking at it from A.I.D.'s viewpoint, its administrative efficiency may be somewhat offset by the chance that a project in which A.I.D. could conceivably be interested might be screened out at our local level. We try to overcome this by informal contact with A.I.D. prior to tying together the final package.

The ninth issue relates to recruitment of other countries. Clearly, the "moderate" nations, e.g. Jordan, Tunisia, and Morocco ought to be courted. Two recommenderions are offered. First, time is important; attempting to rush these groups into cooperation with Israel will become a self-defeating movement. Secondly, cooperation among our Programs: Infectious Diseases, Arid Lands, Agriculture, and Marine -- is absolutely imperative. The principals of our respective organizations should get together as soon as possible to work out long range strategies.

To the tenth and final issue, that of A.I.D.'s being the most effectiva home for a Program such as this, my answer inevitably must be to beg the issue! Throughout our Program's brief history, it has been my privilege and pleasure to work with some of the finest civil servants with whom I have ever associated. If I have a complaint it is that they have been transferred out of our juristiction upon atteining experience and therefore usefulness to the projects.

In all conscience, I cannot blame A.I.D. for this owing to the obvious benefits of circulating the talent throughout the institution; nor can A.I.D. blame me for selfishly wanting to hold on to the best people for ourselves. If A.I.D. sincerely wishas to retain the Program, that agency certainly has enough competent and experienced people to do so effectively. If A.I.D. is not that much interested in retaining the Program, (and, after all, they must be allowed the prerogative of decision,) then, like any other organization in the world, they also possess people who may operate at somewhat below the top level of efficiency and can so assign them. Again, the problems and outlook of the A.I.D. administrator are beyond my ken, and perspective becomes overwhelmingly important.

There are probably a large number of additional issues which I have overlooked in my parochial perspective, and I would be happy, therefore, to respond to any questions you might have in that respect. Again, I wish to thank the Chairman and Committee members for permitting me to appear before you this morning.

STATEMENT BY DR. MOHAMMED SHAALAN

REGIONAL COOPERATION AND EGYPT

1. PRESERVING REGIONAL COOPERATION MIGHT CONTRIBUTE TO THE SURVIVAL OF THE PEACE PROCESS IF AND WHEN THE POLITICAL CIRCUMSTANCES ARE RIPE

The current "cold peace" discourages participation in regional cooperation (R.C.) However, the persistance of the pioneers in this venture can provide the politicians with a popular base that could facilitate a change of policy and revival of the peace process if and when the climate becomes ripe.

2. SUCCESS COULD INCREASE CREDIBILITY, LOCALLY AND REGIONALLY, THAT INDEED PEACE AND COOPERATION PROMOTE DEVELOPMENT

The massive support for Sadat's peace initiative was based on the belief that peace would bring prosperity, nationally and subsequently individually. The actual outcome was that only individual prosperity was feasible, and was so for individuals who shifted their allegiance from their own state to their oil-rich Arab employers, renouncing Camp David as a password for acceptance.

PROPOSALS FOR REPAIR:

1. BROADEN THE CONCEPT OF REGIONAL COOPERATION TO INCLUDE EGYPT. The original goal of R.C. was to incorporate Israel into the region so that peace and associated cooperation would provide for a more effective forum for U.S. assistance to that region. Development is more likely if the U.S. were to cooperate with the region as a whole as opposed to multiple bilateral with individual nations. The absence of cooperation within the region has made the peace just a source for another bilateral relation for the U.S. increasing its burden; for now there are two isolated ghetto states in the region. Restricting R.C. to cooperation between any Arab state and Israel is not likely to attract Arab states to the peace process. On the other hand these states are becoming less recalcitrant in isolating Egypt and could be encouraged to cooperate with it. Given Egypt's commitment to the peace process, such cooperation could be a step towards the more comprehensive goal which would include Israel. So that

the broadened concept of R.C. would include cooperation between any Arab state and Israel and/or Egypt. After all the absence of Egypt's leadership in the region, as well as the presence of disruptive forces in the region are more of a threat to peace than Arab rejection of Israel. Furthermore, any threat to peace in the region is very likely to drag both Israel and the U.S. in the conflict, indirectly if not directly.

2. ENCOURAGE OR STIPULATE PALESTINIAN PARTICIPATION (STARTING WITH ISRAELI ARABS, THROUGH OCCUPIED TERRITORY, JORDAN AND DIASPORA PALESTINAINS). The main objection of Arab as well as Egyptian opponents of Camp David is its lack of serious concern with the core of the conflict, namely the Palestinian problem; and even the token recognition of the problem in the second part of the Camp David agreement (the autonomy component) was completely neglected politically, remaining stuck on such side issues as Taba or normalization. This political lack of sensitivity could be compensated for by insisting on recognition of Palestinians at least at the human or professional levels, such as is possible within the framework of the R.C.

3. ACCOMMODATE, AT LEAST FOR THE PRESENT PHASE, FOR INDIRECT; PARALLEL PROJECTS. Until the political climate changes, it may be necessary to accept indirect forms of cooperation, such as working on parallel projects with the U.S. as a common partner (U.S./Israel, U.S./Egypt) or Egypt as a common partner (Egypt/Jordan, Egypt/Sudan, etc.)

4. INTEGRATE SOCIAL SCIENCES WITH TECHNOLOGY AS A WAY OF EMPHASIZING THE VERY PROCESS OF COOPERATION. The whole object of R.C. is the impact it would have on promoting peace and people to people communication in the interest of mutual development. A social science approach alone might be too ambitious

and hence risky; whereas a technology approach alone might be too limited for the required goal. However, an integrative approach where the group is gathered around a task and simultaneously engaged in examining the process of fulfilling this task, i.e., becomes people-oriented, could improve both the task and the people-to-people relations.

5. INSTITUTIONALIZE AND DEVELOP CONFLICT-MANAGEMENT SKILLS SIMULTANEOUSLY WITH DEVELOPMENT. Current institutions are still too slow and reluctant to engage in R.C. or for that matter any problem-based community-oriented activity as opposed to the safe isolation of ivory tower activities. It is worthwhile to aim at immediately establishing an institute for conflict-management integrated with development (brief outlire appended). Such an institute would engage in R.C. activities while simultaneously develop conflict-management skills. These skills would in turn be passed on to other institutions which would subsequently become less reluctant to engage in such activities.

6. IMPROVE THE IMAGE OF R.C. AS WELL AS IMPROVE ITS FUNCTION BY CONSTANTLY REEVALUATING IT. R.C. activities would defeat their purpose if they were to become secretive. After all their object is to influence public attitudes. In fact R.C. has publicity, but of a rather negative nature. It is worthwhile to devote a special effort to improving such an image by openly discussing its role and answering its critics.

7. ALLOCATE ANNUAL AWARDS FOR INDIVIDUALS OF OUTSTANDING PERFORMANCE IN THE REALM OF R.C. This could be an added moral and political incentive, as well as a compensation for the reverse effect of the detractors from R.C.

8. BROADEN THE SCOPE OF PARTICIPATION TO INCLUDE YOUNGER AGE GROUPS (CHILDREN AND YOUTH) AS WELL AS THE LAY PUBLIC. The impact of R.C. must broaden in time to include the generations that will lead the future as well as the masses that will provide the public opinion base for any political initiative.

PROPOSAL FOR ESTABLISHING AN INSTITUTE FOR CONFLICT MANAGEMENT FOR DEVELOPMENT

Goals: To develop expertise in conflict-management through on-the-job training that is geared to transform conflict into cooperation around a development task; or integrative human and environmental development.

Means: Around a nucleus for an alternative community to be established in some area of reclaimable land that can eventually become self-supporting thru food production, small industry, as well as the providing of human relations and human development and consciousness-raising technology. The ideal location would be close to a water source, a shore, a transportation route connecting Cairo with rural and desert Egypt as well as with international land transport, and not too distant from Cairo or, if distant, connected by a local urban office with conference and library facilities. Example: somewhere between Ismailia and Cairo.

Steps: Start with establishing a site for an international youth camp where young people would take part in the labour for reclamation of land while engaging in human developmental activities (exploration and management of intergroup conflict, consciousness raising, personal development, artistic creativity, etc.) A core staff would remain on site while a mobile staff would continue activities at the urban center during the school year. Visiting staff would remain on site while a mobile staff would continue activities at the urban center during the school year. Visiting staff would comprimise leading social figures and would be

inivted to take part in limited presentations. Furthermore, they could be invited to more extended seminars, workshops or even long retreats for creative isolated mediation or group brain-storming. Foreign visitors would be invited and conversely locals would be sent abroad with a view to cultural interaction and mutual enrichment. Selected youth participants would be included in the staff of the institute after appropriate training and experience.

Staff would compromise administrators, technocrats and human relations professionals.

Budget: This is flexible according to the magnitude and extent of the project. However, if something is to start that would attract a core of dedicated individuals to renounce their other activities, an appropriate capital base for an adequate infrastructure is needed. For the urban center a good $1 million is needed and the same forrthe peripheral site. As a start for support and maintainence of activities for enough years (say 5) until some degree of self-support is achieved another equivalent sum at least would be needed.

TRINATIONAL (EGYPT-ISRAEL-U.S.) AGRICULTURAL RESEARCH COOPERATION

Project Description

Trinational Agricultural Technology Exchange and Cooperation (TATEC) Research Project

(Formal Title: "Patterns of Agricultural Technology Exchange and Cooperation in a Similar Ecosystem: the Case of Egypt and Israel")

The U.S. Agency for International Development (AID) has agreed to provide $2,526,000 for the first two stages (years 1 through 3) of the 4-year Trinational workplan named above. The purpose of this agricultural research project is to promote agricultural cooperation among Egypt, Israel, and the United States, and to accelerate agricultural development in both Egypt and Israel.

Summary of Work

To accomplish this purpose, a limited number of innovative technologies that are good candidates for Egyptian-Israeli exchange, experimentation, and promotion have been selected in the following subject areas:

A. Intensification of Farm System Production.

1. Cropping Systems and Water Use
2. Economic Evaluation of Integrated Cropping and Water Use Systems
3. Dairy Production

B. Medicinal Uses of Desert Flora

C. Solar Heating of Soils for Disease, Pest, and Weed Control

In addition, another sub-project, "Evaluation of Methods for Technology Exchange in Agriculture," will assess the implementation of the five other subprojects and will address broader aspects of agricultural technology exchange, adoption, and diffusion between markedly differing economic and farming systems.

Sub-projects in these areas will be conducted according to individual work plans by the identified Egyptian and Israeli principal investigators with advisory assistance from U.S. cooperating scientists.

Project Administration

The project is administered through a Participating Agency Service Agreement with the U.S. Department of Agriculture's Office of International Cooperation and Development (USDA/OICD), which is responsible for coordinating, administering, technically reviewing, and evaluating the cooperative research. AID and USDA signed this agreement on July 27, 1984.

The project is directed by a Coordinating Committee composed of senior scientists and research administrators from each country, who have been involved for several years in the development of the project.

Following completion of a mid-term external evaluation in Year 2 of the project, AID will consider providing funds for support of the project's fourth year (Stage III).

Project Execution

Beginning October 1, 1984, USDA/OICD periodically channels funds to the principal investigators in Egypt and Israel via a single grant to the major performing institution in each nation, the Egyptian Ministry of Agriculture and Israel's Hebrew University of Jerusalem. The budget for the entire project is distributed in the approximate ratio of 41:41:18 to Egypt, Israel, and the United States respectively. Less than half of the U.S. portion of the budget is for project administration.

American, Israeli, and Egyptian scientists designed the project to emphasize involvement of Israeli and Egyptian institutions, in accordance with AID guidance. The contributions of American scientists to the subproject activities are to be advisory in nature, upon request of the Egyptian and Israeli principal investigators: e.g. making consultive visits to subproject sites, providing access to information most readily available in the U.S., reviewing and evaluating progress reports.

EGYPT-ISRAEL-U.S. AGRICULTURAL RESEARCH PROJECT ON

TRINATIONAL AGRICULTURAL TECHNOLOGY EXCHANGE AND COOPERATION
IN A SIMILAR ECOSYSTEM
("T.A.T.E.C.")

Annual Progress Report
Reporting Period - October 1, 1984 thru September 30, 1985

a. Summary Description of Technical and Scientific Progress (by Sub-project)

a.1. Intensification of Farm System Production:
Cropping Systems and Water Use

Principal Investigators: A. Marani and M. J. Pinthus (Israel)
A.M. Abdel-Shafy (as of 5/30/85) and
A.S. Badawi (Egypt)

As reported previously in the first semi-annual report (10/84-3/85), the work in Egypt started late, due to turnover of assigned personnel. No permanent Principal Investigator (PI) directed the work until May. Since then, the Egyptian team has demonstrated remarkable energy in implementing wheat and maize experiments, as detailed in the annual and semi-annual reports at Appendix A.

Experiments at Gemeiza station focused on the effect of plot size on plant growth and grain yield under various methods of water use, with a view toward optimizing the efficiency of water use and the timing and dose of fertilizer application. Preliminary results indicate that water-sparing treatments, combined with appropriately timed fertilizer applications, can have significant positive effects on grain yield. Drip irrigation, in particular, seems to have considerable promise for increasing maize yields, producing 18% and 8% higher average yields than sprinkler and furrow irrigation methods respectively.

As reported previously, the Israeli team has conducted a comparison of vegetative development of wheat under dryland versus irrigated conditions and following different crop rotations. The technical report in Appendix A provides details on trials of grain yield in wheat and maize at the Lakhish exprimental farm on dryland and sprinkler-irrigated fields.

In studies of 5 excelling lines of dwarf and semi-dwarf wheat, significant differences in grain yield were found between the dryland and the irrigated fields (as well as among the various lines and CCC-treated vs. nontreated areas). However, these differences were caused primarily by differences in cold damage, which affected the number of grains per spike. Analyses attempted to factor out this unusually severe and prolonged cold period. These resulted in an estimate of the expected grain yields which indicated the following:

the expected yields of irrigated plots treated with the foliar spray CCC (chlorocholine chloride/chlormequat/[2-chloro-ethyl] trimethylammonium chloride) are an average 34% greater than the dryland plots not treated by CCC. The irrigated plots had received 100 mm more water than the dryland plots, and the CCC treatment increased grain yield beyond its reduction of lodging. These results clearly demonstrate the decisive effect on wheat yields of small amounts of water, applied at the right time and in combination with CCC.

Another study, in progress at the end of this reporting period, is assessing the effects of a maize crop on a wheat crop planted immediately after it on the same field. The wheat experiment of the 1985-86 season will be carried out on this field. In addition, the 5 hybrids of maize planted on this field in May-June 1985 will be analyzed by irrigation regime (spacing and timing of drip-trickle), plant spacing per row, and early-vs-late termination of irrigation..

a.2. Intensification of Farm System Production:
Economic Evaluation of Cropping System and Water Use

Principal Investigators: D. Yaron, S. Pohoryles (Israel)
Y. Mohieldin (Egypt)

In Egypt, considerable progress has been made since activity started in February 1985. (The tardy start was due to funding problems [the exchange rate question) and complexities of technical plans needing resolution.) Since April, the team has designed data collection efforts to include factors for imputing the cost of water, and has focused the first analyses on estimates of production and cost functions of certain inputs (e.g. fertilizer and water).

In addition, numerous methodolgical questions have been resolved, in the areas of cost-benefit relationships in studies of the economics of plot size under several irrigation treatments. The team has also designed and pretested a questionnaire, to study different irrigation systems in New Lands areas, with a view toward evaluating the degree of adoption and the constraints involved.

In Israel, the subproject consists of 3 distinct efforts, with specific progress in each as indicated:

1. Analysis of Factors Promoting/Inhibiting Adoption of Modern Irrigation Technology.

To identify and evaluate farmers' incentives and Government policy options which may promote the adoption and speed the diffusion of drip irrigation, investigators have sampled by questionnaire and personal interview 45 kibbutz cotton growers (25 in the Rehovot region and 20 in the Lakhish region). They have applied this data to a diffusion model of drip irrigation in cotton. Preliminary results indicate that this technology was adopted mostly on new cotton plots at first, with gradual but only partial replacement of sprinkler irrigation in established cotton fields, as the new technology became better known. Economic advantages of the new technology were the most important reasons cited by growers for its adoption.

2. Case Study: Transition from a Traditional to a Modern Irrigation System

Israeli researchers have gathered data on 24 farms in an arid area served by a regional irrigation system. This system is being analyzed, with the aid of simulation program by Anderson and Maass, to assess the benefits derivable from each component and stage of the transition process. Both current and capital investment costs are being estimated and benefit-cost ratios will be developed.

Preliminary results highlight the high capital intensity of the modern system. Adopting it has been justified only by shifting to high-value crops having significant export-market potential. Traditional crops apparently would not have proved economical under the modern system. Thus, the next questions to be answered (in Year 2 and following years) are: 1) which crops can be economically irrigated using the modern system? 2) are markets available for these crops? and 3) which types of farming systems can bear the high investment costs and related risks?

3. Comparative Analysis of the Integrated Cropping and Water Use Systems: A Modeling Approach to the Evaluation of Irrigation Systems

Scientists reviewed the literature and compiled data available on the major parameters needed for a quantitative evaluation of alternative water use systems. The study's working hypothesis is that the major difference among the various existing irrigation methods in their impact on yield results from their different performances in uniformity of water application.

Theoretical approaches have been developed to apply a model for testing and evaluating the effect of surface, sprinkler, and drip irrigation systems under a variety of conditions. When successfully calibrated, it will be used to extrapolate analyses of irrigation systems from one set of conditions to another.

a.3. Intensification of Farm System Production: Dairy Production

Principal Investigators: A. Berman (Israel)
M. Hathout (Egypt)

As reported previously, the Egyptian team performed a literature review and collected information on artificial rearing, early weaning, roughage treatment and complete rations. Unfortunately the death Dr. M. Kheireldin, Project Coordinator, and the illness of Dr. M. Hathout, PI, delayed the initial phase of project activities.

Since April/May 1985, 2 trials involving Friesian calves have been done, to determine the influence of feeding milk replacer and an early weaning system on their performance. A study on the effect of seasonal temperatures on milk yield is in progress. Preliminary work on developing a complete ration system for weaned calves (treated straw) has been completed, and a computerized record-keeping system for several livestock research stations is being developed.

In Israel, the dairy team altered the timing of certain phases in their workplan, in light of unanticipated difficulties in generating comparable sets of information from both Egyptian and Israeli teams. (These difficulties are being addressed in the computerization of record-keeping in Egypt.) The two main lines of Israeli effort remain developing a feeding system for young calves and developing an efficient cooling system in summer for dairy cows.

Preliminary examination of the first effort's data indicates that liquid-state complete rations (costing half as much as milk or milk replacer) boost growth in body weight during the first 10 days of age, as compared with normal milk and concentrate rations. However, the reverse is true at 20 and 30 days of age.

The cooling system experiments center on an automated wetting system, involving repeated water sprays lasting only a few seconds, followed by forced ventilation for periods of minutes. Variables studied include the duration of both wetting and cooling periods, the effect of cow density in holding areas, and the daily frequency of cooling treatment. Although the data obtained are under analysis, preliminary examination strongly suggests that a powerful cooling method is available for application on farms, one which can be effective even in the most extreme hot weather.

a.4. Medicinal Use of Desert Flora

Principal Investigators: D. Palevitch, Z. Yaniv (Israel)
K. Awaad (Egypt)

Selection of ethnobotanical survey locations (western desert, Alexandria to Borg El-Arab - Egypt and southern part of Negev and Arava deserts - Israel) were made, and the collection, identification, and grouping of specimens has begun in both countries.

In Egypt, soil and weather data for the survey locations was collected. However, most activity in the field was limited by the unavailability of a vehicle suitable for long desert trips. (This problem is being circumvented by rental of a temporary vehicle until the arrival of a purchased vehicle from the U.S. in March/April 1986.)

In Israel, the first stage of research was an ethnobotanical survey, to record plants known in folk medicine for their therapeutical properties. If three or more informants mentioned such a property in a given plant, it was accepted as a valid medicinal folk medicine, and its identity was checked via live specimen or photograph. Most of the individuals interviewed were active as herbal healers; 23 were interviewed in various arid zones, e.g. Gaza strip, Beersheva, Mizpe Ramon, Jericho, and the Dead Sea.

The first group of plants chosen for investigation are those thought to reduce the concentration of blood sugar. A list of 25-30 plants known for their hypoglycaemic activity was developed, both from interviews of herbal healers and from the literature. A computerized survey is underway, to confirm their role as potential raw material for medicines.

Other desert plant properties identified by several folk healers include treatment of rheumatism, skin and eye infections, burns, and head-, tooth-, and stomach-aches. Researchers have not made any selection among these plants for further investigation at this point.

Plans were made for the next stages of work, to follow identification of the most promising plants collected in the ethnobotanical surveys: domestication assessments at research stations in both Egypt and Israel, development of cultural practices of selected plants for therapeutic and pharmaceutical raw materials (e.g. alkaloids, glucosides, oleoresins, essential oils), chemical analyses of active compounds, and animal tests of the most promising compounds.

a.5. Solar Heating of Soils for Pathogen, Weed, and Insect Control

Principal Investigators: Y. Katan (Israel)
M.F. Abdel-Reheim, M. Satour (Egypt)

Research cooperation between the Egyptian and Israeli solar heating teams has been in progress since 1981.

In Egypt, 2 sets of experiments have yielded results during this reporting period. (The third set is detailed below, to indicate activity expected to provide results in the coming year.)

1. Long-term Experiments.

Following soil treatment on 5 sites in the summer of 1983, the winter crops of 1983/84 showed over 50% more fresh weight in clover yield; modest control of corky root fungal disease and 54% increase in yield in tomato fields; superior growth, yield, and bulbing in onions; 100% increase in cucumber yield; and complete control of broomrape in broadbean plots.

2. Experiments Mulched in 1984.

Soil treatment over six weeks in July/August 1984 produced the following results at 3 sites: portulaca abounded under the sheeting during mulching of plots later planted with tomato, which showed a 72% increase in fruit yield; low-quality local strawberry seedlings showed a 50% increase in fruit yield. The third plot was cultivated with onion for seed (bulb) production, using bulbs from the long-term experiment. This plot resulted in an increased seed yield of 24% and a dramatic reduction of Tylenchorhynchus nematode.

3. Experiments Mulched in 1985.

From mid-June through late July, fields were mulched to begin experiments on onion (both for seed production and direct harvest), broadbean, rapeseed, cucumber (under plastic greenhouses), and tomato. One of the broadbean plots will examine the control of Orobanche, and broadbean seeds will be inoculated with Rhizobium.

A principal focus of this season's experiments is determining the optimum duration and timing for mulching the soil. In addition, a large plot for long-term observation was established, which will also be used as a demonstration plot (to be cultivated with onion for seed production).

Israeli investigators have concentrated on establishing simulation systems in which various factors (e.g. heat, pathogen mortality, volatile movement) can be followed separately or in combination. In these systems, soil samples are exposed to heating regimes similar to those prevailing in solarized soils under field conditions. In particular, the reinfestation of solarized soils by pathogens (simulating the situation in furrow-irrigated soils) is under study.

Preliminary results include 90-100% reductions in the pathogenic fungus Verticillium dahliae to the depth of 70 cm. This and related findings indicate that mechanisms other than thermal killing are involved. In addition, recent results on the long-term effects of solarization ("induced suppressiveness" of pathogens) and on combining this treatment with biocontrol agents or reduced pesticide dosages show that these may be promising lines of further inquiry.

In conjunction with the Egyptian team, as indicated above, experiments are underway which will assess solarization's potential advantages in the production of plant propagation material (e.g. seed onions). Studies are also in progress to determine the practicality of re-using the plastic tarping, to lower this technology's cost to the farmer.

The side-effects of solarization, in the opinion of the Israeli team, are research topics as significant as the technology's major purpose (control of soilborne pests). Therefore, research using simulation systems dealing with salt movement in the soil is now underway, focusing on soil samples collected from various sites in Egypt. (So far, reduction of soil salinity following solarization is a phenomenon observed only in Egyptian soils.)

First results of these experiments support the Israeli team's working hypothesis: that mulching salinity-affected soils with the solarizing tarp for several weeks stops water evaporation from the soil, eliminating the upward movement of salts from a source at deeper soil layers (e.g. ground water or high water tables).

The Israeli team initiated studies which deal with microbial and chemical mechanisms possibly involved in the phenomenon of increased growth response (IGR), i.e. the beneficial effects of solar heating of soils, beyond that of disease control. These studies involve continuous chemical analyses of soils and examination of the effects of microorganisms found in the rhizosphere of plants growing in solarized soils.

Preliminary examination of data from chemical analyses indicates the following: Solarization frequently enhances the release of minerals in the soil, slightly reduces soil pH, increases calcium concentration (an element associated with increased plant resistance to various soilborne pathogens), and in some soils, increases the concentration of soluble organic substances (e.g. fulvic acid).

Microbial analyses show that solarization reduces the total number of fungi, bacteria, and actinomycetes. However, the number of bacteria in the root-zone of plants in solarized soil increased considerably. Most significant among the findings is the marked increase in fluorescent pseudomonas bacteria in the root-zone; these are well known as beneficial microorganisms which improve plant growth.

a.6. Evaluation of the Methods for Technological Exchange in Agriculture

Principal Investigators: S. Pohoryles, D. Yaron (Israel)
A.M. Basheer (Egypt)

Focusing in the first year on the technological data and experimental results of the Solar Heating of Soils subproject, the Egyptian technology evaluation team commenced literature review and data collection in February 1985. They also met with the Solar Heating team to review the solarization group's methodology and to visit one of the long-term experimental sites (in Fayoum), where solarization treatments were made on fields planted later with onions.

In the second six months of Year 1, the Egyptian team addressed methodology questions in the evaluation effort on soil solarization, deciding on an economic and social feasibility study to be conducted jointly among the TATEC project's economists and solarization specialists.

Among the subjects considered in refining the methodology were: cost-benefit analyses of solarization (in comparison with other weed/disease control methods), comparisons of the economics of manual vs. mechanical application, the opportunity costs involved in using the technology (duration of treatment and its affect on farmers' choice of crops), re-usability of plastic tarps, and potential for reinfestation of fields via irrigation water (risk to the farmer).

Standards for data to be collected were agreed on, and the data collection began.

The Israeli team reviewed literature on agricultural technology diffusion and held several lectures, seminars, and group discussions on modernization of agriculture, extension methods, and diffusion of agricultural innovations in developing countries. They also began 4 studies, commencing their work on the economic evaluation of technologies for exchange: solar heating of soils, double cropping, agricultural development on Arab farms in Israel 1971-81, and supporting systems for agriculture.

Considerable progress has been made on 3 of the 4 studies, as noted in the report appearing in Appendix A. The evaluation of double cropping is in the preliminary stages (literature review and data collection). The reader is referred to the Appendix for details on the progress of the other 3 studies, which are too complex to summarize adequately here. Supplementary reports on these 3 studies are in preparation.

b. Description of Regional Cooperation Activities
(visits, meetings, exchanges of papers or data, etc.)

b.1. Cropping System and Water Use Subproject Meetings:

October 8-9, 1984, Egypt (2 senior Israelis: Drs. Marani, Pinthus)
January 6-10, 1985, Egypt (1 senior Israeli: Dr. Marani)

Discussion on the promotion of grain yield of wheat was held at the Ministry of Agriculture, Cairo, during two visits in October 1984 and January 1985. The discussion covered field trials at the Lakhish experimental farm on the development of wheat under dryland vs. irrigated conditions.

August 11-12, 1985, Egypt (1 senior Israeli: Dr. Bresler)

Met with Drs. A. M. Abdel Shefy and A. S. Badawi to discuss the possibility of integrating certain aspects into the experiments carried out at Gemeiza. It was concluded that toward the start of the Gemeiza work, Drs. Bresler and Abdel Shefy will meet in Egypt to set up the experiments in accordance with the project's aims. Dr. Bresler provided informative material relevant to planning the experiments.

b.2. Economic Evaluation of Integrated Cropping and Water Use Systems Meetings:

September 1984, Egypt (3 senior Israelis: Prof. Pohoryles, Dr. Szeskin, Prof. Yaron)
December 1984, Egypt (1 senior Israeli: Prof. Yaron)
January 1985, Egypt (2 senior Israelis: Profs. Yaron and Bresler)

During these visits, the subproject implementation plan for the first year was jointly prepared with the Egyptian co-investigators.

June 27-July 5, 1985, Israel (2 senior Egyptians: Drs. Mohieldin, Habashey)

General review of progress to date, with submission of oral and written reports to the Project Coordinating Committee. Dr. Habashey provided additional oral presentation on related aspects of the subproject's subject area.

b.3. Dairy Production Subproject Visits:

December 1984, Egypt (2 senior Israelis: Drs. Berman and Kali)
January 1985, Egypt (1 senior Israeli: Dr. Berman)

During this period 2 visits of Israeli investigators on the dairy production subproject were made to Egypt. On the first visit in December, various aspects of the implementation plans for the subproject and the locations of experimental work were discussed.

The second visit to Egypt took place in January 1985. At this meeting final implementation plans for the subproject were developed by both Egyptian and Israeli investigators, outlining the topics of the study and the sequence of points to be examined. Potential sites for the experimental work in Egypt were visited.

b.4. Medicinal Plants and Desert Flora Subproject Meeting:

November 12, 1984, Egypt (1 senior Israeli: Prof. Palevitch)

Meeting held in Cairo on November 12, 1984, which set up guidelines and cooperation in research by Egypt and Israel. The two parties will accomplish a literature review of potential medicinal plants that grow wild in the desert area. The plant list will be based primarily on ethnobotany surveys held in the two countries.

The two countries will exchange throughout all research periods: seeds for propagation, results of chemical analysis, literature reviews, results of ethnobotanical surveys, and horticultural studies.

June 27-July 5, 1985, Israel (1 senior Egyptian: Dr. Awaad)

Met with Dr. Palevitch and visited experimental stations at Neve Yaar and Bet Dagan. Discussed various aspects of the research plan. Dr. Awaad stated that the lack of a venicle has prevented the start of the project in Egypt. This problem was discussed with American project administrators (Messrs. Kincaid and Abbo*t).

b.5. Solar Heating of Soils Subproject Visits:

November 1984, Egypt (1 senior Israeli: Prof. Chen)

Israeli Professor Yona Chen, a soil chemist who is investigating chemical and salinity changes occurring in solarized soils, visited Egypt in November 1984. Attending the meeting were cooperating plant pathologists and soil scientists from Egypt. Focus of the discussion was the phenomenon of decreased salinity occurring in soil. Plans were made to carry out soil chemistry/salinity experiments in both countries.

May 16-23, 1985, Egypt (2 senior Israelis: Dr. Grinstein, Prof. Rabinowitz, plant physiologist specializing in onion culture)

Visited Drs. Abdel Reheim and Satour, to view experimental onion plots and discuss the possibilities for solarization research using this plant. Special emphasis was placed on onion seed production. Other topics (e.g. nematode and weed control) were also discussed in the context of plans for the next year's work.

June 27-July 5, 1985, Israel (2 senior Egyptians: Drs. Abdel Reheim and Satour)

Met with Prof. Katan and Dr. Grinstein, visited solarization experimental sites, and discussed aspects of their on-going, joint efforts. Presented joint oral and written reports to the Project Coordinating Committee, including a plan for implementing the coming year's work.

September 19-24, 1985, Egypt (2 senior Israelis: Dr. Grinstein, Prof. Chen)

Visited to discuss the possibility of reducing salinity in soils by solarization. This approach to soil salinity problems is new to the science of soil solarization, and guiding concepts need to be established. For this purpose, soil profiles were examined at 3 sites: Fayed, Manayef, and Tamiya, to evaluate salinity levels. Other matters of mutual interest were also discussed.

Throughout 1985 the solarization teams of Egypt and Israel were in contact by mail and telecommunications, data were exchanged, and consultations were carried out.

b.6. Economic Evaluation of Technology Exchange Methods:

September 1984, Egypt (3 senior Israelis: Drs. Pohoryles, Szeskin, and Yaron)
December 1984, Egypt (1 senior Israeli: Dr. Yaron)
January 1985, Egypt (2 senior Israelis: Drs. Yaron and Bresler)

During these visits, a subproject implementation plan for the first year was jointly prepared with the Egyptian co-investigators, and overall project coordination was discussed in detail.

March 1985, Israel (2 senior Egyptians: Drs. Kheireldin and Dessouky)

Although this visit's major activity involved the CALAR/San Diego State regional cooperation project, Drs. Kheireldin and Dessouky met with Profs. Pohoryles and Yaron to discuss the Technology Exchange project's activities and progress since the January coordinating committee meeting in Cairo.

June 27-July 5, 1985 (2 senior Egyptians: Drs. Basheer & Mansour)

Met with Profs. Pohoryles and Yaron; Drs. Szeskin, Feinermann and Dinar; and U.S. advisor Prof. Dorfman during the Project Coordinating Committee, providing the Committee with oral and written progress reports. Israeli hosts provided similar presentations on technical aspects of this subproject in working group sessions. Both teams agreed to focus on the evaluation of solarization as the first step in this subproject, due to the volume of data available over several years of solarization experiments conducted jointly and singly in both nations. Technical aspects of the various approaches possible were discussed.

August 11-12, 1985, Egypt (1 senior Israeli: Prof. Yaron
(1 U.S. advisor: Prof. Dorfman)

Met with Drs. Mohieldin, Basheer, Habashey, and Mansour of the economic subproject teams, as well as Drs. Abdel-Shefy, Badawi, Aziz, and Darwish from the Cropping Systems team. Profs. Bresler and Dorfman also attended, as did Mr. Ovadia Kedar, resident Israeli consultant to the Egyptian Ministry of Agriculture's experimental farm at Gemeiza. At the meeting, the following decisions were made (and subsequently approved by Minister Wally):

(A) The work at Gemeiza (of Egyptian investigators and Mr. Kedar) will be incorporated into the TATEC project, to provide an additional information base for the evaluation of the various technologies.

(B) Two subjects were earmarked for intensive cooperation between Egypt and Israel in this subproject: (1) evaluation of costs in various irrigation systems, with emphasis on water pricing, and (2) economic evaluation of solar heating for soil disease control.

(C) Prof. Bresler (economist) and cooperating Egyptian scientists (irrigation, water, and field crop specialists) will prepare a joint proposal on technological aspects of irrigation. This will be suggested to the Project Coordinating Committee as a candidate for an additional subproject.

(D) Visits among the scientists of the Cropping Systems and Dairy teams will be encouraged, to promote the research planned on these subjects.

At a second meeting, Profs. Yaron and Bresler met with Cropping Systems scientists (Drs. Abdel-Shefy and Badawi) and Mr. Kedar. They reviewed the layout of the double cropping experiment at Gemeiza, and ideas for an irrigation technologies subproject were discussed, as background for preparing a proposal on a joint additional subproject. Dr. Dorfman remained in Egypt through August 16, participating in technical discussions of the economic studies planned and underway, and visiting wheat and maize experimental sites of the Cropping Systems subproject.

b.7. First Project Coordinating Committee Meeting:

January 7-10, 1985, Egypt
(4 senior Israelis: Drs. Yaron, Berman, Marani, and Bresler)
(1 American scientific advisor/PCC member, and 1 American administrator/observer)

Cooperation among the Egyptian and Israeli investigators went quite smoothly, with fruitful discussions and agreements that finalized previous technical discussions (Israeli visits to Egypt, Oct-Dec '84). This meeting was the first since project inception (Oct 84) to involve any American project/subproject scientist advisor. Dr. Robert Dorfman of Harvard University participated as subproject advisor to the Economic Evaluation subprojects, as well as one of the

two U.S. project advisors. Mark Abbott represented the other advisor, D. R. Kincaid, Director, OICD/IRD, addressing administrative issues for the most part. Field sites in Gharbia Governorate (at Gemeiza - Cropping Systems module) and in Kafr el Sheikh (at Sakha - Dairy module) were visited and chosen for use in the project, along with previously visted sites at Nubariya (New Lands area west of the Delta). Also visited was the massive New Lands center-pivot irrigation site at El Salhia east of the Nile Delta, near Ismailia. Minister of Agriculture Youssef Wally approved the use of the sites chosen for field work, as well as visits of Egyptian scientists to Israel.

Two days of meetings in Cairo, with two days of field trips in between, resulted in final, written implementation plans for all subprojects except for Solar Heating of Soils. (Solar Heating, as an on-going bilateral activity, will be submitted separately. Medicinal Uses of Desert Plants was submitted in writing by the Israeli principal investigator and approved by his Egyptian counterpart, following Dr. Palevitch's recent visit to Cairo in December).

b.8. Second Project Coordinating Committee Meeting:

June 27-July 5, 1985, Israel
(7 senior Egyptians: Drs. Mohieldin, Basheer, Mansour, Habashey, Abdel Reheim, Satour, and Awaad)
(1 junior Egyptian administrative official: M. A. Moniem)
(2 American scientific advisor/PCC members, and 1 American administrator/observer)

The Egyptian delegation to the first Project Coordinating Committee (PCC) meeting in Israel was headed by Drs. Mohieldin and Basheer. It included representatives of subprojects on the economic evaluation of technology exchange, solar heating of soils, and medicinal uses of desert plants. The Israeli side was represented in all fields involved in the 6 subprojects, and was headed by PCC members Prof. Samuel Pohoryles (Ministry of Agriculture) and Prof. Dan Yaron. American representatives were PCC members Dr. Robert Dorfman (Harvard Univ.) and David Kincaid (USDA), U.S. administrative officer Mark Abbott (USDA), and Roy Simpkins (Science Attache, U.S. Embassy/Tel Aviv).

During the visit, interpersonal relations were consistently warm and professional, with social events during the visit having the flavor of old friends and colleagues getting together again. Site visits were very well organized and attended; they included trips to various agriculture production and processing centers and visits to some of the several different farming systems found in Israel (kibbutz, moshav, moshav shitufi).

At the first session of the PCC, Dr. Pohoryles opened the meeting with a discussion of the rural and agricultural situation in Israel. Dr. Mohieldin made a statement on the hope and potential for benefits to both sides--Egypt and Israel--of this trinational project. The second half of the meeting was of a review of the economic evaluation project by Dr. Yaron and a discussion by Dr. Feinerman of the distribution and diffusion of drip irrigation technology and the adoption of drip irrigation in areas with crops formerly cultivated using sprinkler irrigation.

At a separate session of the soil solarization teams from Egypt and Israel, Drs. Abdel-Reheim and Satour presented the latest data from their 1984-85 field experiments. Dr. Katan pointed out several unexpected results of soil solarization field work in Egypt, most notably an evident reduction in soil salinity and the technology's effectiveness even in conventionally irrigated fields (gravity or furrow irrigation). Areas for major emphasis in the coming year were agreed upon.

In sessions of the economic teams, Dr. Basheer gave a description of the work being done on economic evaluation of the solar heating project, followed by a technical briefing given by the soil solarization teams. Dr. Yaron discussed a framework for analysis of "exchangeable technology:" first, design a long-term sequence of events/treatments and then analyze these under various price situations. If the technology appears to be "transferrable," field trials and semi-commercial applications would be set up.

Dr. Habeshay gave an insightful discussion of Egyptian price policy and its relation to the cropping pattern. This talk emphasized that cropping patterns generally are not controlled by farmers, but are managed by different Government agencies with differing interests.

Several items were discussed at a meeting of the Coordinating Committee on Monday, July 2:

-- Dr. Yaron's plans for sabbatical leave at Oxford University (for 1 year, starting September 1985);

-- the best approach to take regarding add-on subprojects;

-- the need to strengthen the technical evaluation of the water use aspects of the Cropping Systems subproject;

-- the need for increased funds for field demonstrations in Egypt, in order to provide for an extension specialist on the project (most likely at Gemeiza);

-- in the solar heating project, the need for small plot experiments to be expanded to semi-commercial applications.

-- operational administrative issues, e.g. expediting shipments of materials and visas for travelers between Egypt and Israel

-- agreement to hold the next PCC meeting in Cairo in January 1986. It will not include separate subproject Principal Investigators, except for reports on the activities of the subprojects on the Egyptian side. These reports would result, in part, from subproject team meetings (international visits), which Principal Investigators may schedule as needed and mutually convenient.

The PCC drafted and released a communique for the press. The local press had taken notice of the visit on the first day. Coverage throughout the visit was low key and in accordance with the wishes of both the Israeli hosts and the Egyptian visitors.

APPENDIX 2

ARID LANDS RESEARCH WORK SUBMITTED

Cooperative Arid Lands Agriculture Research Program

A program funded by the Agency for International Development/Bureau for the Near East
Administered by San Diego State University Foundation □ San Diego, CA 92182

NEWSLETTER

SPRING 1986

Workshop Held in Alexandria, Egypt

Dr. El-Beltagy *explains water management at El-Qasr experimental site, Marsa Matruh.*

CALAR's Annual Scientific Workshop II took place in Alexandria, Egypt, from January 15 to 23, 1986. By all accounts, the goals set for the workshop were attained with considerable success. These goals included: (1) Permitting as many CALAR participants as possible, especially those from Egypt and Israel, to attend the meetings and to visit research sites; (2) Optimizing interpersonal interaction among all participants at formal and informal levels; (3) Creating a common experience shared by all participants for the duration of the workshop; (4) Maintaining scientific and technical reporting and presentations at the highest professional level; (5) Creating an overall climate of authentic cooperation; (6) Enhancing and maintaining interpersonal relationships among the participants and setting the stage for the establishment and development of new relationships with which newcomers to the workshop can be involved; and (7) Critiquing the achievements of CALAR and discussing alternative courses of action.

The preparation for the workshop took these goals into account. The expansion of the budget supporting cooperative efforts between CALAR scientists permitted widening the scope and level of participation. Furthermore, additional funding support from the Fred J. Hansen Institute for World Peace helped make the workshop one of the largest meeting of its kind ever between Egypt, Israel, and the United States. The workshop was attended by some 88 participants. The Israeli delegation consisted of 24 participants, including a Steering Committee member, principal investigators, first and second level scientists working on research and application, field researchers, and field technicians. They represented the following institutions involved in CALAR: Agriculture Research Organization; Hebrew University, Rehovot; Ministry of Agriculture; and Ramat-Negev Extension Station.

Similarly, the Egyptian delegation, totalling 52, represented

Continued next page

Workshop . . . *Continued*

all levels of participation in CALAR and a large number of institutions: Agriculture Research Center, Ministry of Agriculture; Ain Shams University; Al-Azhar University; Alexandria University; Assyout University; Benha University; Mansoura University; and National Research Center, Cairo.

Mrs. Afiat El-Menshawi, CALAR Project Office Director, and staff members Messrs. Mahmoud Kamel and Gamal Tawfiq handled the local arrangements of the workshop in Egypt, as well as attended the meetings.

The U.S. delegation included Drs. William Bemis and Wilford Gardner (University of Arizona, Tucson) Emanuel Epstein (University of California, Davis), Harold Johnson (University of Missouri, Columbia), and Cyrus McKell (Native Plants, Inc., Salt Lake City). Messrs. Steve Bloom and Kent Gibson represented the San Diego State University Foundation. In attendance also were Dr. Mohamed El-Assal, CALAR Program Coordinator, and Ms. Peggy Luckett, San Diego CALAR Program office.

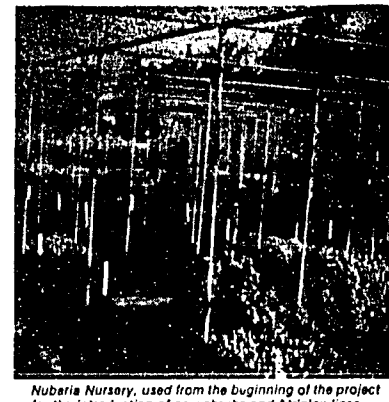
Opening and closing sessions, as well as site visitations, were also attended by Mr. Joseph Beausoleil, Agricultural Development Officer, U.S./AID, Cairo, and Mr. Robert Ressegule, ANE/TR/ARD, AID, Department of State, Washington, D.C. In addition, Mr. Robert Carr, Counselor, Scientific & Technological Affairs, U.S. Embassy, Cairo, as well as a number of dignitaries from the Egyptian Ministry of Agriculture, attended the opening and closing sessions.

Opening the session on the evening of March 15th at the Mena House Hotel, Cairo, Mr. Mohamed Dessouki, Undersecretary of State, Foreign Relations Department of the Ministry of Agriculture, welcomed the delegates to Cairo and emphasized the cooperative nature of CALAR. Drs. El-Beltagy, Pasternak, and El-Assal gave short presentations explaining the importance of the meetings and the goals they hoped to achieve. Mr. Beausoleil also addressed the group, outlining the role that AID plays in cooperation. After these presentations, the group spent the rest of the evening in informal interactions.

During the period of March 16-19, the group traveled by bus to various CALAR research, demonstration, and implementation sites in Egypt. Highlights of these visitations included:

- Saudi farm (a private Egyptian company, 5,000-acre). A presentation was given by the farm manager. This farm represents a model of several private sector farms in this area dealing with arid land development. The activities include animal husbandry and off-season vegetable production, outdoors or under plastic houses.
- Tahrir and Nuba-Seed Companies. Mr. Fouad Abu-Hedb, Chairman of both companies, explained the activities of these two companies, which belong to the Ministry of Agriculture. He also explained the Ministry's master plan of development for this arid land area.
- Nubaria Research Station. Dr. Thanaa Hassan and his colleagues briefed the group as to the function of the station and its involvement in the CALAR program. The station has conducted various experiments in *Atriplex* species and, as a consequence, its nursery has supplied large numbers of *Atriplex* seedlings to farmers in the Fouka area, as well as distributed shrubs to the Bedouins in the area.
- Borg El-Arab Animal Research Station. Dr. Adel Aboul-Naga and his colleagues gave a presentation of the work done at this station in connection with the CALAR program. On-site elaborations of the ideas presented were given at the animal enclosures. It was interesting to find that some of the

Continued next page



Nubaria Nursery, used from the beginning of the project for the introduction of new shrubs and Atriplex *lines.*

CONTENTS

COOPERATIVE ARID LANDS AGRICULTURE RESEARCH PROGRAM (CALAR)

Funded by the U.S. Agency for International Development/Bureau for the Near East

Administered by San Diego State University Foundation
San Diego, CA 92182

With support from the Fred J. Hansen Institute for World Peace
San Diego, CA

Mohamed El-Assal, Ph.D.,
CALAR Program Coordinator
6505 Alvarado Rd., Ste. 108
San Diego, CA 92120
Phone: (619) 265-4262
Telex: 335 1733
(CLG EXSTUD SDC)

Adel S. El-Beltagy, Ph.D.,
Project Coordinator/Egypt

Dov Pasternak, Ph.D.,
Project Coordinator/Israel

Workshop . . . *Continued*

problems faced and research findings concluded by the Egyptians were similar to those faced by the Israelis.

- El-Dab'a Animal Research Site. Dr. Aboul-Naga and his colleagues have distributed a large number of Damascus goats to the breeders in the El-Dab'a area in a systematic way to improve the local Barki goat herds. The breeders are also cooperating with CALAR scientists in ascertaining the impact of nutrition regimes, including the ammonification of rice straws as a supplementary feed.
- Fouka Fodder Research Site. Dr. Ahmed Rammah and his colleagues represented the *Atriplex* experimental farm to the group and explained the experimental arrangement. Different varieties of *Atriplex* were transplanted in the Fouka site at the inception of the program in 1983. In spite of the fact that that year was characterised by very meager rainfall, a certain amount of the transplanted shrubs were left without irrigation in order to measure the degree to which they can survive under harsh drought conditions. The group also visited the small nursery at Fouka, and were shown the buffalo gourd plants, which are a part of the industrial crops planted at the site.
- Marsa Matruh area. His Excellency Yusri El-Shami, Governor of Marsa Matruh, welcomed the delegates at a formal group dinner.
- El-Qasr Nursery. Dr. Rammah explained to the group that the goal of the nursery at El-Qasr is the dissemination of *Atriplex* and related desert shrubs to the Bedouins at the north coast of Egypt. Dr. Rammah indicated that the three nurseries at Nubaria, Fouka, and El-Qasr are all integrated in the program, and are intended to distribute millions of *Atriplex* shrubs to the Bedouins. So far, close to one million shrubs have been distributed to the Bedouins in 20 acre mini-ranches.
- Various implementation sites. The group visited rain catchment areas and saw how the farmers harvest rainwater and pump it through drip irrigation lines to grow fruits and vegetables. They also saw *Atriplex* mini-ranches in which Bedouins are caring for their *Atriplex* shrubs, sometimes using drip irrigation to enhance their yield. In a number of these ranches the Bedouin were grazing their flocks and herds, to which, as previously indicated, Damascus sheep and goats were introduced by CALAR to enhance meat and milk qualities of the indiginous Barki herds.
- Bedouin tea. The group was invited for a tea in Sheik El-Me'affin's tent. At that gathering an extensive question and answer exchange took place between the CALAR scientists and the Bedouins.
- El-Bousseily sand dunes. Dr. El-Beltagy and his colleagues described the potential of the area as well as the project plan to modify and optimize productivity and quality under saline conditions. The area consists of more than 650,000 acres and extends across the northern coast of the Nile Delta, from approximately 40 miles east of Alexandria all the way to Rasheed. Local farmers use highly brackish drainage water for irrigation to grow off-season vegetables. The CALAR program has research and implementation sites in this area, where the group saw the water management sites and visited the farmers who are cooperating with CALAR. The scientists of the salinity program have been working with the farmers to improve their water management techniques by introducing drip irrigation and other elements to help with the improvement of fruit quality and yield.
- Salinity Laboratory at Bakus. Dr. Abdel Muhsen Khalil introduced his colleagues to the group and escorted the delegates for a tour of the lab facilities. Different experiments connected with CALAR were presented and discussed.

Continued next page

Dr. Aboul-Naga *explains the activities by the animal enclosures at Borg El-Arab Experimental Station.*

Workshop . . . *Continued*

At the Bedouin Farm of Sheik El-Mea'ffin. *Note the large Damascus buck introduced by CALAR to cross-breed with the local Barki goats.*

The site visits were followed by three days of reporting in which research papers were presented and discussed. The general session opened with presentations and reviews of progress by the PI's of each activity: Drs. Adel El-Beltagy and Dov Pasternak (salinity); Drs. Amos Dovrat and Ahmed Rammah (fodder); Drs. Adel Aboul-Naga and Reuven Yagil (small animal); and Dr. Meir Forti (industrial crops).

This was followed by general presentations by the American scientists dealing with reviews of the state of the art in relation to their topics: Dr. Emanuel Epstein (salinity); Dr. Willford Gardner (salinity research in Arizona); Dr. Cyrus McKell (fodder); Dr. Harold Johnson (animal nutrition, with special reference to sheep and goats); and Dr. William Bemis (buffalo gourd). The meeting then reconvened in the three major groups.

The presentations of the salinity group began with an overview by Drs. El-Beltagy and Pasternak on the current research and objectives of the salinity program. Presentations then covered five areas:

STRESS PHYSIOLOGY

"Effects of salinity on the domesticated tomato and on the tomato relatives," Dr. Dov Pasternak;

"Response of tomato plants to salinity," Dr. Osman A. Azim;

"Physiological properties of tomato species under salinity," Dr. Yehoshua Saranga;

"Background on the protected cultivations of tomato and some other vegetables," Dr. Ayman F. Abou-Hadid;

"Effect of different levels of salinity on the seed germination of different varieties of *Atriplex* and annual medics," Dr. Osman El-Kely.

NUTRITION

"A role of cobalt in salt-tolerance of plants," Dr. Ahmed Abdel Fatah Ibrahim;

"Osmotic and specific ion effects in tomato plants exposed to different Ca/No ratios in nutrient-salt solution," Dr. Amos Feigin; and

"Comparative studies on Na, K and Cl solution in two different cultivars of tomato grown under saline conditions," Dr. Osman A. Azim.

AGROMANAGEMENT

"Possibility of using saline water in El-Bousselly area," Dr. Abdel Mohsen Khalil;

"Irrigation and fertilization management of industrial tomatoes irrigated with saline water," Dr. Yaakov Peretz;

"Salinity and herbicides' interaction during tomato growth," Dr. Mamdouh F. Abdalla;

"Agromanagement of processing tomatoes under irrigation with brackish water," Dr. Yoel de Malach.

QUALITY

"Effect of salinity on the yield and quality of normal and non-ripening mutant tomatoes," Dr. Abdel Rahim Sharaf.

BREEDING

"Tomato breeding," Dr. Mohamed Abdel Maksoud;

"Genetical aspects of salt-tolerance," Dr. Yehoshua Saranga;

"Evaluation of some melon cultivars for salt-tolerance," Dr. Refaat Helal; and

"The genetics of salt-tolerance in melon," Dr. Sam Medlinger.

The fodder/animal project included the following presentations:

MICROFLORA

"Inoculation of grasses with *Azospirillum*," Dr. Y. Okon.

"Non-symbiotic N fixation in barley in the north coast of Egypt," Dr. Gamal Hassouna.

"Inoculation of legumes with *Azospirillum* and *Rhizobium*," Dr. E. Yahalom.

SHRUB MANAGEMENT AND PRODUCTION

"Comparative study of *Atriplex* species grown at Nubaria calcereous soil," Dr. Ahmed A. Younis.

"Rationale for current shrub experiments in Migda," Dr. Noam Seligman.

"*Atriplex* productivity under different irrigation treatments at Fouka," Dr. Thanaa Hassan.

BIOMASS

"Standing biomass, growth and regrowth of shrubs," Dr. Meir Forti.

"Behavior of two *Atriplex* species grown in salt-affected soil

Continued next page

Dr. El-Assal *(left)* and Mr. Mohamed Dessouki *(right) in discussion with* Mr. David Nahmias *and* Dr. Noam Seligman, *at the shrub nursery at El-Qasr.*

Workshop . . . *Continued*

Dr. Ahmed Rammah (center) explains the activities at El-Qasr Nursery. Also shown are Dr. Emanuel Epstein, Mr. Steve Bloom, Drs. Amos Dovrat, Reuvin Yagil, Shaul Levi, Mr. David Nahmias, *and* Dr. Thaana Hassan.

at Manzala Lake area," Dr. Mohamed Aboul El-Magd.

"Methods for estimating total shrub and leaf biomass," Dr. Noam Seligman.

"Chemical analysis of *Atriplex* species grown at Nubaria in calcereous soil," Dr. Y. El-Hayatmi.

"Response of *Atriplex* species to soil application of fertilizers," Dr. G. Samy.

"N balance in sheep feeding on shrubs," Dr. Roger Benjamin.

"Questionnaire and data collection of sheep and goats in the coastal zone of Egypt," Dr. Badr Aboul-Ela.

Dr. Adel El-Beltagy *introduces* Gov. Yusri El-Shami *to* Dr. William Bemis. Dr. Hussein El-Henawy *looks on.*

"System analysis and models of sheep and goats," Dr. Hassan Mansour.

"Improving production of Barki goats through crossing with Damascus goats in the experimental farm and in the field," Dr. Adel Aboul-Naga.

"Climatalogical studies on Barki goats and their crosses with Damascus goats," Dr. Badr E. Aboul-Ela.

"Shrub utilization by lambs in summer," Dr. Roger Benjamin.

"Mineral survey of animals and plants in the coastal zone of the western desert," Dr. Ibrahim El-Galad.

"Studies on palatability and digestibility of *Atriplex nummularia* in sheep and goats," Dr. Esam Shehata.

Presentations on industrial crops research, and discussions of results and findings were undertaken in the panel session chaired by Drs. Meir Forti, William Bemis and Hussein El-Henawy.

A surprise birthday celebration at Marsa Matruh group dinner for Drs. Meir Forti *and* Dov Pasternak.

The last day of meetings was devoted to panel sessions for indepth discussions of the major problems in the fields of salinity, fodder, and industrial crops. Discussions included the direction and future plans of the programs as well. The panels, formed from American, Egyptian, and Israeli scientists, were each coordinated and chaired jointly by the PI's and an American scientist.

A closing session was held on the evening of Friday, March 24th, at the Marriott Hotel. Dr. El-Beltagy expressed his pleasure in the proceedings, and his hopes and highly positive outlook for the continued progress of the CALAR Program. Dr. Pasternak shared a personal revelation of what the CALAR Program can accomplish. Reflecting on the group's brief visit to the El-Alamein War Memorial site, which brought to everyone's mind the recent years of conflict in the Middle East, he proposed that CALAR can and will accomplish two goals: First, CALAR will also build a monument, a monument to life, by making the desert green. Second, all participants will be proud of this monument, and, most importantly, will feel "proud to be proud."

The group was received at the Ministry of Agriculture by Dr. Yehya Hasan, representing H.E. Dr. Yussef Wally, Deputy Prime Minister and Minister of Agriculture and Food Security; Mr. Mohamed Dessouki, Undersecretary of State, Foreign Relations Department of the Ministry of Agriculture; and Dr. Adel El-Beltagy, Egyptian Project Coordinator, for a closing banquet. Also attending were dignitaries of the Ministry of Agriculture, the Ministry of Foreign Affairs, and the American Embassy, as well as representatives of AID, and Ain Shams University.

Progress and Highlights

ISRAEL RESEARCH HIGHLIGHTS

SALINITY

Salinity research studies have been carried out at various sites in Israel, with most of the field studies being conducted at the Ramat Negev Station, 35km south of Beer-Sheva. Laboratory work was carried out at the Applied Research Institute, Ben-Gurion University of the Negev, the Faculty of Agriculture of the Hebrew University, and the Volcani Institute. The emphasis is on production of salt-tolerant tomatoes and melon varieties which are most suitable for canning or export. Elaborate fertigation systems have been used to control irrigation regimens and attain optimum water management levels.

During the last year irrigation with saline water has increased the number of tomatoes suitable for peeling from 40% to 80%. These tomatoes receive top prices from the canning industry.

Meanwhile, efforts to test different cultivars for salt tolerance have been continuously carried out. Last year, 24 tomato cultivars were compared for salt tolerance. Two salt-tolerant cultivars were identified. In addition, a wild relative of the tomato, *Solanum pinnellii*, as well as its crosses with tomatoes, has been found to be even more salt-tolerant than cultivated tomatoes. Since the salt tolerance of wild tomato is attributed to selective ion uptake, work has been carried out to identify the processes involved. Genes controlling this process are being identified.

In addition, intensive studies have been carried out on tomatoes grown on loess soils and irrigated with saline water. These studies have led to the recommendations of specific agromanagement procedures to optimize their growth and yield. On the whole the work with commercial production of processing tomatoes, which started last year, will continue in 1986. The results of that work have important scientific and economic advantages.

The same process of cultivar selection has been carried out with melons. Last year a new melon hybrid was identified as more tolerant to salinity than any existing commercial melon cultivar. Work with this hybrid is carried out in order to render it commercially viable.

FODDER

As CALAR enters into its implementation phase, thousands of fodder shrub seedlings are being planted in a demonstration range on a hilly site near Beer-Sheva. This effort is based on previous CALAR work, which showed that first estimates of biomass production confirmed the superiority of fodder shrubs in productivity when compared with annual pasture plants under arid conditions.

Meanwhile, grazing trials of lambs and ewes on fodder shrubs are being carried out at the Migda experimental farm. At this site, various grazing regimen were designed to determine the optimum results. On the whole, the food intake was high, and initial observations also show that grazing on fodder shrubs can largely replace nitrogen-rich additives normally given to sheep in late summer and early winter.

INDUSTRIAL CROPS

Eight thousand guayule seedlings - a rubber-producing desert plant - have been planted. These seedlings have been

El-Bousselly area before reclamation.

Highlights . . . *Continued*

selected from 20 different genetic lines. Meanwhile, a method for quick extraction of rubber content and other resins from guayule have been developed. Initial results show that rubber content is inversely related to water application. The rubber content ranged between 11% and 15% of dry weight. These values are among the highest ever reported for guayule. There are good indications that proper agromanagement procedures can markedly increase the rubber yield of guayule.

EGYPT RESEARCH HIGHLIGHTS

SALINITY

Salinity research programs have been carried out at various sites in Egypt, with most field studies being conducted at the El-Bousseily area and the north coast, near Marsa Matruh. Laboratory work has been undertaken at the Salinity Laboratory (A.R.C) and Ain Shams University.

At the El-Bousseily area, farmers have used drainage water with relatively high saline content to irrigate their fields in the coastal sand dunes. More basic data are collected regarding the input and output of the system, which is a very important element in helping to modify the agromanagement system in this area. A pilot drip irrigation with fertilizer injector was introduced and is currently under intensive study to compare with the traditional methods of irrigation with saline water.

A mixing unit, developed by the agromanagement team to study different ratios of saline and fresh water in irrigating tomatoes and watermelons, is now operational at El-Bousseily Experimental Farm. Root pattern studies were undertaken to understand the normal farming practice used by the farmers in this area, in comparison with that of the introduced irrigation system. In addition, a continuous monitoring of the water table is being conducted.

Shrub and Atriplex production at Fouka Nursery.

Greenhouse and laboratory experiments were undertaken to gain basic information related to the two distinct agromanagement systems used traditionally at El-Bousseily. These studies include the effect of static and changing water tables in sand culture, organic manures, and nutritional aspects under saline and non-saline conditions.

Results presented in two international meetings, and the Scientific Workshop of the CALAR Program in Alexandria, showed that the Edkawy variety of tomato, which is indigenous to Egypt, was more saline-tolerant than any known cultivars. The breeding team has already selected different lines with distinct fruit characteristics, which were included in a breeding program to modify the fruit shape and maintain high fruit quality.

Evaluation of melon cultivars for salt tolerance resulted in the identification of two top cultivars, one of which was produced in a breeding program from a local variety.

Experiments designed to investigate the role of cobalt and anti-transpirants in minimizing evapotranspiration were undertaken. Studies in relation to the specific ion effect are continuing.

A continuing interest in evaluating the impact of salinity on yield and quality of normal and unripened mutant tomato has resulted in an understanding that this element should be linked with the agromanagement irrigation scheduling in future experiments.

Preliminary studies in relation to the introduction of protected cultivation in the El-Bousseily area as a possible means to maximizing productivity have begun.

In addition, the salinity team is involved in testing various *Atriplex* and fodder shrubs for salt-tolerance, in cooperation with the fodder team.

FODDER/ANIMAL

At the inception of CALAR, a pilot field survey was undertaken to ascertain the characteristics of the management system, level of production, potentialities, and constraints for sheep and goats in the coastal zone of the Western Desert. Field data were collected on the productivity of sheep flocks and goat herds under the Bedouin conditions.

On the basis of those findings, a program was designed for improving the productivity of desert Barki goats by cross-breeding them with Damascus goats. The program had two main goals: evaluating different crosses of Damascus and Barki goats at the Borg El-Arab research station; and improving productivity of Barki goats with the breeders in the project area through distribution of Damascus bucks.

The plan was to introduce 25% of the Damascus blood into Barki goats through the use of crossbred bucks on the breeder's herd. Zaraibi (Egyptian Nubian) was also crossed with Barki and with Damascus for comparative purposes. The objective of crossing was to double milk production of desert goats (to reach 120-150 kg) and to increase the body weight of kids by about 20%.

Aside from the animals kept in Borg El-Arab Animal Experimental Station, ten bucks were distributed to the breeders in 1984, and another 55 bucks in 1985. Performance of the distributed bucks and the produced crossbred kids has been followed through periodic visits to the breeders.

Data have been collected and are being continuously evaluated on kid and lamb performance, including birth weight, weaning weight, marketing weight, and mortality up to weaning. Ewe and doe performance are also being measured, including weight of dry ewes and does at late pregnancy and during lactation, conception rate, prolificacy, and incidence of abortion. Measurements have been obtained regarding residual milk for does; feeding and management system applied; wool

Continued next page

Highlights . . . *Continued*

productivity; and marketing system for lambs, kids, and other products.

The program called for determining the adaptability of different goat breed groups to heat stress of solar radiation, and response to seasonal changes in climatic conditions. Data collected from five breed groups of six mature does each include rectal temperature, skin temperature, hair surface temperature, respiration rate, plasma, and cortisol concentrations.

Coincident with the program for herd improvement, another program has also been carried out to evaluate the nutritive value and utilization of the pasture species selected by the CALAR fodder group, *Atriplex*. The program included testing its palatability and digestibility by both sheep and goats, and the evaluation of the efficiency of utilization through grazing trials.

Measurements included physical analysis of the plants prior to and after grazing, feed intake using harnesses and markers, selectiveness of different plant parts by sheep and goats, water intake, physical and chemical analysis of the refusals, digestibility of different nutrients,nitrogen and mineral balance blood metab...tes, body weight changes, effect of grazing on revegetation, observations on different grazing behavior of sheep and goats, and the effect of mixed grazing by sheep and goats on utilizing *Atriplex*. Feed supplement (with high carbohydrate content), which was given only when body weight losses exceeded 20%, was also used to screen the level of different minerals in feedstuffs and animal tissues at different times of pasture availability in order to formulate mineral mixture supplements that should be used to increase productivity.

A systems analysis for sheep and goats has also been conducted using simulation and modeling techniques of plant and animal data to optimize the use of different resources. The technique should help in evaluating any proposed action in the management system before implementation. Trials are now being carried out to adapt the applicability of the Texas A&M systems analysis models for small ruminants using actual field data collected from the breeders' flocks.

Efforts to introduce fodder shrubs suitable for more saline and drought conditions have continued. In this regard, different lines of *Acacias* and other Australian and American indigenous species have been introduced and included in the screening program for salinity and drought tolerance.

Ms. Peggy Luckett *holding the offspring of CALAR's Damascus/Barki goat cross-breeding, shown with local farmer in the Marsa Matruh area.*

Group dinner in Alexandria. Clockwise from the top: Drs. Cyrus McKell, Reuvin Yagil *and* Harold Johnson, Mrs. Lonetta Johnson, *and* Dr. Aliza Benzioni.

A nursery was established in El-Qasr near Marsa Matruh to assist in the introduction of the most promising lines to be included in the Bedouin farms and different sites in the area near water catchment installations. This nursery, as well as a nursery established in Fouka last year, will enhance the introduction program.

Meanwhile, the fodder team is following up the progress of the distributed seedlings (approximately one million seedlings since the beginning of the program). Experiments on *Atriplex nummularia* have shown that while there were no apparent negative effects on goats, a lethal effect on sheep is being recorded (a tendency of the animals to eat each other's wool). Blood analyses and other detailed studies are undergoing to pinpoint the reason of this behavior, but what seems evident is that feeding sheep with *A. nummularia* alone is not a suitable proposition at the time being.

Finally, the project included investigating summer feeding problems in the area and ways to overcome them. An economic summer feeding system was developed, utilizing treated poor quality roughages, mainly through the ammonification of rice and wheat straw. The mineral level in these feedstuffs and in animals at different times of the year, as well as the productive status of the animals, are being monitored and surveyed.

INDUSTRIAL CROPS

The industrial crops segment of the program is mainly one of introduction of new crops which have potential industrial by-products. In this connection, continuous introduction trials are being undertaken with more indepth work related to jojoba, guayule, and buffalo gourd. The team working in this segment operate in various sites in Egypt (north coast area, Fouka, Baharia Oasis 400 km from Cairo, Nubaria area, Western Desert).

Experiments related to some nutritional and water requirement aspects have been undertaken in relation to jojoba plants in the experimental site of El-Azhar University, Cairo. This program will tie up with the agromanagement team in the salinity component for interdisciplinary efforts to introduce the agromanagement systems suitable for the new crops.

International Conferences

TOMATO PRODUCTION CONFERENCE HELD IN EGYPT

A number of Egyptian and Israeli CALAR scientists presented the results of their work in the "Eleventh Africa Symposium on Horticultural Crops: Tomato Production on Arid Land," which was held in Cairo, Egypt, December 9-16, 1984, under the auspices of the International Horticulture Society. Participants in this symposium were truly international, with representatives from Bulgaria, Egypt, England, Ethiopia, France, Hungary, Ireland, Israel, Italy, Kenya, Morocco, the Netherlands, Norway, Sweden, Tunesia, Senegal, Saudi Arabia, Sudan, USA, West-Germany, and Zambia. Five Israeli scientists were invited to the meeting by their Egyptian counterparts to present papers on related topics, and were hosted by their colleagues in Egypt. Two papers were presented by CALAR Israeli scientists, and six by Egyptian scientists with CALAR.

The closing session and conference dinner was hosted by H.E. Minister Yussef Wally. Accompanying him were Ministers Kafrawy and Ganzouri, of the Land Reclamation and Economics Departments. Representatives from the American Embassy and AID attended as well.

CALAR SCIENTISTS PRESENT PAPERS

As CALAR R&D continued to develop, many CALAR scientists are now presenting papers in international conferences around the globe.

"The First International Symposium on Desert Vegetable Production," sponsored by the International Society for Horticultural Science, was held in Tucson, Arizona, October 13-19, 1985. Papers were presented by eight Egyptian and two Israeli CALAR participants:

"Agromanagement systems for vegetable production at El-Bousseily sand dunes," A.S. El-Beltagy, T. El-Kobbia, and I.M. Anter, Ain Shams University;

"Comparative studies on the sodium, potassium, and chloride relation of Ace and T5 tomato cultivars," O.A. Osman, Ain Shams University, and A. Lauchli, UC-Davis;

"Differential response of Edkawy and T5 tomato cultivars to salinity," O.A. Osman, Ain Shams University, and J. Lynch and A. Lauchli, UC-Davis;

"Effect of different growing locations on tomato fruit storage in Egypt," M.A. Atta Aly, and A.S. El-Beltagy, Ain Shams University;

"Effect of stress imposition on pepper fruit development and endogenous levels of ethylene, indoleacetic acid and abscisic acid," A. El-Sawi, Ain Shams University;

"Growth and organic acid content in cultivating vegetables as affected by different concentrations of cobalt," T. El-Kobbia, and T.A. Ibrahim, Ain Shams University;

"Management of saline water irrigation of processing tomatoes under desert conditions," D. Pasternak, Y. de Malach, and I. Borovic;

"Protected nursery for winter tomato cultivation in Egypt," M.S. El-Beltagy, A.S. El-Beltagy, and A.F. Abou-Hadid, Ain Shams University;

"Salt resistance of wild tomato relatives," A. Danon, Y. Rudich, D. Pasternak, and D. Zamir;

"Water-nutrient management for drip-irrigated tomato," A.M. El-Gindy and A.S. El-Beltagy, Ain Shams University.

"Arid Lands Today and Tomorrow," an international arid lands research and development conference in cooperation with the Office of Arid Lands Studies and Division of Continuing Education, University of Arizona, Tucson, was held October 20-25, immediately following the Desert Vegetables Production conference. CALAR papers presented included three from Egypt and three from Israel:

"Developmental responsiveness of salt-tolerant and salt-sensitive genotypes," R. Jones, UC-Davis, M. Hashim and A.S. El-Beltagy, Ain Shams University;

"Guayule as an industrial crop in semi-arid zones," M. Forti, J. Schechter, J. Wisniak, and C. Forgacs;

"Introduction and evaluation of 120 halophytes under seawater irrigation," J.A. Aronson, D. Pasternak, and A. Danon, Ben-Gurion University of the Negev;

"Obstacles to transfer of agricultural technology," J. Schechter, Ben-Gurion University;

"Productivity and management of desert Barki sheep and goats in arid western coastal zone of Egypt," A.M. Aboul-Naga, M.B. Aboul-Ela, H. Mansour, A. Helder, E. Shehata, and A. Hassan, Animal Production Research Institute, Ministry of Agriculture, Egypt;

"Sand dune agriculture in Egypt: a possible model for development," A.S. El-Beltagy, Ain Shams University.

In addition to the two conferences above, CALAR scientists have participated in several other international conferences during the past year. These include:

"Modern Techniques of Soilless Culture," London, UK, 7/85; and

"I.S.H.S. Symposium on Protected Cultivation of Solanacea in Mild Winter Climates," Faro, Portugal, 12/85.

Fodder shrub seedlings ready for distribution, at El-Qasr Nursery.

Cooperation and Exchange

Off-season melon crop at El-Bousseily reclaimed sand dunes.

EGYPTIAN SCIENTISTS VISIT ISRAEL

During March, 1985, eight Egyptian scientists visited several scientific institutions in Israel, as well as CALAR experimental research sites. These visits included Moshav Neot Hakikar, Oceanographic and Limnological Research Ltd. Mariculture Laboratory in Eilat, Yotvata Regional Experimental Station, family farms and Kibbutzs, Institute for Desert Research (Ben-Gurion University), Tel-Izhak and Rupin Institute of Agriculture (Emek Hefer), Volcani Center, Agricultural Research Organization (Bet-Dagan), Hebrew University (Rehovot), Ashkelon Seawater Experimental Station, Ramat Negev Experimental Station, and Migda Experimental Farm.

As a part of the scientific exchange between Egypt and Israel, three Egyptian scientists, concerned mainly with the implementation of CALAR, visited Israel for one week during the month of March, 1986. Mssrs. Taher Kaseh, Mustafa Sultan and Gamal Tawfiq visited the research and implementation sites in Israel, particularly those related to the fodder/animal component of the program, including the nursery in the Applied Research Institute in Ben-Gurion University, Agriculture Research Organization, Hebrew University, Migda research site, the Ramat Negev Experimental Station, the Ashkelon Seawater Irrigation Experiment Station, and Negev settlements using brackish water irrigation. A special presentation on methods of production of salt-tolerant plants was given by Dr. Pasternak to Mr. Kaseh.

More exchange visits are planned for the coming year.

SEED EXCHANGE

A part of the cooperation between Egypt and Israel has always been the continuous exchange of seeds and cuttings.

Israeli scientists have identified a salt-tolerant line of *Atriplex barclayana*, and have transferred seeds of *A. barclayana*, as well as another *Atriplex* species, *nummularia*, to Egypt, to be included in the fodder program trials in Egypt. Different cuttings and seeds of wild and domestic plants have been transferred from Egypt to Israeli scientists Drs. Dov Pasternak, Meir Forti, and James Aronson.

The plant breeding group of the Egypt salinity team has identified the highly salt-tolerant tomato, Edkawy, which is indigenous to Egypt, and is working on the development of this variety for better quality. A sample of Edkawy seeds was given to Dr. Pasternak.

PERSONNEL DEVELOPMENT PROGRAM

The CALAR Personnel Development Program for training of junior and senior scientists continues to flourish, involving more U.S. and international institutes. Our sincere thanks to those participating institutions and especially the professors sponsoring the trainees, and other personnel involved in hosting the trainees and organizing their programs: Univ. of California at Davis and Riverside, Univ. of Arizona, Tucson, Utah State Univ., Univ. of Missouri, Texas A&M Univ., Cornell Univ., and the USDA Sheep Experiment Station, Idaho. The sponsoring professors' interest and participation in the training and research programs have been instrumental in the high degree of success and satisfaction gained by all involved.

The majority of the trainees have earned their terminal degree, and are working with their sponsors in highly specialized areas which are of interest to CALAR. The trainees usually work jointly and cooperatively with their hosts in work that may lead to joint publication of results. Past programs have laid the foundation for even more indepth studies and mutually beneficial research programs in the future.

Focus on CALAR

GOOD NEWS AND BAD NEWS

In March of 1985, the CALAR coordinators met together to submit a proposal to AID to: (1) extend the original five-year time period of CALAR for an additional three years, and (2) increase funding for the last two of the original five years in order to expand the program in the areas of cooperation, R&D, and application and development.

The good news is that both the extension of three years and the expansion funds of an additional $250,000 yearly were granted, extending the ending date to 2/28/92 and increasing yearly funding to $1.25 million. The bad news is that, due to the Gramm-Rudman-Hollings Bill, a budget cut of twelve percent was necessitated as of 3/1/86, the beginning date of Year Five of the CALAR Program.

Undoubtedly this decision will impact the expansion aspects of the program, especially in the areas of cooperation and application of R&D results. We will continue, however, to carry out the objectives of the program, and will strive to have the budget reinstated for future years of CALAR, in order to maintain the high levels of achievement and cooperation demonstrated to date.

STEERING COMMITTEE MEETING

The upcoming Steering Committee meeting will be held on May 1-3, 1986, in Washington, D.C. The meeting was scheduled for that time to coincide with the INTERSECT Workshop, organized by Mr. G. David Miller, which is taking place May 4-6. The workshop, devoted to discussions of matters and issues related to regional cooperation in the Middle East, will be attended by those involved in regional cooperation as well as representatives from Congress, AID, the State Department, and members of the House Sub-Committee on Europe and the Middle East. Holding the Steering Committee meeting at that time will permit optimal participation of CALAR members in INTERSECT proceedings.

The last Steering Committee meeting took place on March 17-19, 1985, in Beer-Sheva, Israel. Eight Egyptian scientists who were visiting scientific institutions in Israel at that time were invited as observers to that meeting.

Dr. Adel El-Beltagy explains the activities at the El-Boussaily site.

CALAR'S PARTICIPATION IN AAAS MEETING

One session of the American Association for the Advancement of Science (AAAS) Annual meeting, which will be held in Philadelphia May 25-30, 1986, will be devoted to CALAR. The session is entitled: "Future Direction of the Trilateral Arid Lands Agriculture Project - Egypt, Israel and the United States." Presentations in the session will be given by Dr. Cyrus M. McKell, Vice President of Research, Native Plants, Inc., and Adjunct Professor of Natural Resources, Utah State University, Logan, Utah; and the three CALAR coordinators, Drs. Mohamed El-Assal, Adel El-Beltagy, and Dov Pasternak. In addition, Mr. Gerald L. Kamens, Director of Middle East/Europe/North Africa Affairs section in AID, will give a presentation on CALAR as a regional cooperation model in international development. The discussant of the session will be Dr. Joe R. Goodin, Dean of Science, and Professor of Land Physiology, Texas Tech University, Lubbock, Texas.

The cooperation between CALAR and AAAS is intended to go beyond participation in the Philadelphia meetings. Actually, negotiations started some time ago to arrange for holding the CALAR Scientific Workshop III in conjunction with the meetings of the Arid Lands section of AAAS in 1987. The plan is to involve a small number of top arid land scientists in the workshop, which is scheduled to be held in Israel and Egypt in the winter or spring of 1987. Aside from the usual site visitations, the workshop is expected to materialize in the publication of CALAR achievements in a special book to be published by Westview Press. A tentative title of the book is *Proceedings, Symposium on Improving Arid Land Agriculture in the Middle East*. It is hoped that the book will serve as a valuable reference, both for cooperation and for arid land agriculture.

ARID LANDS NEWSLETTER FEATURES CALAR

The CALAR Program was featured in the September, 1985, issue of *Arid Lands Newsletter*, edited by Patricia Paylore, and published by the Office of Arid Lands Studies, University of Arizona, Tucson. The 12-page lead article, which was jointly authored by Drs. El-Assal, El-Beltagy, and Pasternak, focuses on the background, goals, and major accomplishments of CALAR. A copy of this Sept., 1985, issue of *Arid Lands Newsletter* may be purchased from the Office of Arid Lands Studies, University of Arizona, 845 North Park, Tucson, AZ 85719. A copy may also be requested from the CALAR Program Office, 6505 Alvarado Rd., Suite 108, San Diego, CA 92120.

CALAR:
THE COOPERATIVE ARID LANDS AGRICULTURE RESEARCH PROGRAM
Egypt - USA - Israel

by

Dr. A.S. El-Beltagy, Dr. M. El-Assal, Dr. Dov Pasternak
Project Coordinators: Egypt, USA, Israel

Introduction:

One of the areas of cooperation identified by the Egyptians and the Israelis following the signing of the peace treaty between these two countries on March 26, 1979, was development of arid lands agriculture in both, marking the beginning of an era of peace and cooperation.

This choice was based on national priorities and interests. About 95 percent of the land area of Egypt and about 60 percent of Israel are deserts. In both, most of the population is densely concentrated in fertile agricultural zones, and the desert is empty. In both countries, too, reclamation of the desert offers great opportunities for increasing food and fiber production.

At about the time of the signing of the peace treaty, the Fred J. Hansen Institute for World Peace, established with the San Diego State University Foundation, was concentrating its efforts on the pursuit of peaceful cooperation between Israel and Egypt. Working closely with the Egyptian and Israeli Ministries of Agriculture, the Hansen Institute convened a meeting in San Diego in June 1981, attended by top scientists from Egypt, Israel, and the U.S. Together they wrote a program for cooperative agricultural development of arid lands in the two Middle Eastern countries, the first bonafide trilateral cooperative efforts between the participants, and submitted it to the U.S. Agency for International Development (AID), Bureau for Near East, through San Diego State University Foundation. Funding began in March 1982.

From its inception, CALAR was designed as a two-dimensional program covering a cooperative aspect and a technical aspect. The latter contains three major research and development components, with the day-to-day management conducted by three coordinators, one from each country. A steering committee comprised of two representatives from each is responsible for general project policy. The following have been designated for each of the three research and development components of the technical program:

... Irrigation with saline water
Egypt: Dr. Adel S. El-Beltagy
Israel: Dr. Dov Pasternak

... Fodder and small animal production
Egypt: Dr. Adel Aboul-Naga;
Dr. Ahmed M. Rammah
Israel: Dr. Amos Dovrat

... Industrial crops
Egypt: Dr. Mahmoud El-Barkouki
Israel: Dr. Meir Forti

Each Co-Principal Investigator is responsible for undertaking the detailed plans and designs of his research program, preparation of annual technical research reports, and the overall technical/cooperative aspects of his project. In essence, therefore, the experimental plans for each of the three sub-projects are formulated separately by the research teams in each of the two countries involved. Research plans are designed specifically to suit the conditions in each country.

Scientists from leading American institutes concerned with arid land development, i.e., the University of Arizona, University of California (Davis and Riverside), Salinity Laboratory (USDA), Texas Tech, Texas A&M, and the University of Utah, are involved on several levels such as evaluation of the research programs, consultation, and training.

In Egypt, three institutes under the Agriculture Research Center, and scientists from four universities are involved in the CALAR program under the auspices of the Ministry of Agriculture.

In Israel, five institutes are involved under the auspices of Ben-Gurion University of the Negev.

In-depth scientific discussions are carried out yearly in an annual workshop attended by Egyptian, US, and Israeli scientists. Research results are presented on this occasion followed by informal discussions of the results and presentation of future research plans.

Cooperation is also carried out in the form of a one-to-one scientific exchange, exchange of seed and other propagation material, student exchange, and cooperation in specific small projects.

Because research undertaken in Egypt and Israel is oriented toward different practical applications, development aspects of CALAR differ in the two countries, according to the needs, organization, and policies of each.

Here most developmental efforts are devoted to wide-scale application of the results of saline water studies to the farming communities of the Ramat Negev region. Four mechanisms are being employed:

1) Participation of the government extension service in the research project

   Ministry of Agriculture extension officers participate in planning, execution, and evaluation of all CALAR field trials. These same workers provide all the extension services for the Negev farmers involved in implementation of CALAR research results.

2) Use of Ramat Negev Experimental Station Services

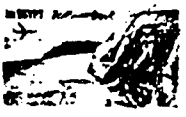
   This station is situated in the heart of a new agricultural area in the Negev which uses the local saline groundwater for irrigation. The station which belongs to the local settlements under the jurisdiction of the local Regional Council is operated by local farmers. Most field experiments are run in a manner similar to local agricultural practices.

3) Maintaining liaison with the settlements

   A liaison officer chosen from among the area's settlements serves as interface between farmers and CALAR's R&D team. This officer also carries out contractural work between the farming communities and the food processing factories (for processing tomato components of the project), and between farmers and produce export companies. He coordinates all aspects of production and marketing of new products.

4) Cooperation with seed companies

   Melon breeding for salt resistance has been carried out cooperatively with the "Hazerah" company, the largest seed company in Israel. It supplies parent material for crossing with true salt resistant lines selected by the project breeders. It also makes available its fields and its experts in melon breeding.



In Egypt the results of both the salinity project and the fodder and small animal production are being implemented using completely different, yet very effective, mechanisms than in Israel. A most efficient way to disseminate new technologies, for example, is to work directly with selected leading farmers who are willing and enthusiastic to adopt CALAR technologies. These farmers are chosen on the basis of the following five criteria:

1) readiness to accept new ideas
2) ability to cooperate with scientists in the program
3) willingness to share information and experience gained with neighboring farmers
4) representation of a typical farming unit in the study area
5) position of leadership among the neighboring rural community

The salinity group working at the El-Bousseily area has selected from the outset of the project three leading farmers representing two management systems: surface irrigation and underground irrigation. These farmers have provided input-output data for the research team. In turn, the research team used data and results from their own experimental studies to devise agron.anagement packages to be applied in these farmers' fields. Recently, fifteen additional leading farmers have joined the project.

Similarly, the component dealing with the small animal and fodder project involves the Bedouin communities of the western desert. On the basis of an elaborate study of animal breeding practices, ten breeders have been selected in El Dab'a in the Mersa Matruh area. They have received imported Damascus bucks which are being crossed with local Barki goats. Productivity of crossbred animals is continuously analyzed with more Damascus bucks being distributed to more than 75 Bedouins of the area to improve milk and meat productivity of the herds.

In the fodder element, large nurseries were established at Fouka and El-Quasr near Mersa Matruh. These nurseries produce 80,000 seedlings of *Atriplex* species for distribution to selected breeders. In addition, another 80,000 shrub seedlings, including *Acacia* and *Prosopis* spp and other leguminous trees are ready for distribution. These species will be planted in the periphery of small artificial runoff reservoirs, by the main desert water pipeline, and in Siwa Oasis which has saline water. Observations of performance are carried out in cooperation with the breeders and will supplement the results of experimental studies carried out at the pilot plot at Fouka. In addition, demonstration facilities for ammoniation of straw (rice straw brought from the valley, or barley straw locally produced) will provide additional feed to flocks of about 100 or more head of sheep and goats. The treated straw will replace a part (25-50%) of the grain and concentrates used.

CALAR represents an intensive effort to solve in scientific and methodical ways the problem of agricultural development of arid lands. So far, 45 Egyptian and Israeli scientists are involved in the project, and today, after two years of field operations, more than 150 farmers and

breeders in both countries are already participating actively and benefiting from the results. More scientists and breeders who are indirectly involved will be active participants in years to come.

CALAR's program has been publicized in three international conferences, the last being the Eleventh African Symposium on Horticultural Crops, Cairo, December 1984, where two Israeli and four Egyptian scientists presented papers on their CALAR work. Additionally, a number of CALAR papers will be presented at the International Symposium on Desert Vegetable Production and at the Arid Lands Conference to be held at the University of Arizona, Tucson, October 1985.

DEVELOPMENTAL ASPECTS OF CALAR

I. The Use of Saline Water for Production of Crops in Arid Lands

Background

Many arid areas of the world, including those in Egypt, Israel, and the U.S., suffer from an insufficient supply of water for agricultural crop production. This problem is compounded by the fact that much of the water in these areas is highly saline and unusable for conventional irrigation purposes.

Egypt faces two interrelated fundamental problems requiring an urgent solution: a continuing escalation of population pressures, and a shortage of cultivable land. Its population is now estimated to be 47 million, increasing at a rate of 2.7 percent per year. On the other hand, the actual area of its cultivated land has remained fairly static.

Some of the semiarid and arid areas proposed for cultivation have underground aquifers with brackish water, water that cannot be used for irrigation without employing a strategy of introducing salt tolerant plants suitable for the local ecological systems. In addition, several billion cubic meters of saline drainage water are lost each year through discharge into the Mediterranean. Possible use of this drainage water for intensive agriculture in the sand dune areas of Egypt is an important proposition.

In Israel, most land available for future agricultural development lies inside the boundaries of the Negev Desert. The success of this development is highly dependent on proper utilization of local saline groundwater. In the Negev, saline water is currently being used in three locations: the Arava Valley, the central Negev, and the western Negev. Electrical conductivity of waters being used ranges from two to five dS/m corresponding to soluble salt concentrations of 1,200-3,000 parts per million (ppm). It is expected that water of wells to be drilled in the future in the central Negev will have a much higher concentration of total dissolved salts (TDS). Arava Valley agriculture is based on production of high-value cash crops for the out-of-season market. In the central Negev, irrigated field crops and orchards dominate, but the proportion of mechanically-harvested vegetable crops produced for export is steadily increasing. The saline water agriculture of the western Negev is based on field crops.

Most of the experimental field work on saline water irrigation in Israel is carried out at two locations. In the Southern Arava Experimental Station at Yotvata, emphasis is on production of out-of-season vegetables, subtropical fruit, and on irrigation technology. In the Ramat Negev Station, emphasis is on mechanically-harvested out-of-season vegetable crops and on field crops using both drip and sprinkler irrigation.

In Egypt, three major areas are of interest: the sand dune coastal area, the north coastal region, and the Siwa Oasis. The El-Bousseily area is part of the coastal zone stretching from Alexandria to Rasheed, adjacent to the Abu Quir Bay. Here, where soils are saline, some areas are so highly saline that they are used as salt pans. The area is adjacent to the seashore and is crossed by extensive dunes. Most water reaching El-Bousseily is through drainage canals from the Nile delta. The salt concentration in these waters fluctuates during the year from 200-8000 ppm.

The farmers of this area produce a good part of the out-of-season tomatoes and melons for Egypt. For this purpose, they have developed an original intensive and highly productive agricultural system which is described below.

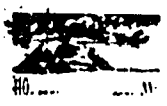
The north coast stretches from Alexandria to Salûm, an area where traditional agriculture is based on figs, olives, and barley, as well as minor vegetable-fruit production. Yield is correlated with annual fluctuations in rainfall. Supplementary irrigation is required and can be achieved through the use of saline groundwater, for which appropriate agromanagement techniques will be needed. In Siwa Oasis, water originating from natural aquifers is saline. Expansion of land-based agriculture is dependent on the utilization of this water.

The Experimental Plan

Salinity research groups in both countries are concentrating their efforts on two crops: tomatoes and melons. In Egypt emphasis is on production of out-of-season fresh tomatoes; in Israel, the emphasis is given to production of processing tomatoes.

In both countries, a multidisciplinary team has been established to produce a complete agromanagement package for production of tomatoes and melons with saline water, and to introduce through selection and breeding salt tolerant cultivars. Under investigation are such aspects as water and fertilizer requirements and management, irrigation methods, genetic improvement, and aspects of fruit quality.

Administratively, the project started in March 1982 but because of delays in fund transfers, it actually got under way in 1983, so that so far we have results of two years study. Here are the highlights of this research, in brief:



El-Bousseily sand dune belt starts at Abu Quir Bay and stretches east of Alexandria along the Mediterranean shore, continues for hundreds of miles into Sinai, and ends in Israel's central Negev, just south of Beer-Sheva. In the vicinity of El-Bousseily (Fig. 1, p. 2, upper left) the dune area available for development is estimated at 60,000 ha. Most of the water reaching this region is drainage Nile water. Some drains are blocked by coastal dunes to form shallow saline lagoons. El-Bousseily farmers have been reclaiming these saline lagoons, turning them into fertile arable land.

First by diverting canal water and thus drying up the lagoons, farmers employ a fairly sophisticated operation using tractors, bulldozers, and trucks to move out entire dunes to cover the dried lagoons to a height of 0.5-3 meters (Fig. 2, p. 2, upper right). Then using a locally developed sand-hoe, they dig trenches running from east to west, 1.5m deep and 2m apart. Dried chicken manure is applied at the bottom of these trenches, then covered by a 50cm layer of sand. Tomato seedlings are planted on the side of the trench facing south, at a distance of two meters between plants.

Water is delivered through canals constructed from locally made bricks and mortar. The canal aqueducts serve also as supporting walls when constructing the sand "fields" which are furrow irrigated, the length of each being approximately 10m. Deep trenches in the sand serve as windbreaks to prevent damage from strong northerly salt-laden winter winds, and to support large vines that eventually cover the entire field. Additional wind protection is given by windbreaks made of dried palm leaves placed on the ridge above each trench (Fig. 3).

For two years the salinity research group has been studying all aspects of the management of this native "sand culture." In addition, a survey of year-round variation in salinity of the drainage canals at El-Bousseily has been carried out. The local Edkawy tomato variety is apparently a Mermand-type cultivar selected by farmers for high productivity under El-Bousseily conditions. The Edkawy cultivar was found to be far more resistant to salinity than many other cultivars.

The effect of irrigation water with fluctuating salinity levels on tomato yield was studied under a simulation setup constructed at the Soil Salinity Laboratory in Alexandria.

A team of soil and water scientists and horticulturists from Ain Shams University have characterized the physical and chemical parameters of the El-Bousseily sand, its water-holding capacity, rate of water infiltration, and capillary water raise.

A facility for the production of mixtures of water of various degrees of salinity has been constructed at the El-Bousseily experimental farm and methods of irrigation (drip, furrow) are being studied, together with a whole range of management practices: planting distances, effects of windbreaks, fertilizers, irrigation techniques, effect of furrow depth, etc.

A second traditional system of irrigation called the Ba'li system is also practiced in the El-Bousseily area. The 50-150mm annual rainfall over the coastal dunes penetrate the 8-20m high dunes and accumulate over an impermeable layer to create shallow aquifers. Here the water of the coastal shallow aquifer is slightly saline, perhaps from additional intrusion of drainage water. In this system, local

Fig. 3: After sand is spread, farmers start digging trenches, with vegetable seedlings planted in the bottoms. Elevated irrigation canal, left, serves to support the sand. Note windbreaks over each trench.

Fig. 4: Ba'li irrigation system. Sand is removed to reach the shallow aquifer which is used for tomato seedling irrigation planted 60cm above the water table.

farmers remove sand above the aquifer to a depth of 60cm above the water table, then plant vegetables on top of this water table (Fig. 4), and irrigate only until the roots of the plants reach the moist soil above the aquifer. CALAR scientists are trying to improve the Ba'li system through introduction of small pumps and drip irrigation systems which can be used by farmers in the area to optimize productivity and increase yield.

The climate of the central Negev differs from that of El-Boussely inasmuch as rainfall is lower, winter temperatures are lower, and the atmosphere is drier (Table 1).

Most of the settlements in the central Negev are cooperative farms with relatively large holdings. Agriculture is based on mechanized field crops. Processing tomatoes is a possible crop activity, as is the melon, which enjoys relatively low night summer temperatures. Salinity improves quality of both crops and assures reasonably good yields, so that saline water may become an asset rather than a liability in production of these two particular crops.

Groundwater salinity in the Ramat Negev experimental station (Fig. 5) is rather high (Table 2). Using this salt concentration as reference, a series of field experiments were conducted in the summers of 1983 and 1984 (Fig. 6, p. 2, lower left). Main highlights so far are:

1) If tomatoes are irrigated with saline water, the relation between relative yield (Y) and salinity of irrigation water (EC_i) can be expressed as $Y=100-8.9(EC_i-1.8)$. When saline water irrigation starts after the four leaves stage, the relation is $Y=100-4.9(EC_i-1.4)$; meaning that germination and establishment should, whenever possible, be carried out with fresh water.

2) Under apparently optimal conditions for production of tomatoes with saline water irrigation, use of 10.0dS/m water reduced marketable yield by 30% (from 128 to 90Kg 10m^2), but because fruit soluble solids were significantly increased by salinity, fruit dry matter yield was reduced by only 11% (from 6.1 to 5.7Kg/10m^2).

3) Production functions based on a linear threshold response model have been generated for irrigation of processing tomatoes with water of three different qualities.

4) There were marked differences in salt resistance among commercial tomato cultivars. The M-82-1-8, the most common in Israel, was the most sensitive.

5) In a precisely controlled greenhouse experiment, no interactions were found between Cl- and NO3- on tomato and melon yields.

Table 1
Selected Climatic Data for the Revivim Weather Station in Ramat Negev

Month	Mean daily temp (°C)	Mean daily max (°C)	Mean daily min (°C)	Mean monthly rain (mm)	Mean daily evap (mm)
January	11.0	17.2	5.0	24.0	2.9
February	12.4	19.1	5.6	16.6	3.6
March	15.3	22.9	7.6	13.0	5.2
April	19.6	26.9	10.3	5.9	7.1
May	23.5	31.9	12.3	1.9	8.5
June	24.8	33.4	14.5	—	9.2
July	25.7	34.9	16.9	—	10.0
August	25.6	34.1	17.5	—	8.7
September	23.9	32.6	16.2	0.3	7.1
October	21.0	29.6	13.9	2.3	5.7
November	17.1	24.4	9.8	10.6	3.6
December	11.9	18.5	6.4	21.0	2.7
Annual	—	—	—	101.6	229.7

[illegible]

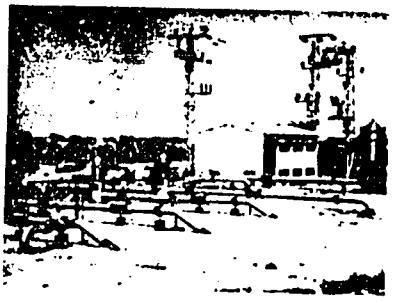


Fig. 5: Saline water well in Ramat Negev. A well is drilled to a depth of 1000m, water raised to depth of 300m is pumped (pump, right) at a rate of 400m^3/hr, then pushed to the fields with a series of smaller pumps. Salt concentration in the water of this particular well is 3000ppm.

Table 2
Chemical Analysis of Water at the Ramat Negev Experimental Station

	National water carrier	Saline groundwater
Sampling date	19.7.81	24.2.81
Electrical conductivity (dS/m)	1.3	5.5
TDS (ppm)	868	3466
Chloride (ppm)	239	1303
Ph	7.8	6.5
Major cations		
Na^+	152	325
K^+	38	148
Mg^{++}	80	325
Ca^{++}	119	673

6) A long-term project to introduce salt resistance to the cultivated tomato, from wild relatives of tomatoes, was commenced.

7) In the first field screening, a Persian type melon variety, "Even-Key," showed marked salt tolerance. This is apparently genetically transmissible.

8) The effect of saline water irrigation on fruit quality parameters of tomatoes is given in Table 3. Saline water irrigation markedly improved quality parameters of tomatoes.

Table 3
Fruit Quality Parameters for Processing Tomatoes Irrigated With 1.2dS m (fresh) and 10 dS m (saline) Waters

Treatment	Total soluble solids (%)	Electrical conductivity	Acidity (% citric acid)	pH
Fresh water	5.2	6.1	0.38	4.3
Saline water	6.3	6.9	0.41	4.4

II. Fodder Production and Utilization by Small Animals in Arid Regions

Background

In arid and semiarid areas, land is utilized to a large extent by grazing animals, the latter often the principal resource for the survival of the inhabitants. In many of these regions, where valuable native perennial species have almost disappeared, animal nutrition must rely on annuals, which in turn depend for germination and growth on erratic and badly-distributed rainfall. Drought years have disastrous consequences, up to and including loss of breeding flocks through starvation.

A major effort is directed towards exploring ways and means to raise living standards among populations dependent on animals for subsistence. Small ruminants can supply milk as well as meat and wool if a suitable supply of fodder is available to the animals.

Limited water resources in the area call for rainfed and irrigated pasture systems. With the resources available to this program, the decision was made to concentrate on rainfed pastures so that adequate progress could be made within the original five-year time span. The program therefore places emphasis on development of drought-resistant forage shrubs and small ruminant species that will integrate in the Mediterranean arid environments for maximum production of milk, meat, and wool.

The socioeconomic conditions in the arid lands of Israel and Egypt, which determine strategies for production of small animals, vary greatly. Therefore, although each team had to devise a separate R&D program, custom-made for the conditions in the two countries, the common denominator is the heavy reliance on one fodder shrub species, *Atriplex nummularia*.

The characteristics of *Atriplex* sp to serve as pasture plants include:

1) capacity for production during summer feed shortage is high
2) water requirement is low, indicating a high efficiency in production in terms of rainfall
3) the root system is deeply penetrating and capable of using moisture which has reached the subsoil during winter
4) protein and phosphoric acid contents are high
5) they are salt resistant

The introduction of a forage shrub area as an additional component within the existing agro-pastoral production unit of defined and fixed boundaries necessitates reduction in the area of some other component within the system, or if land is available, enlargement of the existing land area used by the production unit. In the first instance, the replacement, partial or complete, of an existing component by the shrubs can be justified only if some potential economic advantage to the whole production system can be demonstrated; the advantage, if any, will be a substitution value. In the second case, we would want to assess the additional net income that would accrue to the system by the addition of shrubs to the existing boundaries of the production unit.

The search for the answers to these two basic questions is the underlining objective of the forage shrubs component.

Little information is available on the use of forage shrubs in agro-pastoral systems where stocking rates are high and supplementation and seasonal grazing are practiced. Here, because of the high-grade protein and vitamin content of edible parts of the shrubs, quite small quantities of shrub in the diet of sheep, grazing dry annual pastures and or grain aftermaths may have importance in favorable mating behavior, conception, pregnancy, lambing, lactation, lamb birth weights and growth rates. Evidence from the literature suggests that this is unlikely at low stocking rates where sheep have the possibility to graze selectively quality green and or dry annual plant parts. At the high stocking rates planned in this project, however, the ability of sheep to selectively graze dry herbage is limited to a short period, and the addition of forage shrubs may favor the above mentioned sheep production factors.

Within the 200-250mm rainfall region of Israel, the principal agriculture practiced is wheat cultivation in a two-year wheat-fallow rotation. Because of recurring drought, this is an economically marginal enterprise maintained only by drought compensation and price subsidies. Intensive agropastoral systems in which pastures replace fallow, but where wheat areas sown are maintained, have been intro-

duced. These systems integrate wheat production with animal production from grazing of pastures and/or aftermaths, and lamb fattening. Results of five years of experience indicated that such systems can alleviate the need for drought compensation and price subsidies. Because of the need to maintain wheat areas, the ratio of wheat to pasture is 1:1.

1. Place of Shrubs in Agropastoral Systems

In the Migda Experimental Station, three agropastoral systems are being investigated. Inclusion and place of perennial shrubs in each will be studied and evaluated with the help of a computer program devised to incorporate all variables relevant to each. Some 50,000 seedlings of *Atriplex nummularia, A. cinerea, A. linearis, A. canescens, Cassia sturtii, C. nemophila, Acacia victoriae, A. ligulata,* and *Medicago arborea* were prepared in "speedlings" trays and planted in four fields having the overall size of 30 ha (Fig. 7, p. 2, lower right). First grazing trials will begin in the summer of 1985 (Fig. 8). Meanwhile, preliminary investigations of costs (Table 4) and of the nutritional value of the shrubs were carried out.

Fig 8. A field of established 18-month-old Atriplex shrubs ready for grazing trials at Migda Experimental Station.

2. Enhancement of N Supply to Mediterranean Pasture Grasses by Means of Rhizosphere Bacteria

Under the typical semiarid weather conditions of the Middle East (winter rainfall 200-250mm), primary production is not only limited by moisture availability, but by the low natural fertility of the soil, particularly nitrogen. Length of the growing cycle is determined by rainfall intensity and distribution. The actual production rate during the rainy period and hence total yield is, however, suboptimal due to nutrient shortage. Removal of this constraint through introduction of fertilizers leads to substantially higher yields but at the same time increases the variability since the lowest yields in drought years remain moisture-limited.

Table 4
Comparative Costs of Forage Shrub and Herbaceous Pasture Establishment

Pasture Type	Establishment cost ($ ha)	Economic lifespan (years)	Annual cost ($ ha)
Forage shrubs[1]			
1100 plants ha	718	10	107
1100 plants ha	718	30	64
2200 plants ha	1228	10	183
2200 plants ha	1228	30	109
Pasture legumes	230+50	3	139
	230+50	5	107
	230+50	10	84
Annual barley	215	1	215

[1] Establishment cost of shrubs does not include loss of pasture (or wheat) use of the land during 1-3 years needed for shrub establishment.

In this region, production of rainfed winter cereals may be advantageous. Early in the season, cereals produce more dry matter than natural vegetation because of higher seeding density. This early growth may be used for grazing without affecting grain yield and is therefore a useful supplement.

The proportion of natural leguminous species in herbage is generally low and fluctuating. The major determinant seems to be the rainfall regime early in the growing season. Their advantage is that without nitrogen fertilizer (since they are able to fix atmospheric nitrogen in symbiosis with rhizobium bacteria), they produce high quality forage which does not deteriorate at the end of the season as fast as the natural vegetation. Some annual legumes, when properly managed, will regenerate spontaneously.

Since application of N fertilizer to cereals and natural pasture is hardly economically feasible in vast areas of semiarid lands, alternative nitrogen sources have to be explored. Nitrogen fixing bacteria, *Azospirillum* and *Azotobacter*, plus other rhizosphere microorganisms like *Pseudomonas* or *Bacillus*, are known to affect plant growth and benefit crop production. A basic study of the physiology of rhizosphere microrganisms and their interaction with arid zone grasses is being conducted hand in hand with applied field studies of artificial inoculation of stands of grasses at the Midga experimental station.

The coastal zone of Egypt's western desert extends over a distance of 500km from Alexandria to Salûm, its width varying from 30 to 60 km. Annual rainfall (November to April, with the greatest intensity during February and March) varies within the area from 100 to 250mm and affects pasture intensity from one

place to another, as well as from one year to another. Such environment changes in this area have created a nomadic social life dependent upon rearing sheep and goats and relying mainly on natural pasture for grazing. Over one million head of sheep and half a million goats are kept in this area, which plays a significant role in the small ruminant production in Egypt.

Only one breed of sheep, the Barki, is raised there. The Barki goat is the dominant goat breed, while some crosses of other local breeds are kept in a very small number. Flock size varies considerably from few tens up to 20,000 head, the average size being from 100 to 500 head. Nomads travel with their flocks to areas of good rainfall, seeking pasture. In drought conditions, the Government supplies the breeders with amounts of subsidized concentrated feed mixture, usually insufficient to maintain the animals. The breeders then move to the delta, seeking pasture and crops by-products for their animals.

Recent increased exportation of lambs and kids to other Arab countries at good prices has encouraged breeders to raise large numbers of animals in this area, leading inexorably to overgrazing which in turn has resulted in the creation of barren desert where only plants not consumed by animals exist. Development of such areas and maintenance and improvement of suitable pasture is fairly critical, even necessary to insure maintenance of community life in the area.

Along with pasture improvement, development of animal resources is a major element for maximum efficiency of the use of such improved pasture. It is well known that Barki sheep are a hardy breed, adapted to perform and reproduce under severe climatic and underfeeding conditions prevailing in the western desert. Minor considerations have been given to improve their productive criteria to obtain the best output from their genetic potential, either of lambs or wool. Wool produced from Barki sheep contributes to carpet wool production, and efforts to increase the quantity and improving the quality of this wool will contribute substantially to economic development of the coastal zone.

Barki goats, though hardy, are small in size and of low milk production (40kg average, even under improved farm conditions) which indicates little possibility for achieving a real genetic improvement in productivity through selection. Outbreeding of these goats with some other local breeds of the valley or with foreign breeds, i.e., Damascus goat, is a promising approach.

There are six objectives to the Egyptian program:

1) evaluation of the nutritive value and use of shrubs and other pasture species by sheep and goats through grazing trials
2) establishing performance testing centers for genetic improvement of Barki sheep
3) expanding the program of genetic improvement of Barki goats through crossing with Damascus goats
4) continuation of program of improved summer feed resources, especially roughage and ammoniated straw, minerals and vitamin supplements
5) establishment of controlled grazing system for protecting natural pasture
6) introduction of economical legume trees to supply shade and feed to the animals

With the emphasis given to shrubs in the fodder program in both Egypt and Israel, shrub is the main pasture species to be tested in the grazing trials, along with other pasture species selected on the basis of their vegetative performances and nutritive value. Two stocking rates will be tested in these trials, and rates will be estimated for different pasture plants on the evaluation of their productivity in previous years.

Research Highlights

A. A questionnaire covering flock management, breeding habits, production data and additional sources of income, distributed to 150 breeders randomly selected in the two major production zones of the western desert, yielded invaluable information now being analyzed. This information will serve as a basis for improvement of the local sheep and goat breeds, improving grazing management techniques, and feeding the local herds.

B. A comparative study of the performance of three goat breeds: Barki (local), Zaraibi, and Damascus, was carried out. Some of the results of this study are given in Tables 5 and 6.

C. Establishment of a nursery for shrub production in Fouka and El Quasr to provide seedlings of the selected shrubs and trees.

D. Genetic improvement program of Barki goats and Damascus bucks through mixing with Damascus goats is underway with 50 distributed to 50 Bedouin breeders (Fig. 9). Program results provide technical and scientific follow-up and offer bases for further distribution.

E. In Fouka, a field of 35 acres was established with *Atriplex* species, and an additional 40 acres in the Nubariya area to provide propagating material as well as feed for the nutritional studies.

F. A nursery at the Nubariya station is used for introduction and evaluation of new fodder species before releasing them for mass propagation in the Fouka and El Quasr nurseries.

The Egyptian program is being executed by scientists from both the fodder section and the small animal section of the Agriculture Research Center, Ministry of Agriculture of Egypt, in cooperation with scientists from three universities.

Table 5
Milk Yield of Three Goat Breed Groups in the 1984 Lactating Season

Breed group	No. of does	0-8 Weeks Mean kg milk/head ± SE
Zaraibi	27	65.0 ± 3.6
Barki	21	49.7 ± 3.0
Damascus[1]	6	73.6 ± 3.1

[1] The Damascus goats were imported from Cyprus.

Fig. 9. Crossing the Damascus with the local Barki goat results in a superior breed. Damascus bucks were distributed to selected breeders in ceremonies attended by His Excellency the Minister of Agriculture, the Governor of Matruh, and the Minister of Land Reclamation.

Table 6
Fattening Performance of Different Male Groups of Kids

Performance Trait	Zaraibi	Barki	Damascus x Barki
No. of animals	29	11	5
Initial wt. (kg)	13.0 ± 0.9	10.1 ± 0.8	16.0 ± 2.7
Final wt. (kg)	16.7 ± 1.3	14.1 ± 1.0	21.8 ± 2.5
Total gain wt. (kg)	5.5 ± 0.6	4.0 ± 0.5	5.8 ± 0.5
Daily gain (gms)	55	39	58
Consumed Feed (kg DM/head)			
Concentrate Mixture (kg)	27.6 ± 1.7	26.7 ± 0.9	31.5 ± 1.5
Roughage (kg)	39.1 ± 1.5	36.9 ± 0.9	47.5 ± 3.7
TDN (kg)	35.8 ± 1.8	34.1 ± 1.3	42.1 ± 2.3
Efficiency of feed utilization (kg TDN/kg gain in weight)	6.5	8.6	7.3

III. Arid Lands Species as a Source of Industrial Raw Material

Background

Plants have always been an important source of raw materials for industrial exploitation. Over the centuries mankind has domesticated and improved these species and a major part of world agriculture is still devoted to industrial crops. Despite recent advances in modern synthetic chemistry, cotton, flax, pharmaceuticals, gums, and rubber are important cash crops, mainly in developing nations, but also in many industrial nations.

Arid and semiarid plant species are particularly endowed with a diversified range of valuable substances such as oils, waxes, gums, fibers, pharmaceuticals, rubber containing latexes, and a spectrum of hydrocarbons with potential value as fuels. In addition, these are eminently adapted to the harsh conditions of heat, drought, and salinity encountered in the arid semiarid lands. Carefully selected and adapted to modern technology, these relatively unexploited species could provide suitable alternatives for the development of presently unused land and water resources in arid and semiarid regions throughout the globe.

Egypt, Israel, and the U.S. encompass huge areas of unexploited and under-exploited land and brackish water resources suitable for the cultivation of these crops. In fact, many agricultural specialists consider the extended hot and dry periods in these regions essential to the increase of yield of the desired plant component. Many industrial species in these zones are already being utilized by harvesting wild stands. Gums and waxes are outstanding examples of such valuable materials obtained from gum acacias, astragalus, euphorbias, and others. Yields are low, however, and undependable, resulting in inefficient use of human resources due to their erratic occurrence over wide areas. This has brought about exceedingly low living standards for those employed in these activities. Several species, such as guayule and jojoba, are already in advanced stages of domestication, and others are being considered as suitable candidates for improvement and intensive cultivation.

Industrial species could provide an important alternative for development of large presently unexploited areas in Egypt and the U.S. Suitable climate, unexploited land areas, and existence of marginal waters are augmented by availability of an experienced farming community which could easily be trained for cultivation of new crops. There is a great need, everywhere in the world, for diversification of agricultural products and for the development of new crops which could provide export market advantages as well as reduce imports of such vital materials as rubber, industrial oils, and waxes. Especially important is the possibility that industrial crops could provide the basis for new industries and thereby contribute in many places to the transition of a basically agricultural society toward a more modern industrial economy.

Research Goals

1) To initiate a development program of the three most promising crops: jojoba *(Simmondsia chinensis)*, guayule *(Parthenium argentatum)*, and buffalo gourd *(Cucurbita foetidissima)*
2) To introduce in Egypt and Israel a number of plant species of potential value as natural sources of oils, waxes, gums, fiber, rubber, fuel, or other industrial products
3) To test their ability to grow and produce under conditions prevailing in the introduction areas with and without supplementary irrigation (fresh and/or brackish water)
4) To determine in preliminary tests the content and quality of their natural products
5) To screen promising species for further development on the basis of the results obtained in the test performance and to investigate in more detail their characteristics and requirements.

In Israel, a three-year study conducted with selected fuel crops concluded that under today's low oil prices, production of fuels from desert crops is not economically feasible (Fig. 10). Small trials were started with marama and the tepary bean. Initial results indicate that work with these species should continue. The most promising results were obtained with buffalo gourd for a starch crop.

Fig. 10: *Calotropis procera*, a fuel crop producing a gasoline-like latex, just before harvest at the Bokyo Institute in Beer-Sheva. Calotropis was the best fuel producer among a series of tested fuel crops both in Egypt and in Israel.

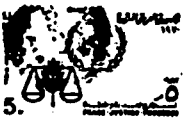
A breeding and screening program was started aiming at increasing starch yield to 10 tons/ha. Preliminary management studies were initiated (Fig. 11). Good results were obtained with guayule, a species which grows very well in the Beer-Sheva area. Preliminary analysis indicates that it has a potential to replace wheat production in the wheat belt north of Beer-Sheva. Thus, the two crops, guayule and buffalo gourd, were selected for further in-depth work.

Fig. 11: Buffalo gourd planted in the North Coast of Egypt at Marsa Matruh to examine the effect of drought and salinity stresses on vegetative and root growth.

In Egypt during the first phase, trials and field experiments included guayule and jojoba, as well as sisal *(Agave sisalana)* as a fiber crop, and euphorbia *(Euphorbia lathyris)* as a fuel crop. The activity was established first in Fouka, near Marsa Matruh, then at the Baheria Oasis in the middle of the western desert. Plant material was propagated in the nursery of the Faculty of Agriculture, Al-Azhar University, then transplanted to both sites. Other plant species that can be used in the same program context were included later: candelilla *(Euphorbia antisyphilitica)*, as a wax crop, buffalo gourd *(Cucurbita foetidissima)*, as a starch crop, El Ausher *(Calotropis procera)*, which grows widely in Egypt and is considered a source for silk cotton and as a fuel crop, and Senna Alexandria *(Cassia acutifoli)*, a medicinal plant which is an important source of laxatives.

The major goal of the current trials is to test their ability to prosper under Egyptian growing conditions. For the time being, we have achieved successful results in growing jojoba, guayule, and buffalo gourd. On the other hand, such crops as sisal, candelilla, and euphorbia grew slowly in their first year. According to those findings, and to some other constraints, investigations on these latter crops will be slowed. Sisal, for example, needs high precipitation not found under local climates. Production of fuel from euphorbia or calotropis is not economic when compared to petroleum. Euphorbia, moreover, has recently been reported to have carcinogenic effects. The emphasis in the CALAR program therefore is being put on jojoba, guayule, and buffalo gourd.

CALAR is a model of regional cooperation allowing countries with kindred problems in their arid land agricultural development efforts to work together for common solutions. Regional food security in arid zone countries requires international cooperation. Information attained from such R&D programs as CALAR should have an impact on overcoming regional food shortage crises, and hence contribute to political and social stability, as well as world peace.



Saline water irrigated tomatoes are being inspected at harvest by the CALAR program coordinator Dr. M. El-Assal. Following successful experiments, the farmers of the region started in 1985 to grow processing tomatoes with saline water irrigation and receive premium prices for high quality.

Harry R. Albers and Davene L. Gibson

Cooperative Arid Lands Agriculture Research in Egypt and Israel

The development and operation of the first "trilateral" research program in the Near East, based upon the Camp David peace initiatives of 1979.

Harry R. Albers is the general manager of the San Diego State University Foundation. He received his B.S. in Physics at the University of Pittsburgh and his M.S. at Cornell University. He also attended Boston University and George Washington University for graduate studies in business. He has been vice-president for finance and administration at Barnard College, Columbia University in New York, and director of administration for the Association of Universities for Research in Astronomy in Tucson, Arizona, which administers the Kitt Peak National Observatory and the Cerro Tololo Inter-American Observatory. Mr. Albers has also held numerous positions with the Smithsonian Institution, including business manager, director of the Smithsonian Research Foundation, and manager of the Smithsonian Astrophysical Observatory's Satellite Tracking Program.

The San Diego State University (SDSU) Foundation has established a Cooperative Arid Lands Agriculture Research Program (CALAR), involving scientists from the Arab Republic of Egypt, Israel, and the United States. This program is the first joint research effort involving Egypt and Is-

Davene L. Gibson is administrative assistant to Mr. Albers at the San Diego State University Foundation. One of her many responsibilities is public information. Ms. Gibson has been an active participant in the establishment of the Fred J. Hansen Institute for World Peace and the Cooperative Arid Lands Agriculture Research Program.

0160-9734/85/0300-0009$04.50/0

rael, and is funded by the United States Agency for International Development (AID), Bureau for the Near East, through its Regional Cooperation Program. Funding is at a level of $1 million per year for a minimum of five years. Approved by AID in March 1982, the award culminated several years of development effort by the SDSU Foundation. The foundation is a nonprofit corporation organized solely for the purpose of furthering the educational and research objectives of San Diego State University.

This grant was the result of a collaborative effort involving staff and faculty of SDSU, members of the San Diego community, experts in agricultural research from universities across the United States, U.S. government officials, and most importantly, researchers and government officials in Egypt and Israel. The program had its genesis in the last will and testament of the late Mr. Fred J. Hansen.

Mr. Hansen was a long-time resident of San Diego, who arrived in the United States from his native Denmark when he was ten years old. After a career as an Illinois farmer and later, with the Cyclone Fence Company, Mr. Hansen moved to San Diego and purchased extensive land holdings on which he developed some of the first major avocado orchards in the area. After travels abroad he came to believe that if adversary nations could be encouraged to work together on projects of mutual benefit, this cooperative effort could help heal their differences. To this end, he bequeathed a substantial part of his estate to the furtherance of world peace. His will reads "that as international understanding is increased, the likelihood of world peace will be increased. . . ." Mr. Hansen is survived by his daughter, Mrs. Rose Cady, and many of his grandchildren and great-grandchildren reside in the San Diego area.

In mid-1978 the SDSU Foundation was contacted by the executor of Mr. Hansen's estate, Mr. Leo R. B. Henrikson, a San Diego attorney, and by Dr. George J. Goodman, a San Diego businessman who was working with Mr. Henrikson to carry out Mr. Hansen's wishes. The foundation was asked to suggest a program that would accomplish Mr. Hansen's wishes. At this time Dr. Albert W. Johnson, vice-president for academic affairs, and Dr. Robert Ontell, professor emeritus, both at SDSU, were brought into the process to "brainstorm" the effort. The result was the establishment at San Diego State University of the Fred J. Hansen Institute for World Peace, with a board of directors that included the above named as well as Mr. Harry R. Albers, general manager of the foundation, and Mr. Ron F. Cady, the grandson of the late Mr. Hansen and a member of the San Diego business community.

Leo R. B. Henrikson, executor of Mr. Hansen's estate.

During 1979, as the Fred J. Hansen Institute for World Peace pursued its discussions, interesting political events were transpiring in the world. In late March of that year President Anwar Sadat of Egypt, Prime Minister Menachim Begin of Israel, and President Jimmy Carter signed the Camp David Accords. In May, President Sadat traveled to Israel and met with Prime Minister Begin and Ben Gurion University of the Negev. During that historic meeting Mr. Sadat and Mr. Begin discussed areas of peaceful pursuit of great importance to the two countries. Two of the areas agreed upon were oceanography and marine programs, and agriculture. Taking this dialogue as its lead, the Hansen Institute began investigating the possibility of sponsoring a meeting between scientists in either or both of these fields.

As it happened, another effort was underway in oceanography and marine biology, under the direction of Dr. Robert Abel, vice-president of the New Jersey Marine Sciences Consortium, and Dr. Sayed

El-Sayed of Texas A & M University. Drs. Abel and El-Sayed were formulating a program that would include scientists from Egypt, Israel, and the United States in a variety of marine sciences projects. Their proposal had been forwarded to AID, but had not yet been approved. Working with Dr. Abel, the Hansen Institute undertook as its first official task the project of hosting a meeting in San Diego of the projected program participants. Through the unflagging efforts of Dr. Robert Ontell, who had been named executive director of the Hansen Institute for World Peace, a meeting was convened in August of 1980. This was an historic meeting, for it was the first time that Egyptian and Israeli scientists had collaborated in almost 30 years. AID representatives also attended the meeting, and the result was a revised proposal to AID for a research program involving more than 20 institutions in the three countries. Subjects of interest were evaluation of productivity of the Mediterranean, aquaculture, shoreline protection, and management of freshwater resources. This program was funded by AID to Dr. Abel and his collaborators at a level of $4.3 million for a three-year period. The proposal was framed as a "mutual bilaterals" type, with Egypt and Israel both agreeing to work separately with U.S. collaborators on problems of common interest.

With the successful result of its first effort, the Hansen Institute turned to using the same model to initiate a program in agriculture that could be administered by San Diego State University. Representatives of the Hansen Institute, including Mr. Henrikson and Dr. Ontell, traveled to Egypt and Israel to investigate this possibility. In meetings with the Egyptian Academy of Scientific Research and Technology, Ben Gurion University of the Negev, and representatives of the Israeli Ministry of Agriculture, it became apparent that an area of great concern to both countries was arid lands agriculture. Arid lands agriculture deals with such subjects as the production of crops on marginal land, and irrigation with marginal water to produce food, fodder, and industrial products. Following several months of discussion, Dr. Yousef Wally, now the Egyptian minister of agriculture, met several times in Cairo with Dr. Samuel Pohoryles,

Fred J. Hansen, who believed "that as international understanding is increased, the likelihood of world peace will be increased."

director of the Rural Development and Planning Authority for the Israeli Ministry of Agriculture and professor of agricultural economics at Tel Aviv University, to fashion a cooperative agenda that included arid-zones agriculture. A joint letter signed by Drs. Wally and Pohoryles was sent to San Diego State University granting permission for the Hansen Institute to organize and fund a trilateral meeting among Egyptian, Israeli, and U.S. experts to discuss problems of mutual concern.

In June of 1981 a conference was held in San Diego and was attended by representatives from the three countries. Institutions represented included Ain Shams University, El Azhar University, Ben Gurion University of the Negev, Hebrew University, the University of Arizona, the University of California at Davis, and Utah State University. Mr. Gerald Kamens and Mr. Richard Burns of AID, and Mr. Mark Abbott of the U.S. Department of Agriculture, also attended the week-long conference.

The conference addressed problems common to all three countries, namely the diminishing supply of fresh water for agriculture, the loss of arable land to urbanization, and the rapidly increasing increment of salt-affected land. The three major discussion topics, in order of priority, were:

- Research dedicated to the use of saline water in crop production,
- the development of arid lands plants of high-nutritive value that can be grown with minimal amounts of water under low-rainfall conditions for use as fodder for small farm animals, and
- the development of new arid land species that show promise for use as economic crops.

The conference proceeded so well that SDSU Foundation staff, working with program participants, fashioned a formal proposal. The proposal, submitted to AID on July 18, 1981, requested funding of $10,250,000 over a five-year period. After due consideration by AID, the program was approved at the $5 million level, and the SDSU Foundation was informed of the grant in December of 1981. In a letter to Mr. Albers, Ms. W. Antoinette Ford, assistant administrator of AID stated: "We wish to support... [the proposal] not only because it seems likely to be successful in fostering long-range cooperation between Egyptian and Israeli agricultural scientists, but also because it has a good possibility of yielding beneficial research results which will be directly useful to both countries." Unlike the earlier "mutual bilaterals" agreement negotiated for the oceanography-marine sciences program, this program was trilateral in nature, with all parties agreeing to work directly with one another. Final funding of the project awaited passage by Congress and approval by President Reagan of the 1982 Foreign Aid Bill. The bill was passed and signed into law by the president in late December 1981.

Research for the project is being carried out in Egypt and Israel, with participants from the United States involved in consultation, administration, and evaluation. International headquarters for the project is in San Diego with the SDSU Foundation responsible for administering the program and also acting as the fiscal agent. Technical oversight/management is effected by a steering committee composed of two representatives from each country. These representatives establish policy for the work of the principal investigators who guide the research activities in each subject area. Day-to-day coordination is provided by the project coordinator in San Diego, working with the technical coordinators in Egypt and Israel. These people are: Dr. Mohamed El-Assal, Program Coordinator, SDSU Foundation; Dr. Adel El-Beltagy, Technical Coordinator, United Arab Republic of Egypt, Ain Shams University; and Dr. Dov Pasternak, Technical Coordinator, Israel, Ben Gurion University of the Negev.

Prior to the release of research funds, AID requested detailed specifications for the research. The first meeting of the steering committee, held in March 1982, in Cairo, was dedicated to developing and finalizing these plans. Principal investigators from Egypt and Israel attended the steering committee meeting and discussed the details of their planned activities. A field trip along the northern Egyptian coast to Marsa Matruh also provided participants with a firsthand view of projected research sites in Egypt. Work plans were prepared and approved by the steering committee, then submitted to AID in April 1982; AID approved these plans in May, and authorization to proceed in development of the actual cooperative agreement was issued. While the main agreement was being drafted, negotiations were conducted in Egypt and Israel, and subagreements with each participating institution were developed and finalized in May 1982.

The program has now completed two full years of successful operation. Highlights of the research programs in both countries are as follows:

- A *two-year salinity survey* for irrigation-drainage canals in the El-Bousseily region of the Nile Delta has been completed by the salinity team. For the first time, a quantitative understanding of the seasonal salinity patterns in irrigation water will allow planning and selection of crops to maximize yield in this potentially highly productive region of Egypt.

CALAR steering committee members and principal investigators at Borg El-Arab Experimental Farm in March 1982.

- A locally designed *facility for mixing brackish and fresh water* to control salinity levels in field experiments has been established at the Agricultural Research Farm at El-Bousseily in Egypt. This site is used by the CALAR salinity program for intensive research on tomato and melon production using saline water.
- For the first time in the El-Bousseily region, *drip irrigation* is being tested for economic feasibility using the local sand culture agronomic methods. Drip irrigation provides for fine control of water delivery and salinity levels in the root zone, and could potentially put more land area into cultivation of high-value winter vegetables.
- The first phase of a *survey of traditional breeding practices* among Bedouin of the northern coast of Egypt was completed by the CALAR animal production team. This unique survey has provided data on meat and dairy production by Bedouin and has given a quantitative understanding of time-tested Bedouin breeding and selection criteria. These data are already being used to help guide an ambitious breeding program to introduce highly productive traits from Damascus goats into the hardy local Barki stock.
- In spite of low rainfall, the *experimental rangelands* being established by the CALAR fodder production program near Fouka, Egypt, are in good condition. Sixty thousand additional saltoush seedlings (*Atriplex* spp.) will be planted this winter, and on-site nurseries are being established to provide for a further 100,000–200,000 seedlings for research.
- A *novel procedure for propagation* of *Atriplex nummularia* from cuttings has been developed by the CALAR fodder production team at the Nubariya Research Station in Egypt. This procedure will substantially improve seedling survival and decrease the time required for seedling establishment before grazing.
- In Israel, *new specific agromanagement procedures* have been developed that permit commer-

CALAR general coordinators for Egypt and Israel, Drs. Adel El-Beltagy and Dov Pasternak, talk together while visiting the El-Bousseily Experimental Farm near Alexandria, Egypt.

cial yields of tomatoes using water with > 3,000 ppm dissolved salts. By irrigating with fresh water (< 500 ppm) during early sensitive stages and then switching to brackish water and irrigating more often, several tomato varieties achieved commercial yields. Several less-common varieties were more productive than those recommended for the conditions prevalent in the Negev.

- *All aspects of fruit quality* in both tomatoes and melons grown in CALAR experiments were improved using saline water. In tomatoes, overall taste and color were superior, and sugar contents were higher using brackish water. Melons were smaller with superior aroma, color, and taste.
- A *commercial planting of tomatoes,* applying results from CALAR research, will be undertaken in the Ramat Negev in 1985. Ten hectares of tomatoes will be irrigated with local brackish water using the agromanagement techniques developed by the salinity team in Israel. This commercial application of research results is the first for the CALAR program, and will be supervised by Dr. Jehosua Rudich, a senior CALAR project scientist, and Mr. H. Geisenberg, currently chief extension officer for tomatoes with the Israeli Ministry of Agriculture. Mr. Geisenberg has been closely involved with the CALAR tomato research from its inception. The farmers are enthusiastically supporting this venture and are excited by the prospect of producing commercial yields of higher-quality tomatoes using the less-expensive local water supplies.
- A *salt-resistant melon variety* has been identified, to be used in the CALAR breeding program to develop a commercial salt-tolerant variety. The CALAR salinity program in Israel acquired seeds of this melon, which is native to Persia, from the French Agricultural Research Institute. This was a very important development, and seeds were sent to Egypt to be incorporated into its own breeding program.
- Spectacular results with *buffalo gourd* were achieved by the CALAR industrial crops program in Israel. A high concentration of good-quality food starch in buffalo gourd

Farmer Zeitoon shows tomato plants grown in the El-Bousseily region of the Nile Delta, using locally developed sand culture agromanagement techniques.

roots was first reported by the University of Arizona, and seeds were given to Ben Gurion University. Growing these wild seeds on sand dunes using an agromanagement scheme modified by the CALAR salinity team, a yield of seven tons of starch per hectare was achieved. These results were similar to those for maize in terms of both quality and yield. A long-term selection program is underway that will substantially increase starch yield and provide a viable commercial crop for sand dune areas.

In the summer of 1984 a full technical review of the project was conducted by AID. Summary findings of the review team were as follows:

Prospects of Purpose and Goal Achievement

- Briefly, all four end-of-project-status conditions outlined in the project proposal appear likely to be achieved. Progress toward some of the end-of-project-status conditions is already highly satisfactory. The greatest limitation is likely to be the time frame, since the original five-year plan clearly did not allow all the time needed. Moreover, start-up delays from slow funding have caused a year's setback in Egypt.
- The general project goal, to create an ongoing cooperative relationship between Israeli and Egyptian scientists, appears likely to be achieved, if external conditions do not interrupt or prevent collaboration.

Problems Encountered

Only two serious problems have been encountered, so far as the review team is aware. Both have been mentioned previously, but will be reiterated here for clarity.

1. *Funds delay.* The system of transferring funds to Egypt via a complicated currency-transfer system (through Paris) led to a year's loss of progress at the beginning of the project and embarrassing delays in funding the second year's work.

2. *Regional tension.* Events in 1982 and subsequently have heightened tensions between Israel and Egypt, leading to problems in reciprocal travel of scientists. Hopefully, this situation can be expected to improve, and a reasonable level of contact has been maintained in spite of difficulties.

Recommendations

The review team offers the following appraisal and recommendations.

- The project is proceeding well and should continue to receive AID funding and support.
- It is strongly recommended that the proposed "add-on" for Bedouin demonstration and technology transfer be approved and funded as soon as possible.
- Extension of the present project by three years (to a total of eight years' authorization) should be made concurrent with the Bedouin add-on.

On the important issue of cooperation, results have also been excellent. In addition to regularly scheduled meetings of the steering committee, all principal investigators met in San Diego in June 1984 to evaluate results to date and to plan for future work. This week-long meeting provided scientists with the opportunity to have face-to-face discussions on all matters pertaining to the program. In addition, Egyptian participants invited their Israeli counterparts to attend the Eleventh African Symposium on Horticultural Crops, which was held in Cairo from December 9–15, 1984. The Israeli scientists were invited to present papers, and the Egyptian government provided assistance with costs associated with the trip.

There are also two Egyptian graduate students spending a year at Ben Gurion University, as a result of the university's invitation. Costs for this are being borne by the university. The students are studying saline water irrigation and sand dune agriculture. A substantial increase in the number of visits by scientists between the two countries is expected to occur in the next few years of the project.

To everyone engaged in the Cooperative Arid Lands Agriculture Research Program it is becoming increasingly obvious that Mr. Hansen's view of the world was accurate. Political differences can give way as discussions and work proceed on problems of mutual concern and interest.

APPENDIX 3

SCIENTIFIC COLLABORATION IN THE MIDDLE EAST

Scientific Collaboration in the Middle East

With funding from AID, Egyptian and Israeli scientists are quietly collaborating on three projects

Although political relations between Egypt and Israel have had their ups and downs since the signing of the Camp David accord, scientific cooperation between the two countries has been quietly flourishing. Three major collaborative ventures, totaling some $15 million, are under way, and a fourth is in the works. In each case, the U.S. Agency for International Development (AID) is providing the funding and American universities are involved as full partners in the programs.

The establishment of scientific links between the two countries enjoyed strong personal support from the late President Anwar Sadat, and the new Egyptian administration continues to look favorably on the developments, according to American scientists involved in the programs. To begin with, scientific contacts between Egypt and Israel were made through the United States, which acted as an intermediary, but collaboration has evolved to the point that Egyptian and Israeli scientists are now cooperating directly.

This thaw in scientific relations has deliberately been given little publicity. But, with a few projects under way, and with obstacles seemingly cleared for Israel to return control of the Sinai Peninsula to Egypt in April, political sensitivity about the programs seems to have diminished.

The first steps were taken early in 1979, largely at the initiative of two American oceanographers at Texas A&M University, Robert Abel and Sayed El-Sayed. In the wake of the announcement that Sadat would visit Jerusalem to address the Israeli Knesset, Abel and El-Sayed began to explore the possibility of collaboration between scientists in Egypt, Israel, and the United States on a variety of marine science projects.

"I was sold on the idea of bringing people together to cooperate on scientific problems, and marine technology seemed to be a natural for this kind of effort," Abel recalls. In particular, the construction of the Aswan Dam had caused problems in the southeastern Mediterranean that affect both Israel and Egypt. By shutting off the supply of sediment to the Mediterranean, for example, the dam has drastically increased shoreline erosion and depressed the productivity of fisheries in the area. Abel and El-Sayed began to drum up support in the United States for a collaborative venture and both traveled to the Middle East to explore the possibilities.

After what several participants describe as difficult and protracted negotiations, a meeting was convened in August 1980 in San Diego at which delegates from Egypt, Israel, and the United States met to discuss proposals for a marine science program involving the three countries. It was a historic meeting, for it was the first time that Egyptian and Israeli scientists had collaborated in almost three decades.

The San Diego meeting resulted in a proposal for a research program involving 21 institutions in the three countries. Projects were agreed to in four chief areas: evaluation of the productivity of the southeastern Mediterranean, aquaculture, shoreline protection, and the management of freshwater resources. A request for funding was made to AID.

AID already had a pot of money available for such ventures, because Congress had written into its fiscal year 1980 appropriations bill a provision setting aside some $5 million a year to encourage scientific cooperation between countries in the Middle East. It agreed to provide $4.3 million over a 3-year period. For protocol reasons, the program is structured as a set of bilateral projects between the United States and the two countries, but the effort is in reality a tripartite arrangement, for it is being planned and carried out by representatives from all three nations. Abel, who is now managing the project—he left Texas A&M last year to head the New Jersey Marine Sciences Consortium—says that projects have been started in all four areas, and a recent planning meeting held in Cairo agreed that there should be free exchange of scientists and information between the 21 collaborating institutions.

A second major project has also begun in the health sciences. Following the decision by Congress to set aside funds for regional scientific cooperation in the Middle East, several U.S. scientists submitted proposals to AID for various health-related projects. Out of these evolved a program centered on three insect-borne diseases that afflict both Israel and Egypt: malaria, Rift Valley fever, and leishmaniasis.

The program is administered in the United States by the National Institutes of Health (NIH) and it is being carried out chiefly through the Hebrew University in Jerusalem and Ain Shams University in Cairo. Like the marine sciences program, it was planned by a series of joint meetings of scientists from all three countries. AID agreed to provide $6 million over a 5-year period, about 90 percent of which will be spent in Egypt and Israel, and the formal agreement was signed on 1 December last year. According to Carl Western, an NIH scientist who is managing the project, much of the collaboration between Israeli and Egyptian scientists is now taking place indirectly through U.S. scientists but, by the end of the project, direct exchange of personnel between the two countries may be possible.

Seeding cooperation

The jojoba plant is under study in a U.S.-Israel-Egypt program on arid lands.

While these two programs were taking shape, a third venture evolved in the area of dryland agriculture. The impetus for this came initially from the Fred J. Hanson Institute for World Peace, an organization linked to San Diego State University. The Hanson Institute provided funding for the 1980 meeting that resulted in the marine sciences program,

(Continued on page 642)

0036-8075/82/0205-0639$01.00/0

(Continued from page 639)

and in December 1980 it sent representatives to Egypt and Israel to look for other possible collaborative research projects. They found considerable interest among scientists in both countries in cooperating on the development of technologies for growing crops on arid lands.

The Hanson Institute's mission led to several meetings between Yousef Wally, then chief consultant to the Egyptian Ministry of Agriculture (he is now Minister of Agriculture) and his Israeli counterpart, Samuel Pohoryles. With the express approval of President Sadat, Wally and Pohoryles formally requested the Hanson Institute to convene a meeting of scientists from Egypt, Israel, and the United States to hammer out a joint proposal for submission to AID. This took place in June last year in San Diego.

The meeting came up with plans for a $10.5 million effort centered on three areas: the use of saline water in crop production, especially for growing tomatoes and melons; the development of species of plants such as guayule and jojoba that can be grown on arid lands and which yield products with industrial uses; and the development of drought-resistant plants that can be grown as fodder for sheep and goats.

AID has agreed to provide $5 million for the program over the next 5 years. It will be managed by the San Diego State University Foundation and, according to Hanson Institute director Robert Ontell, most of the work will take place at the Hebrew University and the Desert Research Institute of Ben Gurion University in Israel and at the universities of Cairo, Ain Shams, and Al-Azhar in Egypt. The University of Arizona and the University of California at Davis will participate from the United States. The project was approved in January.

Although these three projects are the only ones approved so far, AID officials say that another agriculture program is in the early planning stages.

Direct contacts between Egyptian and Israeli scientists working on these collaborative projects have generally been limited to the joint planning sessions. If the political climate warms up in the next few years, however, it may be possible for researchers from the two countries to work in each other's laboratories. "That could happen, and it would be desirable from our point of view," says Richard Burns, an AID official who is responsible for the programs. "We provide support where we can," he says, "but we are not actually going out and trying to drag scientists together into one room."

—COLIN NORMAN

SCIENTISTS OF EGYPT, ISRAEL MARK QUIET COOPERATION

[From the Washington Post Monday, May 5, 1986]

SCIENTISTS OF EGYPT, ISRAEL MARK QUIET COOPERATION—THEY MEET HERE AS "COLD PEACE" CONTINUES

(By David B. Ottaway)

In the shadow of the continuing "cold peace" between Egypt and Israel, 50 Israeli and Egyptian scientists are meeting here for the first time to discuss the result of six years of quiet cooperation.

This rare open manifestation of Arab-Israel cooperation has produced, among other things, a new species of goat, a hybrid fish and a new kind of desert shrub.

The three-day conference, which opened here yesterday, grew out of the U.S.-financed Middle East Regional Cooperation program that has brought together more than 1,000 scientists from the two countries since the signing of the 1979 Egyptian-Israeli peace agreement.

"Regional cooperation has survived and proven itself," said Rep. Henry A. Waxman (D-Calif.), who sponsored legislation in 1979 that gave rise to the program.

The program is widely regarded in Egypt and Israel as the most productive forum for continuing contacts between scholars, scientists and officials. The two governments have had little success in developing any sustained cooperation in other fields.

The strains were apparent even at yesterday's opening session, where conference organizers said the nine scientists from Egypt preferred not to be quoted by name in the press to avoid possible adverse publicity in the Arab world.

The program's funding is now in danger of being cut back from $5.8 million to $2.89 million this fiscal year, according to an April 7 letter 28 congressmen sent to Secretary of State George P. Shultz protesting the administration decision.

"We do not understand this action," the congressmen said. "The program is the only component of our aid to Israel and Egypt aimed at building a long-term foundation of peace rather than simply providing a short-term payoff to the two governments.

"This is a fragile and sensitive time for Middle East peace. After a long period of backsliding after Camp David, Egypt and Israel may be moving forward. Scientists from several other moderate Arab nations have recently approached project participants about joining on a quiet, unpublicized basis," the congressmen said.

The scientific cooperation began in 1980 and has centered on infectious diseases, marine science and arid-land agriculture. Several projects in the social science field have been frozen because of the "cold peace" that began with the Israel invasion of Lebanon in June 1982.

One of the projects has produced a new Middle East desert goat that produces more milk and meat and survives in a far drier environment than any previous species. The new breed is a cross between the Egyptian Barki goat, which lives in the Western Desert, and the "Damascus Goat" that is common in Syria, Turkey and Cyprus.

Egyptian and Israeli scientists have also grown a new shrub, or "salt bush," that Dov Pasternak, Israeli coordinator of the arid-land project, called a "breakthrough in desert agriculture." The shrub, whose Latin name is Atriplex Nummularia, is rich in protein and "very edible," according to Pasternak, who said it is already being planted in the Egyptian Western Desert and the Israeli Negev.

The scientists have also crossbred fish to create a new high-protein species known as Sea Bream that will be served as a conference luncheon today at the Rayburn House Office Building. "It was more a question of trading of the data than the fish," said the American coordinator of the project, Robert B. Abel of the New Jersey Marine Science Consortium.

Another major success of Israeli-Egyptian scientific cooperation, according to conference organizers, was a joint effort to eradicate an epidemic in Egypt of leishmaniasis, a skin disease spread by sandflies, that broke out just after the start of the 1982 Israeli invasion of Lebanon.

Despite heightened tensions, Egyptian authorities took the risk of inviting Israelis to help battle the disease, "even bringing them into remote areas to work in the field," a conference report said. "Jointly, they controlled the outbreak," the report added.