ANNUAL TECHNICAL REPORT

October 1, 1996 - September 30, 1997

Moroccan Cooperative Agricultural Development Project

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Submitted by the

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San Diego, California 92182

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This Annual Technical Report for the Moroccan Cooperative Agricultural Development Project was prepared by the San Diego State University Foundation utilizing input from participants in the Kingdom of Morocco, the State of Israel and the United States of America.

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OVERVIEW

Project Description

The Moroccan Cooperative Agricultural Development Project is funded by the Agency for International Development Bureau for the Near East. Initiated July 1, 1992, the Moroccan Project is being accomplished by participants from the Kingdom of Morocco, the State of Israel and the United States of America and is designed to meet a number of national development priorities set by the governments of Morocco and Israel.

The goal of the project is to promote world peace through cooperation in agriculture. Specific objectives are to contribute to the development of Morocco's agricultural sector by the introduction of new technology, training and demonstration. The project constitutes a new stage in the Middle East Regional Cooperation program, introducing a new partner with Israel and the United States.

Accomplishments

Progress in comparison with the work plan and in comparison to the goals and objectives outlined in our original proposal, including subsequent modifications, has been satisfactory for the period of October 1, 1996 - September 30, 1997. Accomplishments during this report period include:

General

- In November 1996, Project Coordinators, Mr. Driss Lahlou (Morocco), Dr. Dov Pasternak (Israel), and Dr. Bonnie Stewart (U.S.), met with Mr. Hamon, the owner of Palmdat Tissue Culture Laboratories, to discuss collaboration in the production of date palms. Mr. Hamon has selected clones of dates that are tolerant of Fusarium, a disease that has spread throughout Morocco. The testing of selected samples at the project site is being evaluated;
- In November 1996, Project Coordinators also met with the Governor of the Souss in Morocco, Mr. M'Jahdi; the Director of Plant Protection and Food and Drug Administration in Rabat, Mr. Rachid Lakhdar; the Director of the Department of Forestry in Agadir, Mr. Jader Hamma; and the Director of Water and Forest Administration in Rabat, Mr. Hanan Abderrahman, to discuss the reforestation problems in Morocco. Mr. Abderrahman invited a representative from Israel to visit Morocco to discuss the reforestation and dune stabilization approaches in Israel and Morocco;
- In January 1997, Morocco Project Coordinator, Mr. Driss Lahlou, Amaris Marketing Coordinator, Mr. Karim Lahlou, SDSU Foundation staff Dr. Bonnie Stewart and Mr. Tim Hushen, and USAID officials in Morocco, met with Congressman Ronald Packard and other members of his delegation to brief them on the Middle East Cooperative programs and their role in the peace process;

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- In May 1997, Project Coordinators visited the Maryut Project site in Egypt with the U.S. Coordinator, Dr. Mohamed El Assal and Mr. David Moore, SDSU Foundation. The San Diego team met with USAID evaluators to discuss the benefits of the regional cooperation programs. Mr. Lahlou and Dr. Pasternak met with Egyptian scientists involved in the Egyptian programs. Mr. Lahlou invited Dr. Ayman Abou Hadid (Professor at Aim Shams University) to visit the Morocco project site and to exchange technicians for training in grafting;
- Project Coordinators had conference calls regarding sponsorship of a seminar on aforestation to be held in September 1997. The seminar was proposed in response to the meeting with Mr. Hanan Abderrahman in November 1997 (see above), when he invited Israelis to Morocco to discuss these issues. The seminar was planned, participants invited but the implementation needed to be delayed due to political events (see "Problems" section);
- In July 1997, Dr. Pasternak, Dr. Stewart, Mr. W. Timothy Hushen, Mr. Driss Lahlou met in Morocco with USAID Contract Officer, Dr. Josette Lewis, Contract Assistant, Dr. Andre Orange, and project evaluators, Dr. Carl Dutto, Dr. David Mears and Dr. Robin Brumfield. The purpose of the meetings was to review the project accomplishments, conduct site visits and meetings with designated individuals in order evaluate the project in its final year. Follow-up information was provided to the evaluators in response to their draft final evaluation report; (see below, "Responses to Draft Evaluation Report" for additional detail on information provided)
- Contract required reports were submitted to USAID; informational meetings and calls with USAID project officers in Washington, D.C. and Rabat, Morocco were held; a summary of project collaborative activities was submitted to USAID in Rabat;
- An article about the Maghreb Agriculture and the activities of this trilateral cooperative project was published in the March 1997 issue of *Le Monde Agricole*, the only professional agricultural newsmagazine in Morocco. The publication date coincided with the National Fair at the TORO Space in Casablanca (March 12-16). This fair was attended by most of the agricultural sector of Morocco. Representatives from Amaris Nurseries participated in the fair to explain and promote Amaris Nursery products.

Specific technical accomplishments, in comparison to stated objectives, are detailed in the next section entitled, "Progress Report."

Responses to Draft Evaluation Report

In a collaborative response to the draft final evaluation for the Morocco project, materials were prepared and sent immediately to the evaluation team for their consideration. Additional materials will be prepared in response to their insightful recommendations. The following list the materials already provided to the evaluators and the items currently being finalized.

Items provided

- Details on project technical and collaborative accomplishments prepared by Mr. Driss Lahlou. Included were a summary of cooperation with Moroccan ministries and Amaris Nurseries activity reports; *(See Attachments B, C, D, K, L of this report)*
- Response prepared by Mr. Karim Lahlou to evaluation recommendations. A detailed list of project beneficiaries and contacts in Morocco was sent following the initial response letter; *(See Attachment A of this report)*
- Response prepared by Dr. Dov Pasternak included a summary of adaptive research activities conducted in Morocco. Summaries of cooperative and collaborative research activities, and lessons learned in regional cooperation, had been provided to the evaluators during their evaluation visit to the project sites. *(See Attachments E, F, G, H, I, J of this report)*

Items being finalized

- Draft business plan is being finalized for converting the project operations from a research facility to a profitable business;
- Promotional literature and extension materials for distribution including extension materials for promoting project supported transplant technologies;
- Cost of production budgets are being finalized for nursery and open-field production activities. This information is provided in a simple format for ease of distribution with the greatest potential impact so that farmers can make informed choices of the best production technique;
- Provide the USAID Mission in Morocco with overviews of the project accomplishments including lessons learned. This information can be utilized in the design and management of future programs.

PROGRESS REPORT
for
MOROCCO

October 1, 1996 - September 30, 1997

The following is a summary of the **Objectives** for each activity that is to be carried out at the project site in Azemour, as detailed in the grant. Following the description of each objective is a **Progress Report to Date.** The progress report covers the period from **October 1, 1996 - September 30, 1997.**

TRANSPLANT NURSERY

Objective:

The high root/shoot ratio production by transplant seedling technology allows for optimal production from drip irrigation and a high rate of germination of expensive hybrid seeds. Planting of transplant seedlings one month later than direct field sowing reduces environmental stress on the plants and results in savings of water, fertilizer, herbicides and field preparation. Thus, introduction of this technology is intended to result in yield gains and cost savings to the vegetable industry.

A transplant nursery will be erected in phases, with an initial capacity of one million seedlings per rotation supplied to farms in the target region. The size will increase five-fold during the project period. This activity is intended to influence the construction of similar nurseries in the country.

The nursery will specialize in the production of tomatoes, peppers, cucumbers, melons, and other crops to be identified. Experimentation will be directed towards the evaluation of locally produced growing media, utilization of fertilizers from various sources, and refinement of irrigation and management.

Progress to Date:

- continued marketing activities for transplant orders for production in July and August 1997;
- grafting of commercial varieties of tomatoes and melons onto tolerant root stocks is a method of producing tolerant plants while reducing the need for chemical treatments of the soil; trials were conducted in greenhouses and open field;
- limited commercial production was started in December 1996 with the objective of introducing this new approach to Moroccan farmers through extension, site visits and farm visits;

- daily visits were made to local growers to provide them with information on transplant production techniques and to introduce a new process of producing grafted tomatoes and melons;
- promotion activities continued including contacting grower groups and brokers in order to reach medium and small-scale producers; *(See Attachment A for a list of beneficiaries and client contacts.)*
- a new marketing brochure on grafted transplants was produced; growers were provided with product information and support; marketing materials were distributed;
- An article about the Maghreb Agriculture and the activities of this trilateral cooperative project was published in the March 1997 issue of *Le Monde Agricole*, the only professional agricultural newsmagazine in Morocco. The publication date coincided with the National Fair at the TORO Space in Casablanca (March 12-16). This fair was attended by most of the agricultural sector of Morocco. Representatives from Amaris Nurseries participated in the fair to explain and promote Amaris Nursery products, in particular the transplant and the new grafted varieties of melons, watermelons and tomatoes;
- marketing in winter months was targeted at the small producers and local markets; summer targets will be large producers and the export market;
- conducted tests in Agadir transplant nursery to evaluate the optimal production and management practices for climate control, irrigation, fertigation and phytosanitary treatments;
- the nursery space in Ait Melloul was expanded in order to serve as a demonstration area for growers to learn about the production of grafted vegetables. *(See Attachment B, "Technical Report for Ait Melloul"; Attachment C, "Technical Report for Azemour"; and Attachment D for an overview of the grafting program.)*

POT-PLANT NURSERY

Objective:

This activity is seeking to utilize Morocco's comparative advantage of mild winter temperatures, high level of radiation, and low labor costs to (a) compete for markets in Europe and neighboring countries and (b) expand the local market. The facility is also producing low cost, quality starters for the local market.

The pot-plant nursery is generating two types of products: rooted seedlings and finished pot-plants. It includes both a mother plantation and a production unit. The mother plantation, based on the highest quality species available, provides propagation material for the production unit. The production nursery is divided into a rooting section and a pot-plant production section.

Linkages will be developed with leading European nurseries, and ornamental lines, mostly rooted seedlings, will be produced according to orders from these nurseries. Production for the local market is concentrated on a line of easy to produce plants, with high quality seedlings being made available to local pot-plant producers and finished pot-plants also being produced.

Experiments include the effects of dwarfing agents, utilization of local materials for plant growth medium, nutrition, and optimization of light and temperature. The nursery will be used for on-the-job training of a large number of farmers in the art of pot-plant production. It will also assist Moroccan farmers who wish to start their own nurseries.

Progress to Date:

- Amaris Nurseries continued to produce seedlings of forest trees for the Department of Forestry in Morocco;
- In November 1996, Amaris Nurseries first began production of 500,000 seedlings of forest trees for the Department of Forestry in Morocco;
- In January 1997, 100,000 plants of eucalyptus, acacia and casuarium were provided to the Forestry Authority;
- Tests were conducted using different soil mixture mediums;
- Tests on a variety of bush seeds were made including: eucalyptus, acacia, cypress; cuttings were made of geranium, sheflera and others; propagation of seedlings of sheflera, dracaena, melaleuca and ficus were accomplished;
- In November 1996 Project Coordinators, Mr. Lahlou (Morocco), Dr. Pasternak (Israel) and Dr. Stewart (U.S.), met with the Governor of the Souss in Morocco, Mr. M'Jahdi; the Director of Plant Protection and Food and Drug Administration in Rabat, Mr. Rachid Lakhdar; the Director of the Department of Forestry in Agadir, Mr. Jader Hamma; and the Director of Water and Forest Administration in Rabat, Mr. Hanan Abderrahman, to discuss the reforestation problems in Morocco. Mr. Abderrahman invited a representative from Israel to visit Morocco to discuss the reforestation and dune stabilization approaches in Israel and Morocco;
- In July 1997, Project Coordinators met with Mr. Ankouz in the Water and Forest Administration in Rabat to continue planning for a collaborative seminar on aforestation involving Israeli, U.S. and Moroccan scientists;
- Mr. Yossi Ben-Dov of Israel and Mr. Driss Lahlou met with five members of the Department of Forestry in Agadir to discuss approaches to resolving the sand dune stabilization in Morocco. Amaris Nurseries is producing seedlings for the Department in support of these efforts.

OPEN-FIELD PRODUCTION OF ORNAMENTALS

Objective:

This activity is focusing on the production of hardy woody ornamentals since (a) out-of-doors production of ornamental is attractive to small farmers due to low investment requirements, and (b) this segment of the ornamental industry is little known in Morocco. The project is concentrating on three species of melaleuca.

Trials on the 2-hectare site are devised to produce optimal irrigation and fertilization regimes and post-harvest treatment.

Progress to Date:

- Plans were made for another marketing campaign in the fall of 1997;
- melaleuca fields were weeded, pruned and cleaned;
- the strelitzia field was weeded and cleaned - expanded cultivation to a third parcel;
- In December 1996, Mr. Karim Lahlou, Marketing Coordinator and Mr. Yossi Ben Dov, Israeli technical consultant visited markets in Europe to assess the potential for exporting melaleuca and verticordia branches; samples were sent following their trip for evaluation
- continued development of melaleuca; growth was less than optimal due to changes in the irrigation and fertigation regimes; continued to weed and mulch the fields with black plastic;

OPEN-FIELD and GREENHOUSE EXPERIMENTS WITH VEGETABLES

Objective:

This component includes experimentation, demonstration, and application of modern methodologies and technologies of open-field-crop production, addressing parameters of crop rotation, soil preparation, manuring and basic fertilization, seed-bed preparation, irrigation, herbicide application, flowering manipulation, planting, fertigation, insect and disease prevention and controls, pollination, harvest timing, and post-harvest treatment.

The activity will seek to introduce a range of species and cultivars of vegetables for the processing industry. The main crops to be tested, improved and disseminated are fresh salad tomatoes and melons, cucumbers, and artichokes. Varietal trials for each group are being thoroughly assessed.

Progress to Date:

- **asparagus** field was cleaned and cut for renewed bunches; a spraying program was continued to control rust; the field was mulched with black plastic to prevent the development of nut grass; the asparagus did not sell well in the local markets so other markets will need to be identified; results of the application of Giberlines showed early flowering; the asparagus testing was completed in February 1997;
- **raspberries** were cleaned and left in dormancy in the winter; in the summer, the fertigation program continued to be evaluated in order to improve the plant quality; the raspberries were having a problem with too much salinity;
- **artichokes** were weeded and cleaned; production was stopped in December 1996;
- **tomatoes** - four nematode resistant varieties were re-tested in greenhouses for tolerance;
- **grafting vegetable crops** techniques are being examined and performed on a trial basis to determine the adaptability of this technique for Morocco.

TRAINING AND EXTENSION

Objective:

Training at the Azemour Project Site

All training at the project site will be carried out by a cadre of 10-15 Moroccan extension workers, drawing also on professionals from the Hassan II Institute of Agriculture and Veterinary Medicine and from the National Institute for Agricultural Research. Groups of farmers and farm technicians will be selected for extended on-the-job training at the project site in Azemour. Training will be provided on agronomic topics of general importance, and a training plan will be developed for each component. The Technical Committee will design the training, evaluate its effectiveness, and advise on equipment needs.
Short-term Project Site Courses of up to one week will be given on topics related to site activities.

Extension Program

In addition to providing training as discussed above, the extension specialists will conduct an advisory service to farmers who cooperate with the project. They will be employed by the project and will work in various activities; their extension work will be in addition to their every-day job obligations.
Extension will be carried out in at least three areas; plant protection, vegetables and ornamental production. The Technical Committee will devise the extension program.

Progress to Date:

- **weekly meetings** are held at the farm in Azemour with technicians and the farm manager to review plans and provide in-depth discussion and direction; weekly meetings are held with the Moroccan Project Coordinator and the Moroccan Farm Manager; weekly meetings in Agadir are held;
- **extension** and information on transplants and production techniques are being provided to growers through the marketing and sales activities; meetings have been held in the Agadir offices with wholesalers and retailers of seeds and farm supplies in order to encourage them to contract with Amaris to produce the transplants which in turn will be sold to the local farmers;
- **Local farmers and potential clients make visits to the project site**; in Agadir the marketing coordinator continues to visit the local farms;
- **publications** and informational bulletins have been produced and are being distributed to local farmers; articles about Amaris were published in local newspapers ;
- **training** of students from Moroccan agricultural institutes takes place on both sites; there have been 14 trainees working at the Azemour for up to three months each since January 1995; in Agadir 9 trainees have worked at the site; Amaris Nurseries is collaborating with the Moroccan extension service in Azemour to establish an on-going training program for student technicians from the Settat, Marrakech and Khouribga agricultural schools - four additional trainees began in October 1996: Mr Baldiri Ali from the Technical Institute Agricole of Chaouia; Mrs. Ezzikari Souad, Mrs. Makhroute Faliha and Mrs. L'Mbareki Flaiha from the Center of Qualification Agricole of Khourribga; during the summer months of 1997, 9 technicians were trained in Azemour and 2 in Agadir; ad additional 16 workers received specialized training in Agadir and 6 in Azemour in various production techniques; *See Attachment N for a list of trainees at Amaris Nurseries from April 1995 through September 1997.*
- **outreach** - information on transplants and production techniques are being provided to growers through the marketing and sales activities; organized visits to the project sites have been arranged for groups of producers, scientists, and agricultural students to demonstrate production techniques, the nursery system, and grafting techniques; groups have visited project sites in Azemour and Agadir (Ait Melloul) from universities, agriculture schools and individual producers from the Souss and Marrakech regions;

- **demonstrations** – tremendous interest was shown regarding the grafting experiments conducted in Ait Melloul and Azemour. There were many visitors at the project sites. In January 1997, the complete staff from Maraissa Company and Azura Export Group visited to get information to establish their own grafting nursery in the southern Morocco. In February, a delegations from Tunisia and Germany visited the Nurseries to view different varieties of wood plants being produced. In March and April 1997, delegates from the Ministry of Forestry in Yemen and Morocco visited the project sites. The delegates visited again in May 1997. Professor Soudi Brahim from Hassan II Institute conducted a study on the water use and quality at Amaris Nurseries. *See Attachment C, "Technical Report for Activities Carried Out at the Amaris Nurseries in Azemour".*

Objective:

Collaboration and Training Abroad

The training abroad aspects have been modified based on the identified needs in Morocco. Extension workers and agricultural technicians have been receiving training at the Amaris Nursery sites in Azemour and Agadir and discussed above. Local agricultural schools and institutes have been enthusiastic in their support for this activity. The training has benefited Morocco greatly.

The collaborative research projects on Argan and Truffles, between Moroccan and Israeli scientists have involved travel to Moroccan by the Israeli scientists and proposed travel to Israel by the Moroccan scientists. This collaborative research exchange aspect to the program was added after the program began and was based on identified mutual scientific interests and needs. Also, the political constraints to implementing this exchange have been relaxed.

Progress to Date:

- plans for travel to Israel for collaborative research scientists, Dr. Aameur (argan) and Dr. Achouri (truffles) were made; proposed travel was for the spring of 1997. Current political situations have ceased travel possibilities;
- Dr. Nerd (Israel) and Dr. Aameur (Morocco) submitted a joint proposal for funding through UNESCO to supplement their on-going work on Argan; *See Attachment J, "Summary of the Joint Proposal on Argan".*
- Dr. Dov Pasternak (Israel) and Dr. R. Shoukr Allah submitted a joint proposal to AID/CDR on, "Development of New Salt Tolerant Forage Grass in Morocco and Israel." Both of the above joint proposals were prepared as a result of the collaboration and contacts established through this program.

PROGRESS REPORT
for
ISRAEL

October 1, 1996 - September 30, 1997

Research and Development in Israel

Cooperative Research

Breeding of High Quality Tomatoes for Morocco

Objective:

The average yield of open field tomatoes in Morocco is 30 tons per hectare, while in Israel it is 80 tons per hectare. The studies on tomatoes to be carried out at the Moroccan site will be supplemented by the breeding of high quality tomato hybrids in Israel that are adapted to the environment of the Middle East and are nematode tolerant.

Progress to Date:

- research work was completed in this project; however, field testing of five varieties was accomplished in Morocco in order to determine the adaptability of these varieties to the local conditions.

Effects of Growth Suppression on Green House Tomatoes

Objectives and Progress:

Trials carried out to date demonstrated the effectiveness of growth suppression by paclubutrazol on extending the period that tomato seedlings stay in the nursery. This effect enables the nursery to keep the seedlings for an additional ten days for customers that did not prepare their fields on time. In both Morocco and Israel, tomatoes are planted in greenhouses from late August onwards. Greenhouse ambient air temperatures in August and September are very high. Tomato plants respond to this temperature by excessive elongation rates of the internodes. Growth suppression at this first stage may also be advantageous. A series of trials was carried out to assess the effect of growth suppression of tomatoes during the post-planting period on growth, flowering and yield of tomatoes.

Development of Verticordiaas an Ornamental Plant

Objective:

This genus has many species, which produce attractive flowering branches, and has good potential for becoming a novel product in the floral markets of Europe and North America. Studies are conducted on the effects of environmental and seed treatment on germination; edaphic and other environmental effects on plant growth and yield; formulation of appropriate agro-management procedures; post-harvest studies; and markets. (The verticordia species of ornamental plant has not yet been introduced in Europe. The branches are very good for decoration with good vase-life. The plants are wild and indigenous to Australia. However, it takes up to two years to germinate and therefore, it is a challenge to domesticate.)

Progress to Date:

- developed fertilization regime resulting in the improvement in plant performance; mass propagation of most successful cultivars; large section was prepared for planting to expand experiments;
- previous research showed problems in soil nutrients for Verticordia; new efforts are being made to graft Verticordia branches onto Melaleuca in order to produce a stronger more resistant plant; grafting trials are continuing;
- new species were introduced at the Azemour site including grafted branches on relative species from the same family (Myrtceae);

Micro propagation of Ornamental Eucalyptus

Objective:

This work is conducted at a tissue culture laboratory of the Ben Gurion University which is also be responsible for training Moroccan technicians in methods of micro propagation, and advising on the construction and operation of the laboratory in Morocco. Results of this research will be applicable to the open-field ornamental production activity in Morocco.

This research program was discontinued because it is no longer relevant to the project, since the decision to discontinue the construction of the tissue culture laboratory. A new research project on raspberry chilling is being conducted instead.

Evaluation of Chilling Raspberry Roots

Objective:

Evaluation of chilling of raspberry roots on flowering induction and yield. Raspberries are normally produced in regions where winter temperatures are lower than those experienced in morocco or Israel's coastal areas. Most cultivars require some winter chilling to induce flowering.

The research project set for year 5 will investigate the effect of artificial chilling of raspberry roots for flowering and yield. The effect of chilling will be compared with non-chilled controls. The trials will be carried out at the laboratories of the Ben Gurion University in beer Sheva and at a research site in the Negev coastal area.

Progress to date:

- trials in the North Negev are continuing;
- preliminary results showed that with artificial chilling the raspberries did flower earlier;
- continued testing will be accomplished.

Collaborative Research

Commercial Production of Truffles

Objective:

Truffles are well known and highly appreciated commodity in Morocco, and in Israel there is an on-going research aimed at the "domestication " of desert truffles. Intensive production of truffles will potentially introduce a new field on intensive agriculture production for both Morocco and Israel. This activity will seek to identify Moroccan scientists who would be interested in cooperating with Israeli research in this area, and to expand direct ties between involved research institutions in both countries.

Progress to date:

- Dr. Achouri, the Moroccan collaborator, developed the work plans for activities in Morocco;
- Dr. Mohamed Achouri was scheduled to visit Israel for additional work on the truffle project in the winter of 1997; however, current political events have prohibited his travel;

- continued test in Israel were made to multiply infected plants by the truffles in order to have a large population of infected plants for experimentation;
- additional tests will be made with other varieties of truffles.

Domestication of the Argan Tree (Argania spinosa) as an Oil Crop

Objective:

The Argan is indigenous to areas of southwestern Morocco. Argan oil production has a high cash crop potential for Morocco and Israel, however, cultivation of Argan is rare. The objective of this study is to determine the potential for domestication of the Argan tree as an oil crop. Research will be conducted in Israel and Morocco by an Israeli researcher in collaboration with a Moroccan counter-part.

Plants at various Negev sites will be used for the research study. Specific objectives include: 1) to examine the establishment, yields and oil production or Argan under various desert conditions; 2) to study its reproductive biology, especially factors associated with high oil content in the fruit; and 3) to select high productive clones for commercial plantations.

Progress to Date:

- collected seeds from 30 selected trees and germinated them; seedlings were planted in experimental plots for evaluation;
- Dr. Aameur was scheduled to visit Israel in the winter of 1997 to work with the Israeli collaborator in the Negev to study existing yielding trees; however, due to recent political events her travel was canceled;
- Dr. Nerd and Dr. Aameur prepared a joint proposal for additional funding for their Argan research – *see Attachment J for a summary*;
- continued work on Argania will take place in Morocco and Israel;

See the following Attachments for additional details:

Attachment E, Summary List of Completed Research Activities: Adaptive, Cooperative and Collaborative
Attachment F, Report on Truffles
Attachment G, Report on Argan
Attachment H, Summary of Adaptive Research in Morocco
Attachment I, Summary of Cooperative Research Activities in Israel
Attachment J, Summary of the Joint Proposal on Argan

CHANGES IN PERSONNEL

Israeli Technical Advisor
In March 1997, Mr. Nissim Sroussi completed his assignment in Morocco and returned to Israel.

MEETINGS AND COLLABORATIVE ACTIVITIES

The attached provides information on meetings and other collaborative activities accomplished during this reporting period: October 1, 1996 - September 30, 1997.

MEETINGS & OTHER COLLABORATION

Morocco, Israel and U.S. Project Coordinators Meeting November 1996

Meetings

In November 1996, Project Coordinators, Mr. Driss Lahlou (Morocco), Dr. Dov Pasternak (Israel), and Dr. Bonnie Stewart (U.S.), met with Mr. Hamon, the owner of Palmdat Tissue Culture Laboratories, to discuss collaboration in the production date palms. Mr. Hamon has selected clones of dates that are tolerant of Fusarium, a disease that has spread throughout Morocco. The testing of selected samples at the project site is being evaluated;

In Morocco, Project Coordinators met with the Governor of the Souss in Morocco, Mr. M'Jahdi; the Director of the Department of Forestry in Agadir, Mr. Jader Hamma; and the Director of Water and Forest Administration in Rabat, Mr. Hanan Abderrahman, to discuss the reforestation problems in Morocco. Mr. Abderrahman invited a representative from Israel to visit Morocco to discuss the reforestation and dune stabilization approaches in Israel and Morocco.

The Project Coordinators met with the Director of Plant Protection and Food and Drug Administration in Rabat, Mr. Rachid Lakhdar. Project activities related to environmental protection were explained to Mr. Lakhdar. Grafting of vegetables, nematode resistant tomatoes and the introduction of fusarium tolerant date palms were activities that have direct positive impact on the environment. Mr. Lakhdar expressed his strong support for these activities. He emphasized the government and King Hassan II's commitment to environmental concerns.

In Rabat, the Project Coordinators met with the Israeli Consular, Mr. Dadonn, to review project activities to date and to discuss the results of the meetings. Mr. Dadonn expressed an interest to visit the project sites in Azemour and Agadir (Ait Melloul). The Coordinators met with Mr. Alan Hurdus, USAID Agricultural Officer, following the meeting with Mr. Dadonn. They reviewed the progress to date and gave Mr. Hurdus a copy the report on collaborative activities accomplished to date *(see Attachment K for a copy of the report).*

Field Trips

Project coordinators visited Amaris nurseries at the project site in Azemour and Ait Melloul. Visits were also made to the tissue culture laboratories of Mr. Alain-Noel Hamon in Genille, France and to the Tissue Technologies Laboratory in Rancho Santa Fe, California to evaluate their date palm propagation capabilities.

Congressional Briefing
January 1997

Meeting

In January 1997, Morocco Project Coordinator, Mr. Driss Lahlou; Amaris Marketing Coordinator, Mr. Karim Lahlou; SDSU Foundation staff Dr. Bonnie Stewart and Mr. Tim Hushen; and USAID officials in Morocco met with Congressman Ronald Packard and other members of his delegation in Marrakech, Morocco. The purpose of the meeting was to brief the delegation on the Middle East Cooperative programs and their role in the peace process.

Mr. Michael Farbman, USAID Director in Morocco, presented an overview of the USAID activities in Morocco. In particular, water utilization and management along with the development of the private sector were identified as key and focal issues for the USAID Mission. Mr. Alan Hurdus, Head, Division of Environment and Natural Resoures, USAID, Morocco and U.S. Ambassador, Marc C. Ginsberg, also attended the briefing.

Mr. Tim Hushen and Dr. Bonnie Stewart provided an overview of the Morocco Project emphasizing the accomplishments to date. Mr. Driss Lahlou and Mr. Karim Lahlou provided information regarding their role as a private sector participant in the project.

Travel costs for this meeting were paid for by the SDSU Foundation and not by project funds.

Melaleuca Marketing Trip
December 1996

Meetings

In December 1996, Mr. Karim Lahlou, Marketing Coordinator and Mr. Yossi Ben Dov, Israeli technical consultant visited markets in Europe to assess the potential for exporting melaleuca and verticordia branches; samples were sent following their trip for evaluation;

In Morocco, Mr.Yossi Ben-Dov and Mr. Driss Lahlou met with five members of the Department of Forestry in Agadir to discuss approaches to resolving the sand dune stabilization in Morocco. Amaris Nurseries is producing seedlings for the Department in support of these efforts.

USAID Evaluation
May 1997

In May 1997, Project Coordinators, Mr. Driss Lahlou, Dr. Dov Pasternak and Dr. Bonnie Stewart, visited the Maryut Project site in Egypt with the U.S. Coordinator, Dr. Mohamed El Assal and Mr. David Moore, SDSU Foundation. The San Diego team met with USAID evaluators, Dr. Krishna Kumar and Dr. Irving Rosenthal, to discuss the benefits of the regional cooperation programs. Mr. Lahlou and Dr. Pasternak met with Egyptian scientists involved in the Egyptian programs. Mr. Lahlou invited Dr. Ayman Abou Hadid (Professor at Aim Shams University) to visit the Morocco project site and to exchange technicians for training in grafting;

USAID Final Evaluation for the Morocco Project
July 1997

In July 1997, Dr. Pasternak, Dr. Stewart, Mr. W. Timothy Hushen, Mr. Driss Lahlou met in Morocco with USAID Contract Officer, Dr. Josette Lewis, Contract Assistant, Mr. Andre Orange, and project evaluators, Dr. Carl Dutto, Dr. David Mears and Dr. Robin Brumfield. The purpose of the meetings was to review the project accomplishments, conduct site visits and meetings with designated individuals in order evaluate the project in its final year. Follow-up information was provided to the evaluators in response to their draft final evaluation report;

Aforestation Seminar
September 1997

Project Coordinators, Mr. Lahlou, Dr. Pasternak and Dr. Stewart, had conference calls regarding sponsorship of a seminar on aforestation to be held in September 1997. The seminar was proposed in response to the meeting with Mr. Hanan Abderrahman in November 1997, when he invited Israeli technical experts to visit Morocco to discuss issues of aforestation and sand dune stabilization. The seminar was planned, participants invited from Israel and the U.S. but the implementation needed to be delayed due to political events (see "Problems" section);

See Attachment M for a complete list of Project Visitations, 1992-1997.

TRAVEL COSTS

The attached summaries details the costs, dates, names, origins and destinations for the project related travel that took place during this report period: October 1, 1996 - September 30, 1997.

TRAVEL COST SUMMARY: October 1, 1996 - September 30, 1997
Morocco Project

NAME	DATE	PURPOSE	ORGIN/ DESTIN.	DESCRIPTION	EXPENSES
Mr. Nissim Sroussi	10-Nov-96 through 15-Nov-96	Long term technical support to Morocco Project	Tel Aviv/ Casablanca/ Tel Aviv	Transportation(Air/Ground)	$ 1,158.70
				Hotel/Lodging	
				Meals and Incidentals	
				Misc. (phone,fax,film,etc.)	
				Total Mr. Sroussi	**$ 1,158.70**
Dr. Dov Pasternak	10-Nov-96 through 16-Nov-96	Date Palm Research	Tel Aviv/ Paris/ Tel Aviv	Transportation(Air/Ground)	$ 1,873.13
				Hotel/Lodging	$ 713.82
				Meals and Incidentals	$ 516.50
				Misc. (phone,fax,film,etc.)	$ 204.04
				Total Dr. Pasternak	**$ 3,307.49**
Mr. Driss Lahlou	09-Nov-96 through 11-Nov-96	Date Palm Research	Casablanca/ Paris/ Casablanca	Transportation(Air/Ground)	$ 226.74
				Hotel/Lodging	$ 351.76
				Meals and Incidentals	$ 237.06
				Misc. (phone,fax,film,etc.)	
				Total Mr. Lahlou	**$ 815.56**
Dr. Bonnie Stewart	09-Nov-96 through 17-Nov-96	Date Palm Tissue Culture Research	Paris/ Casablanca/ Paris/San Diego	Transportation(Air/Ground)	$ 1,885.75
				Hotel/Lodging	$ 860.66
				Meals and Incidentals	$ 717.20
				Misc. (phone,fax,film,etc.)	$ 26.00
				Total Dr. Stewart	**$ 3,489.61**
Mr. Nissim Sroussi	12-Nov-96	Travel to farm	Casablanca/ Agadir/ Casablanca	Transportation(Air/Ground)	$ 162.90
				Hotel/Lodging	
				Meals and Incidentals	
				Misc. (phone,fax,film,etc.)	
				Total Mr. Sroussi	**$ 162.90**
Mr. Yossi Ban Dov	08-Dec-96 through 17-Dec-96	Marketing fact finding trip for Agricultural products produced by Morocco Project	Tel Aviv/ Amsterdam/ Paris/Nice/ Casablanca/Paris/ Tel Aviv	Transportation(Air/Ground)	$ 1,877.51
				Hotel/Lodging	$ 947.00
				Meals and Incidentals	$ 880.84
				Misc. (phone,fax,film,etc.)	$ 168.26
				Total Mr. Ben Dov	**$ 3,873.61**
Mr. Karim Lahlou	08-Nov-96 through 14-Nov-96	Marketing fact finding trip for Agricultural products produced by Morocco Project	Casablanca/ Amsterdam/ Paris/Nice Casablanca	Transportation(Air/Ground)	$ 443.20
				Hotel/Lodging	$ 616.83
				Meals and Incidentals	
				Misc. (phone,fax,film,etc.)	
				Total Mr. Ben Dov	**$ 1,060.03**

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TRAVEL COST SUMMARY: October 1, 1996 - September 30, 1997
Morocco Project

NAME	DATE	PURPOSE	ORGIN/ DESTIN.	DESCRIPTION		EXPENSES
Mr. Nissim Sroussi	18-Feb-97	Long term technical support for the Morocco Project	Tel Aviv/ Casablanca/ Tel Aviv	Transportation(Air/Ground)	$	887.73
				Hotel/Lodging		
				Meals and Incidentals		
				Misc. (phone,fax,film,etc.)		
				Total Mr. Sroussi	**$**	**887.73**
Mr. Driss Lahlou	14-May-97 through 20-May-97	Travel to Cairo as consultant for the Morocco Project, assist review of project for MERC pre-evaluation	Casablanca/ Cairo/ Casablanca	Transportation(Air/Ground)	$	14.30
				Hotel/Lodging	$	495.70
				Meals and Incidentals	$	419.00
				Misc. (phone,fax,film,etc.)	$	-
				Total Mr. Lahlou	**$**	**929.00**
Ms. Nadia Chouri	14-May-97 through 20-May-97	Travel to Cairo as interperator for Mr. Driss Lahlou, assist review of project for MERC pre-	Casablanca/ Cairo/ Casablanca	Transportation(Air/Ground)	$	14.30
				Hotel/Lodging	$	495.70
				Meals and Incidentals	$	419.00
				Misc. (phone,fax,film,etc.)	$	-
				Total Ms. Chouri	**$**	**929.00**
Dr. Bonnie Stewart	14-May-97 through 20-May-97	Travel to Cairo for Morocco Project review and site visits, MERC pre-eval coordination	San Diego/ Cairo/ San Diego	Transportation(Air/Ground)	$	3,454.15
				Hotel/Lodging	$	495.70
				Meals and Incidentals	$	451.96
				Misc. (phone,fax,film,etc.)	$	68.47
				Total Dr. Stewart	***$***	***4,470.28***
Dr. Bonnie Stewart	24-Jul-97 through 07-Aug-97	Travel to Morocco, Egypt, and Israel. Participate in USAID Evaluation for Morocco Project	San Diego/ Morocco/Egypt/ Israel/San Diego	Transportation(Air/Ground)	$	3,385.98
				Hotel/Lodging	$	1,211.27
				Meals and Incidentals	$	1,075.00
				Misc. (phone,fax,film,etc.)	$	379.66
				Additional Meeting Expenses (driver, minibus, meeting rooms)	$	1,690.00
				Total Dr. Stewart	***$***	***6,051.91***
Dr. Dov Pasternak	26-Jul-97 through 06-Aug-97	Travel to Moroco, Egypt, and Israel Participate in USAID Evaluation for Morocco Project	New York/ Casablanca/ Egypt/Israel	Transportation(Air/Ground)	$	1,103.70
				Hotel/Lodging	$	634.72
				Meals and Incidentals	$	483.00
				Misc. (phone,fax,film,etc.)	$	89.60
				Total Dr. Pasternak	***$***	***2,311.02***

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TRAVEL COST SUMMARY: October 1, 1996 - September 30, 1997
Morocco Project

NAME	DATE	PURPOSE	ORGIN/ DESTIN.	DESCRIPTION		EXPENSES
Mr. Nissim Sroussi	22-Jul-97 through 31-Jul-97	Travel to Morocco Preparation and attendence in USAID Evaluation for the Morocco Project	Tel Aviv/ Casa/ Tel Aviv	Transportation(Air/Ground)	$	1,156.63
				Hotel/Lodging	$	762.47
				Meals and Incidentals	$	573.00
				Misc. (phone,fax,film,etc.)	$	-
				Total Mr. Sroussi	***$***	***2,492.10***
Dr. Irit Rylski	04-Aug-97 through 06-Aug-97	Participation in USAI Evaluation for Morocco Project	Tel Aviv	Transportation(Air/Ground)	***$***	*-*
				Hotel/Lodging	***$***	***248.00***
				Meals and Incidentals		
				Misc. (phone,fax,film,etc.)		
				Total Dr. Rylski	***$***	***248.00***
Dr. Dov Pasternak	08-Aug-07 through 09-Aug-97	Travel to London to research Date Palm tissue culture laboratories for ongoing research for Morocco Project	Tel Aviv/London/ Tel Aivv	Transportation(Air/Ground)	$	1,294.40
				Hotel/Lodging	$	-
				Meals and Incidentals	$	-
				Misc. (phone,fax,film,etc.)	$	-
				Total Dr. Pasternak	***$***	***1,294.40***

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PROCUREMENT

Attached is an updated list of equipment, materials and supplies procured for the project.

Equipment for Azemour and Agadir

	Maghreb Agriculture List of Materlials and Supplies Actual vs Planning July 1, 1992 - March 31, 1997	Approved	Actual Purchases 1st & 2nd Year	Actual Purchases 3rd Year	Actual Purchases 4th Year Azemour	Actual Purchases 4th Year Agadir	Actual Purchases 5th Year Azemour	Actual Purchases 5th Year Agadir	Source Origin
1	**Infrastructure & Machinery**								
	a. Meterological Station	$ 20,000		$ 6,587					USA
	b. Electrical Generator	$ 18,000							
	c. 110 HP Tractor	$ 25,000	$ 28,351						M/USA
	d. 60 HP Tractor	$ 15,000							
	e. Subsoiler	$ 3,000	$ 3,230						M
	f. Rotovator	$ 5,000	$ 1,170						M
	g. Disk Harow	$ 2,000	$ 2,107						M
	h. Riverside Triple Head Plough	$ 7,000							
	i. Boom Sprayer 500 liter stainless	$ 4,000	$ 3,564						M
	j. Fertilizer Spreader	$ 1,000							
	k. Fogger			$ 5,500					M
	l. Organic Spreader	$ 4,000							
*	m. Water Development (not in original approved List)		$ 1,752	$ 27,713					M
	Sub Total	**$ 104,000**	**$ 40,174**	**$ 39,800**	**$ -**	**$ -**	**$ -**	**$ -**	
2	**2000 m2 Transplant Nursery**								
	a. 2000m2 Steel Structure (3000m2)	$ 15,000	$ 20,470	$ 31,000		$ 43,652			ISR/M
	b. Plastic Cover IR AF	$ 12,000			$ 1,090	$ 5,197			M
	c. Concrete Paths & Works	$ 10,000		$ 6,152					M
	d. Benches & Trays	$ 68,000	$ 22,422	$ 38,952	$ 12,193	$ 31,511			ISR/M
	e. Heating system	$ 25,000	$ 16,050						ISR
	f. Cooling & Ventilation	$ 22,000		$ 3,100					ISR
	g. Irrigation & Fertilization	$ 25,000	$ 10,000	$ 12,432	$ 348	$ 10,511			ISR/M
	h. Electrical Works	$ 8,000		$ 9,549					M
	i. Preparation Area & Germination Room	$ 10,000		$ 64,752					M
	j. Automatic Seeding System	$ 14,000	$ 17,550	$ 9,320					ISR
	k. General Supplies			$ 4,718					M
	Sub Total	**$ 209,000**	**$ 86,492**	**$ 179,975**	**$ 13,631**	**$ 90,871**	**$ -**	**$ -**	
3	**10,000 m2 Open Field**								
	a. Initial Field Treatment, Drains, Pipe	$ 20,000		$ 43,326	$ 413				M
	b. Drip Irrigation System	$ 120,000	$ 38,187	$ 31,944	$ 2,125				M/ISR
	c. Automation & Main Head	$ 25,000							
	Sub Total	**$ 165,000**	**$ 38,187**	**$ 75,270**	**$ 2,538**	**$ -**	**$ -**	**$ -**	
4	**1,000 m2 Pot Plant Nursery**								
	a. Galvanized Steel Structure	$ 8,000	$ 18,920						ISR
	b. Cover	$ 10,000							
	c. Benches & Trays	$ 50,000	$ 11,658						ISR

Equipment for Azemour and Agadir

	Maghreb Agriculture List of Materlials and Supplies Actual vs Planning July 1, 1992 - March 31, 1997	Approved	Actual Purchases 1st & 2nd Year	Actual Purchases 3rd Year	Actual Purchases 4th Year Azemour	Actual Purchases 4th Year Agadir	Actual Purchases 5th Year Azemour	Actual Purchases 5th Year Agadir	Source Origin
	d. Concrete Path & Works	$ 10,000							
4	**1,000 m2 Pot Plant Nursery (cont'd)**								
	e. Root Heating System	$ 14,000	$ 2,100		$ 2,905				ISR
	f. Space Heating System	$ 10,000							
	g. Cooling System	$ 15,000							
	h. Thermal Screen	$ 8,000		$ 372					M
	i. Irrigation & Fertilization	$ 10,000	$ 7,000		$ 357				ISR
	j. Pot Plant - Strilizia				$ 470				
	Sub Total	**$ 135,000**	**$ 39,678**	**$ 372**	**$ 3,732**	**$ -**	**$ -**	**$ -**	
5	**Micropropagation Laboratory**								
	a. Construction	$ 160,000							
	b. Air Conditioning & Positive Pressure	$ 65,000							
	c. Light, Electricity, Gas and Vaccuum S	$ 20,000							
	d. Internal Furniture	$ 20,000							
	e. Equipment including five hoods, autoc	$ 35,000							
	f. Hardening nursery (included in construction budget)		$ 18,920						ISR
	Sub Total	**$ 300,000**	**$ 18,920**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
6	**Soil Mixing Plant**								
	a. Concrete Structure	$ 10,000							M
	b. Conveyers	$ 10,000							M
	c. Mixing Machine	$ 6,000		$ 31,630					ISR
	d. Steam System	$ 10,000							USA
	e. Packing System	$ 3,000							USA
	Sub Total	**$ 39,000**	**$ -**	**$ 31,630**	**$ -**	**$ -**	**$ -**	**$ -**	
7	**Fertilizer & Chemicals**								
	a. Super Phosphate - 60 tons	$ 5,000							
	b. Ammonium Sulfate - 60 tons	$ 5,000							
	c. Potassium Chloride - 60 tons	$ 3,000							
	d. Compounded Fertilizer - 20 tons	$ 10,000	$ 3,308	$ 8,367					M
	e. Organic Manure	$ 10,000	$ 13,904	$ 29,659					M
	Sub Total	**$ 33,000**	**$ 17,212**	**$ 38,026**	**$ 3,070**	**$ 3,021**	**$ -**	**$ -**	
8	**Nursery Supplies**								
	a. Seeds	$ 50,000	$ 4,070	$ 20,096			$ 36,093		M,ISR,USA
	b. Plant Stock	$ 40,000		$ 11,677					M,ISR,USA
	c. Vermiculte	$ 10,000	$ 2,025	$ 1,620	$ 2,127	$ 23			M,ISR
	d. Peat	$ 10,000	$ 936	$ 3,527	$ 3,110	$ 1,919			M
	Sub Total	**$ 110,000**	**$ 7,031**	**$ 36,920**	**$ 5,237**	**$ 1,942**	**$ 36,093**	**$ -**	

Equipment for Azemour and Agadir

	Maghreb Agriculture								
	List of Materlials and Supplies		Actual	Actual	Actual	Actual	Actual	Actual	
	Actual vs Planning		Purchases	Purchases	Purchases	Purchases	Purchases	Purchases	Source
	July 1, 1992 - March 31, 1997	Approved	1st &	3rd Year	4th Year	4th Year	5th Year	5th Year	Origin
			2nd Year		Azemour	Agadir	Azemour	Agadir	
9	**Office Equipment and Supplies**								
	a. Fax machine	$ 4,000	$ 1,003			$ 294			USA
	b. Photocopier	$ 6,000							
	c. Desk tables	$ 2,000							
	d. Typewriter and general office equipme	$ 4,000				$ 5,424			
	e. Computer and software	$ 10,000	$ 4,567	$ 3,245				$ 1,378	USA
	f. Office supplies	$ 2,000			$ 250	$ 603		$ 727	
	Sub Total	**$ 28,000**	**$ 5,570**	**$ 3,245**	**$ 250**	**$ 6,321**	**$ -**	**$ 2,105**	
10	**Other Supplies and Equipment**								
	a. Plastics	$ 10,000	$ 26,394	$ 27,032	$ 1,650		$ 41,660	$ 171	M,ISR
	b. Benches	$ 10,000		$ 2,932					M
	c. Water Chemicals and Fuel	$ 15,000	$ 26,060	$ 38,502	$ 18,295	$ 3,329			M
	d. Hoods	$ 10,000							
	e. Growth Chamber	$ 30,000							
	f. High Resolution Microscope	$ 50,000							
	g. Tensiometer (not on original approved list)		$ 360						M
	h. General supplies		$ 4,589	$ 21,219	$ 1,149	$ 671		$ 17,021	M
	i. Maintenance		$ 7,493	$ 19,618	$ 8,661	$ 3,361			M
	j. hangar storage					$ 2,082			
	k. oil motopump				$ 1,655	$ 893			
	Sub Total	**$ 125,000**	**$ 64,896**	**$ 109,303**	**$ 29,755**	**$ 10,336**	**$ 41,660**	**$ 17,192**	
	Grand Totals	**$ 1,248,000**	**$ 318,160**	**$ 514,541**	**$ 58,213**	**$ 112,491**	**$ 77,753**	**$ 19,297**	
	Total Actual Expenditures Year 1,2,3 & 4	**$ 1,003,405**							
	Total Approved minus Total Expenditures	**$ 147,545**							
*	Water development costs were covered by project revenue.								

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PUBLICATIONS SUBMITTED TO USAID

The following Technical Reports have been submitted to USAID, as requested by the Moroccan Cooperative Agricultural Development Project grant.

Technical Reports Required by Grant	*Date Submitted*
• **Quarterly Technical Progress Report**	
October 1, 1992 - December 31, 1992	January 10, 1993
April 1, 1993 - June 30, 1993	July 10, 1993
October 1, 1993 - December 31, 1993	January 3, 1994
April 1, 1994 - June 30, 1994	July 10, 1994
October 1, 1994 - December 31, 1995	February 10, 1995
April 1, 1995 - June 30, 1995	July 10, 1995
October 1, 1995 - December 31, 1995	February 10, 1996
April 1, 1996 - June 30, 1996	July 10, 1996
October 1, 1996 - December 31, 1996	February 10, 1997
April 1, 1997 – June 30, 1997	July 10, 1997
• **Semi-Annual Technical Progress Report**	
July 1, 1992 - September 30, 1992	October 10, 1992
October 1, 1992 - March 31, 1993	April 10, 1993
October 1, 1993 - March 31, 1994	April 10, 1994
October 1, 1994 - March 31, 1995	April 10, 1995
October 1, 1995 - March 31, 1996	April 10, 1996
October 1, 1996 - March 31, 1997	April 10, 1997
• **Annual Technical Report**	
July 1, 1992 - September 30, 1992	October 10, 1992
October 1, 1992 - September 30, 1993	October 10, 1993
October 1, 1993 - September 30, 1994	November 10, 1994
October 1, 1994 - September 30, 1995	December 15, 1995
October 1, 1995 - September 30, 1996	November 15, 1996
October 1, 1996 – September 30, 1997	Current report
• **Semi-Annual and Annual Technical Report**	
November 1992 Update	November 30, 1992

Financial Reports Required by Grant

- **Quarterly Financial Report**

July 1, 1992 - September 30, 1992	October 10, 1992
October 1, 1992 - December 31, 1992	January 10, 1993
January 1, 1993 - March 31, 1993	April 10, 1993
April 1, 1993 - June 30, 1993	July 10, 1993
July 1, 1993 - September 30, 1993	October 10, 1993
October 1, 1993 - December 31, 1993	January 10, 1994
January 1, 1994 - March 31, 1994	April 10, 1994
April 1, 1994 - June 30, 1994	July 10, 1994
July 1, 1994 - September 30, 1994	October 10, 1994
October 1, 1994 - December 31, 1994	January 10, 1995
January 1, 1995 - March 31, 1995	April 10, 1995
April 1, 1995 - June 30, 1995	July 10, 1995
July 1, 1995 - September 30, 1995	October 10, 1995
October 1, 1995 - December 31, 1995	January 10, 1996
January 1, 1996 - March 31, 1996	April 10, 1996
April 1, 1996 - June 30, 1996	July 10, 1996
July 1, 1996 - September 30, 1996	October 10, 1996
October 1, 1996 - December 31, 1996	January 10, 1997
January 1, 1997 - March 31, 1997	April 10, 1997
April 1, 1997 – June 30, 1997	July 10, 1997
July 1, 1997 - September 30, 1997	October 10, 1997

- **Projection of Funding Requirements Report**
  Fiscal Year July 1, 1993 - September 30, 1994
  Fiscal Year October 1, 1994 - March 31, 1995
  Fiscal Year April 1, 1995 - June 30, 1996
  Fiscal Year July 1, 1996 - June 30, 1997

The "Morocco Report" Newsletters

Spring and Fall 1993
Spring and Fall 1994
Spring 1996

Final Evaluation Briefing Document

Background Materials for the Final Evaluation — July 1997

ACCOMPLISHMENTS IN REGIONAL COOPERATION

The attached provides information on collaborative activities accomplished during this reporting period: October 1, 1996 - September 30, 1997.

ACCOMPLISHMENTS IN REGIONAL COOPERATION

- **Mr. Driss Lahlou (Morocco Coordinator), Dr. Dov Pasternak (Israel) and Dr. Bonnie Stewart (U.S.)** met with **Mr. Hamon,** the owner of Palmdat Tissue Culture Laboratories, to discuss collaboration in the production of date palms; in Morocco they met with the Governor of the Souss in Morocco, **Mr. M'Jahdi**; the Director of the Department of Forestry in Agadir, **Mr. Jader Hamma**; and the Director of Water and Forest Administration in Rabat, **Mr. Hanan Abderrahman**, to discuss the reforestation problems in Morocco. Mr. Abderrahman invited a delegation from Israel to visit Morocco to discuss aforestation problems; a seminar was planned and representatives selected and accepted but political events resulted in a delay in the seminar; finally, in Rabat, project coordinators met with **Mr. Rachid Lakhdar**, Director of Plant Protection and Food and Drug Administration; **Mr. Dadonn**, the Israeli Consular; **and Mr. Alan Hurdus,** the USAID Agricultural Officer; (November 1996)
- **Mr. Driss Lahlou, Mr. Karim Lahlou, Dr. Bonnie Stewart, Mr. W. Timothy Hushen (SDSU Foundation),** met with Congressman Ronald Packard and other members of his delegation in Marrakech to brief them of the accomplishments in regional cooperation of the Morocco project; Mr. **Michael Farbman, USAID** Director in Morocco and **Mr. Alan Hurdus,** USAID Agriculture Officer, presented information on water use and management in Morocco at the meeting; (January 1997). **Ambassador Marc C. Ginsberg,** also attended the meeting.
- **Mr. Karim Lahlou,** Marketing Director for Amaris, and **Mr. Yossi Ben-Dov**, Israeli technical expert in ornamentals, visited markets in Europe and met with wholesalers for ornamental branches. The purpose of the trip was to establish some potential markets for project produced melaleuca branches; (December 1996)
- **Dr. Dov Pasternak** (Israeli Coordinator), **Mr. Driss Lahlou** (Morocco Coordinator), **Ms. Nadia Chouri** (Morocco Project Assistant), **Dr. Bonnie Stewart** (Morocco U.S. Project Director), **Dr. Mohamed El Assal** (Maryut U.S. Project Director) and **Mr. David Moore** (SDSU Foundation) met with **Dr. Krishna Kumar** (USAID-Washington, D.C.) and **Dr. Irving Rosenthal** (USAID Consultant) in Egypt to review project accomplishments in regional cooperation. (May 1997)
- **Dr. Dov Pasternak, Mr. Driss Lahlou, Dr. Bonnie Stewart, Mr. W. Timothy Hushen** met with USAID Contract Officer, **Dr. Josette Lewis;** Contract Assistant, **Mr. Andre Orange;** USAID evaluators, **Dr. Carl Dutto, Dr. David Mears and Dr. Robin** Brumfield met in Morocco to review the project accomplishments and prepare a final review of the program. (July 1997)

PROBLEMS

Problems and Actions Taken to Address them

Problem: Cancellation of the Aforestation Seminar Scheduled for September 1997

Plans for a cooperative seminar on aforestation were made at the request of the Director of the Water and Forestry Administration in Rabat, Morocco. Initial meetings were held in November 1996. Mr. Driss Lahlou, Moroccan Coordinator, Dr. Dov Pasternak and Dr. Bonnie Stewart made subsequent visits. Final arrangements for the seminar were made in July 1997. Five Israelis were invited, two from the U.S. and five from Morocco. However, due to the political events that transpired in August and September, approvals for the seminar could not be secured.

Problem: Cancellation of the Travel Plans of Moroccan Collaborative Researchers

Travel plans to Israel were canceled for Dr. Mohamed Achouri, a Moroccan scientist working on truffles research with Israeli counterpart, Dr. Tsur; and Dr. Fouzia Ben Ameur, a Moroccan scientist working on argan research with an Israeli counterpart, Dr. Nerd. Again, the travel was canceled due to the political events and decisions of the Israeli government.

Resolution of these Problems

We are seeking support from the Cabinet Royal to provide approvals to conduct the seminar on aforestation in Morocco with Israeli, U.S. and Moroccan experts. We hope to receive approvals in time to sponsor the seminar in December 1997.

Travel plan approval for the researchers will be attempted if approval is secured for the seminar. If the scientists are still not able to travel to Israel, then their Israeli counterparts will travel to Morocco to exchange information on their collaborative research.

LESSONS LEARNED

LESSONS LEARNED FROM THE MOROCCAN COOPERATIVE AGRICULTURAL RESEARCH PROGRAM

LESSONS LEARNED

- The program must be of top priority to governments of participation countries
- The program must have the patronage of influential political figures in each country
- The program should be long-term to allow full execution of the research programs, appropriate transfer of technologies, training of professional staff, marketing, and the beginning of application of research and technology transfer results.
- The program should be designed to benefit the largest possible number of people. At the same time it should have maximum relevance to the benefactors so that results will be readily adopted.
- Cooperation between country coordinators is crucial for the success of the program. The coordinators should contact each other on a weekly basis and meet 4-5 times a year.
- The participating scientists should be of a high caliber and with a strong inclination towards applies research, and they should be dedicated to peace.
- The budget for the program should be reasonable large in order to:
    a) Allow the creation of an integrated project
    b) Allow the participation of the largest possible number of scientists
    c) Reduce overhead costs
    d) Product substantial results
- The overall objective and topics of research should be identical for both cooperating countries. However, the particular research topics should be designed to solve problems specific to the given country. Wherever possible collaborative research should be encouraged, but when applied research with an immediate impact is the main concern, then collaborative research may be loss appropriate.
- The involvement of US institutions is critical at this stage of the peace process:
    a) The umbrella of a trilateral program (rather than a bilateral program confined Israel and an Arab country) is much more acceptable to governments, institutions and individuals in Arab countries
    b) The U.S. institutions and scientists act as moderators and facilitators, and as a body they facilitate the resolution of conflicts
    c) The U.S. institutions maximize the visibility of the program internationally and nationally
    d) Their involvement assures that the objectives and goals of the program as devised by the U.S. government and the U.S. Agency for International Development are being met
    e) The U.S. institutions handle the fiscal and technical management in a professional manner
    f) Their involvement assists in the purchase and shipping of U.S. equipment and facilitates the training of scientific and technical personnel in U.S. institutions
    g) The U.S. institutions conduct internal annual review and evaluations

- The joint Technical Committee is the professional body, which plans the technical and scientific activities, supervises their execution, and provides technical assistance.
- The Joint Steering Committee should include personalities with influence at the highest political levels in each country. It determines guidelines for the Technical Committee and the country coordinators, oversees the expenditure of the program's budget, and is responsible for the appropriate execution of the technical and the cooperative activities.
- Through their influence at the highest governmental levels the members of the Joint Steering Committee facilitate the execution of the cooperative activities. In addition, they both initiate and approve changes and deviations from the original work-plan and recommend those changes to the USAID project manager.
- The role of an Israeli Technical advisor is important in programs involving significant technology transfer from Israel. However, the Israeli Technical Advisor must never assume managerial responsibilities.
- Due to the volatile political situation in the Middle East and the fact that the region is undergoing a peace process, there should be maximum flexibility in designing the implementation programs.

Specific Lessons Relevant to the Moroccan Program

In Morocco the program was carried out with the private sector and in a country which does not have official diplomatic relations with Israel. Specific lessons learned there are:

- To assure and encourage the cooperation of the private sector partner, many of the introduced technologies should be the property of the Moroccan partner
- The commercial interest of the private sector should be used to publicize the program in the country. Thus seminars, workshops, exhibitions, field days, etc. should be designed to simultaneously promote sales and publicize the program
- The program must be flexible in order to respond to changes in market demands and technical capabilities
- The spread of new technologies and ideas should be carried out through the involvement of producers and suppliers
- Creative ways should be devised to involve the public sector (research institutions, extension service, etc.) in the program. However, the participation of the public sector is less reliable than in countries which have full diplomatic relations with Israel
- Nurseries are an effective tool for know-how and technology transfer

ATTACHMENTS

A. List of Beneficiaries

B. Technical Report for Project in Agadir (Ait Melloul)

C. Technical Report for Project Activities in Azemour

D. Overview of the Grafting Activities

E. Summary of Completed Project Research Activities

F. Technical Report on the "Domestication of Truffles"

G. Technical Report on the "Domestication of Argan"

H. Summary of Adaptive Research in Morocco

I. Summary of the Cooperative Research Activities in Israel

J. Summary of the Joint Proposal on Argan

K. Collaboration Accomplishments – report prepared by Project Coordinators, November 14, 1996

L. Project Accomplishments – report prepared by Moroccan Coordinator, Mr. Driss Lahlou, May 1997

M. Morocco Project Group and Individual Visitations

N. List of Trainees at Amaris Nurseries, April 1995 – September 30, 1997

A.

List of Beneficiaries

LIST OF PRODUCERS CONTACTED BY THE MARKETING DIVISION
OF
AMARIS MAGHREB AGRICULTURE

STATION	RESPONSIBLE	REGION	TELEPHONE
Aktir	Barat Lahoucine	Biougra	815255
Tijani	Moutiga Med	Biougra	818244
Sous Fleur	Meziani	Massa	240287
Kabbage Massa	Belghiti	Massa	
Marisprim	Tazi	Massa	242178
Agrito	Khaji	Biougra	318037
Cherdoud	Cherdoud	Biougra	243037
Gdira	Gdira	Biougra	243721
Boussetta	Boussetta. B	Biougra	818051
Frutesma	Carmilo Rodrigues	Ait Milk	818161
Grina	Lahrichi Med	Ait Milk	845534
Moussaid	Moussaid Omar	Biougra	818606
Archane	Archane Med	Biougra	818392
Maroub	Maroub AbdelKader	Biougra	818074
Ifoulki	Oumelouk Med	Biougra	
Jakadir	Zaghdoud	Khmiss Ait Amira	818115
Genti	Genti Med	Biougra	241968
Nectar Prim	Galka J.C.	Route Ait Baha	818144
Boustane	Faris Amine	Massa	845237
Maraissa	Pierrich Puech	Massa	
Amanouz	Amanouz	Biougra	821925
Assa	Baguich	Biougra	818315
Boussebat	Boussebat	Biougra	240344
Bairouk	Bairouk	Biougra	818161
Kamal	Elherd Ahmed	Khmiss Ait Amira	
Nya	Nya Med	Khmiss Ait Amira	241129
Dounia	Elberhichi Atmane	Khmiss Ait Amira	222723
Miftah	Miftah M'Barek	Biougra	818501
Tomasouss	Moumile Abdellatif	Massa	220517
Armona	Jaquemart Etienne	Biougra	846662
Coprimag	Defrioui Med	Biougra	818488
Consimtix	Sidalal	Massa	825514
Elbouj	Bansalah	Douar Taddart	242388
Douna	Galindo Buitragoh	R.Sebt Ait Milk	818420
Korvran	P. Laargeesn	Douar Ait Mimoun	224978

end

LIST OF ORGANIZATIONS AND SOCIETIES INVITED TO THE APRIL 15, 1996 SEMINAR ORGANIZED BY THE MOROCCO PROJECT

ORGANIZATION	ADDRESS	TELEPHONE	FAX PHONE
Ormvasm	Mr le Directeur de l'ORMVASM, Agadir		
DPA	Mr le Directeur de la DPA, Agadir		
Eauz et Forets	Mr le Directeur des Eaux et Forets, Agadir		
Inspection Regional D' Agric	Mr. l'Inspecteur Regional de l' Agric, Agadir		
INRA	Mr le Directeur de l'INRA, Ait-Melloul		
ant Acr	Mr le Directeur de la lutte Anti-Acridiene		
Chb Agric	Mr le President de la Chambra d'Agriculture Adadir		
P.V.	Mr. le Directeur de la P.V. Ait Melloul		
Apefel	APEFEL (Mr. Mouisset) Ait-Melloul, Agadir	08-243454	08-243456
Aspem	ASPEM (President Mr. ahmed Mansour Najjai) 52, Rue d' Azilal	02-301510/02-303456	02-300612
Ampex-Fleurs	Association des Producteurs Exportateurs des Fleurs 145, Bd. Zerktouni, Casablanca	02-252696	02-364041
Cooperative Mabrouka	Quartier Industriel-zone, Agadir	02-833207	02-834676
Chambre d'Agriculture-Aga	Chambre d'Agriculture, Agadir	08-842679/08-844101	
Chambre d'Agriculture-Tar	Chambre d'Agriculture de Taroudante	08-850489	
Ezzouhour	Societe Ezzouhour SA 6 route Biougra, Ait Melloul, Agadir	08-240569	08-241820
Hortec	Societe hortec 192, Bd My Ismail, Casa	02-241271	02-400570
Sofa-Souss	Societe Sofa-Souss, 80 route Biougra Ait-Melloul	02-241459	02-241458
Casem	Comptoir Agricole des Semences 192, Bvd My Ismail, Casa	02-248819	02+400670
Chems		08-833474/76	08-843458
Sodea	SO.de A BP n 13 Oled Teima, Taroudant	08-526869	
Sodea	So. De A (siege) Av. Haj Ahmed Cherkaoui BP: 6280 Rabat-Institut	07-770825/07-774798	07-771514
SOGETA	SOGETA. Siege: 35 Rue Agdal BP: 731 Rabat	07-772834	07-772765/07-754934
SASMA	S.A.S.MA (delegation Agrumes) Mr. ahmed El Khemass. Place Bir Anzaran Cite Rabla Oulad Teima, Taroudant	08-526411	
SASMA	S.A.S.MA (delegation Maraichage) Mohamed Lhimer Immeuble Damou, Route de Biougra Ait Melloul	02-240325	
CNCA	Siege CNCA 2 Avenue l'Alger, Rabat BP 49	07-725920/07-732555	07-732580
A.N.A.P.P.A.V.	A.N.A..P.P.A.V. Dr. Med Besri Av. Hassan II Rabat-Instituts	07-710148	
Agro Spray Techniques	Route de Tiznit	08-241206	08-241206

ORGANIZATION	ADDRESS	TELEPHONE	FAX PHONE
Comptoir Agricole du Souss	Avenue Hassan II BP 374	08-820420/08-821492	08-823208
Vita Maroc	3 rue Taid Abdllkrim, Casablance	02-447726/27/28	02-293549/02-447519
Magriri	Ait Melloul Route de Biougra Hrach	02-242525/27	
Rahane Maroc	24, rue Souheil Faheen 20 000, Casablanca	02-301732/02-305244	02-305006
Graga	Route de Biougra, no. 117	08-24c1812	08-243637
Vitamar	Route de Biougra, no. 117	08-24c1812	08-243637
Alfa Chimie	215, BP Abdellah Ben Yacine Belvedere, Casablanca	02-247202	
Sedagri	Route de Taroudant	02-830905	
Magri-Ser	21, BP Almokawama, Casablanca	02-241537/40	02-246209
Amaroc	SA 152, BP Abdellah Ben Yacine Casablanca	02-242471/72	.
Somai	120, BP Almokawama, Casablanca	02-305629	02-303793
Comicon	9 BP, d'Oujda, Casablanca	02-300318/02-302211	02-306082
Stokvis	Rue de Sergent Hileair Ain Borja BP 2183 Casablanca 21 700	02-403740	02-403887
Bayers	Km 1, route de Taroudant, Ait Melloul 80 150 Agadir	08-240402	08-241426
Process	Km3, route d'Essaouira BP 374	08-820904/08-820763	18-823208
Cali-Souss	Ait Melloul Route de Biougra Hrach	08-826257	
Cali-Maroc	82, rue Loudaya-La Villette, Casablanca	02-623715/02-623634	02-623904
Saoas	Omnium Agricole du Souss 367, Avenue S.M. Hassam II Agadir	08-821968/02-822317	08-825904
Phyto Sud	Route de Biougra	08-240934	
ERI-SER	Route de Taroudant no. 22 Lotissement Ait Melloul	08-242154	08-242154
CPCM			02-278344
Soremar	Walters Loots BP 468 Agadir	02-846657	08-842664
SF CCT	El Mir Abdellah, route Biougra, Ait Melloul		08-831770
CMPE	23 Rue Bnoumjid, Casablanca		02-301793
Marketiks	Mme Bominique Signore, Marketiks	08-844638	08-844638
AMI (DAI)	30, Avenue des f.A.R. 6emc etage, Casablanca		02-442107

end

MEMBERS OF THE AMPEXFLEUR FLOWER COOPERATIVE
AND
OTHER HORTICULTURE PRODUCERS CONTACTED
BY
MAGHREB AGRICULTURE

ORGANIZATION	ADDRESS	TELEPHONE	FAX PHONE
Rose d'Agadir	Mr. Lefnaoui, Sedagri Agadir	08-240905	08-240185
Arbor Sud	Nezha Benchakroun & Michel Ayello Biougra, Agadir	08+818016	02-357274/08-818454
Saflor	Saflor, Biougra, Agadir	08-818217/08-841115	08-847219
Sous Fleurs	Route de Biougra Ait Melloul	08-241898/08-241960	08-241954/241387
Sapiama	Taroudant	08-853551	08-853431
Atlas 2000	Agadir		08-362626
Fantazia	Agadir		08-845405
Rosaflor	Agadir		08-843214
Rosalie	Martin Langer, Agadir		07-708345
Marofleurs	Agadir		08-843083
Beniflore	Beni Mellal	02-243995	02-243995
Fine Flowers	Marrakech		02-314560
Florasud	Marrakech		02-409054
Ghizlane	Marrakech		02-337465
Rose Maroc	Marrakech		02-256216
Toubkal Fleurs	Marrakech		02-247683
Yssil Fleurs	Marrakech	07-772484	
Hortimex	Mr. Ouzaia Ali, Gueliz, Marrakech		
NovaFleur	Marrakech	04-447013	04-435246
Abaz	Kenitra		02-294059
Dom. Poyaux Skhirat	Skhirat, Rabit		07-742367
Florimar	Casablanca-Azemour		02-398936
Floradis	Casablanca-Azemour		02-396980
Morocco Roses	Azemour		03-328834
Prim Rose	Casablanca-Azemour		02-353398
New Garden	Rabat		07-705303
Exmora	Rabat	07-742222	
Domal Agric Marrakech	Marrakech		04-400624
DPVCTRF	Khalis Hind	07-779852/07-779873	
Pepiniere Azrou	Mme Alleon Christine, P 374 Agadir, Azrou		08-823208
Process	Km 3 rute d'Essaouira, Anza, BP 374, Agadir	08-820904/08-820763	08-823208
Ste.Des Ciments Du Maroc, Casa	1, Av. Des Pleiades, Casablanca	02-815501/02-815502	02-815505

ORGANIZATION	ADDRESS	TELEPHONE	FAX PHONE
Brassieries du Maroc	Bd. Ahl Loghlam, Ain Sebaa, Casablanca	02-754646/02-754885	02-754895
Copag	Ait Taza par Taroudant	08-853031/08-853210	08-853219
Mr. M. Benzit	110, Rue Moussa ben Noussair, Casablanca	02-202564/02-271653	02-220735
Agripharma	1, allee des Villas, Ain Sebaa 20 250, Casablanca	02-355950	02-356122
Promagri S.A.	Sidi Maarouf, Bouskoura, Casablanca	02-441100/02-440168	02-440175/441635
Rhone Poulenc Agro Maroc	92, Bd de la Resistance, Casablanca	07-767041/07-765490	07-767079
Agro Spray Technic	14, rue Oued Zem, Rabat	02-354200	02-354204
Zeneca Agrochemicals	Bd. Aicha Bent Haimoud Z.I. Ain Sebaa, Casablanca 20 250	02-220471/02-263401	02-274852
Total Maroc	146, Bd. Zerktouni, BP 13 638, Casablanca	02-355719	02-359311
BASF Maroc S.A.	3, Rue Taib Abdelkrim (ex.Rue Caporal Corras), Casablanca	02-274027	08-241777
Sapel	41, Rue El-Ouraibi Jilali (ex Rue de Foucaould), Casablanca	02-274027	02-296942/296801
CIBA-Geigy	82 Bd. Chefchaoui, Ain Sebaa 21 600, Casablanca	02-354614/02-359314	08-833857
SCPC	Route de Taroudant, Ait-Melloul	08-240710	09-900818
Bayer Maghreb S.A.	3, Bd. Zerktouni, 20 100 Casablanca	02-204727	06-619296
Coca Cola	Zone industrielle de Tassila, Agadir	08-832442	02-395571
Societe K-Lukus	BP 39, Larache	09-918289	08-824051
President Du Groupe GAB	No. 5, Imn, Kirat, rue Touria, Chaouni, Berkanc	06-619294/95	02-251719
Directeur Genera des Damaines Agricoles	km 5, route d'Azemour, Dar Bouazza, BP 125, 132, AP Ain Diab, Casablanca	02-398500/02-398321	
Societe Emballe	Rue Moussa Ibn Noussaire, (QI), Agadir	08-823345/08821832/08-824125	02-234545
Societe Etma	68, rue de Nourmandie, Casablanca	02-251719/02-252607	02-402083
Societe Cali Souss	Route Biougra, Ait-Melloul	08-240019	
Societe Graphiscript	Route de Bouskoura par route d'El Jadida, Km 12500, BP 38/ZI Sidi Maarouf, Casablanca	02-907810/18/50/60	02-234545
Societe Permatec	411, Ave Ambassadeur Ben Aicha, 21 700, Casablanca	02-402082/02-402083	02-402083
Roda Maroc/Netrak	2, Allee des villas (st) Ain Sebaa, Casablanca	02-355927/02-355697	02-356122
Somilec	463, BD Ambassadeur Ben Aicha, Casablanca	02-401145/02-408174/72/02-406288	02-247683

ORGANIZATION	ADDRESS	TELEPHONE	FAX PHONE
Sotrachim	13, Rue Zoubeir Ibn Al Aouam, Roches noires, Casablanca	02-241618/02-401333/34/35/36	02-249550
Societe des Huileries Du Souss	BP 135, Quartier ANAZ, Agadir	08-848429/28	08-847279
Societe Civile Agriocle Mokala	10, Rue El-Oraibi, Jilail, Casablanca	02-201695/02-220691	02-205785
Societe des Ciments du Maroc	Km 7, Route Essaouira, BP 312, Agadir	08-822925/08-821474	08-823598/820792
Fertima	Imm. OCP, Angle route d'El=Jadid et Bd. De la grande Ceinture, Casablanca	02-230025/230125/231025	02-234214
Sedagri	Route de Taroudant, Ait Melloul	08-241800/240905/240578	08-240185
Kettara	11-, Rue Moussa Ben Noussair, Casablanca	02-202564/02-269615	02-220735
Rolland Irrigation Equipment	51, Rue Melouyat, Appt nl. 1, Rabat	07-778099	07-778099
Hydratec	54, Bd. Bahmad, Casablanca	02-245389/07-404048	02-243394
Magriri	58, Rue des Papillions, Oasis, Casablanca	02-254253	02-250245
President du Groupe Salam	Rue Mouquaouama, Ql, Agadir	08-226981/82/08-220409	02-221418
President du Groupe Delassus Casa	9, Avenue Khalid Bnou Loualid BP 3010 , Ainsebaa, Casablanca	02-353917/02-353906	02-353398/355651
President du Groupe Agrisouss	Rue du 18, Novembre, Immueble Manar, Agadir	08-843550/08-822367	08-821397
President du Groupe Sogecap	1, Place Lemaigre Dubreuil, Immeuble Liberte, Casablanca	02-318143/57	02-310457
President du Groupe	BP 125, 129 Agence postale Ain Diab, Casablanca	02-398500/398521	02-398951
President de l'AFB	BP 125, 132 Agence postale Ain Diab, Casablanca	02-397019/397083	02-396393/396083
President du Groupe Kayouh	Immeuble A no. 14-15, Av. Moulay Abdellah, Agadir	08-845258/845110	08-845227
President du Groupe OCE	45, Avenue des FAR, 15 eme etage, Casablanca	02-314117/314103/312870	02-313079

end

LIST OF REPRESENTATIVES AND SEED RETAILERS CONTACTED
BY THE
MARKETING DIVISION OF MAGHREB AGRICULTURE

ORGANIZATION	RESPONSIBLE	TELEPHONE	FAX PHONE
CAS	Directeur: Mr. Alleon; Clause: Naji; Hi-Tech: Mr. Nouieb Omar	820420/821492	823208
Maroc, Vilmorin	Bouamer (resp); El houari Bejja (technico-com)	242455	240513
Sofa Souss "Casem"	Directeur: Mr Ben Ali; Mr Rachid Ait M'hend (vendeur)	240549	241458
Agrimat Co, Asgrow	Mr. Bousnane Abdellah; Technicien: Mr. Hounit ElHoucine	241793	241268
Agrimassa	Mr. Nesyn Ahmed, Mr. Lahcen	240403	
Fellah Essaada	Mr. Fatihi Omar	240176	
Fellah El Massira	Mr. Aboufarah Ali	242487	
Phytonord, Van den Berg	Mr. Baroudi	224836	
Ets Ahouzi	Mr. Ahouzi Brahim	241920	
Fellah Agadir, Pioneer	Mr. Benbah Omar; Technicien ste: Pioneer	241052	
Bioprag, Van den Berg	Mr. Bouchoukou	244620	244686
Cogepra	Mr. Brahim Ait Haddouch (Technico-com)	243436/243437	
Ste Atraco	Mr. Akki (technico-com)	02-156643 (Mobile)	
Ste Ezzouhour, Niagaga	Mr. Moussaoui si Med	241820/240562	241820

end

LIST OF REPRESENTATIVES AND RETAILERS OF SEEDS;
PRODUCERS OF PEAT AND BROMIDE
AND
IRRIGATION EQUIPMENT CONTACTED BY THE MARKETING DIVISION
OF
MAGHREB AGRICULTURE

Organization	Address	Telephone	Fax Phone
CAS	Av. Hassan II, Agadir	820420/821492	823208
Amaroc	Rte Tiznit, Ait Melloul	242455	240513
Sofa Souss	Rte Biougra, Ati Melloul	240549	241458
Agrimatco	Rte Biougra, Ati Melloul	241793	241268
Agri Massa	Rte Taroudant, Ait Melloul	240403	
Biobrag	Rte Taroudant, Ait Melloul	244620	244686
Fellah Saada	Rte Tiznit, Ait Melloul	240176	
Fellah El Massira	Rte Tiznit, Ait Melloul	242487	
Phytonord	Rte Tiznit, Ait Melloul	224836	
Ets Ahouzi	Rte Biougra, Ati Melloul	241920	
Fellah Agadir	Rte Biougra, Ati Melloul	241052	
Cogepra	Rte Biougra, Ati Melloul	243436/37	
Ste. Ezzouhour	Rte Biougra, Ati Melloul	241820/240562	241820
Ste Atraco	Saus	02-156643	
Braga (Sobroma)	Rte Biougra, Ati Melloul		
Socopa	Rte Biougra, Ati Melloul	240287	
Promagri	Rte Tiznit, Ait Melloul		
Agrosray Technic	Rte Tiznit, Ait Melloul		
Irri Sera	Oued souss, Ait Melloul		
Iri Ser	Rte Taroudant, Ait Melloul	242154	
CMGP	Rte Taroudant, Ait Melloul		
Univers Irrigation	Rte Taroudant, Ait Melloul		
Bayer Maghreb	Rte Taroudant, Ait Melloul		
Agrochimie (SAOAS)	Rte Taroudant, Ait Melloul		
Sofagri (Sedagri)	Rte Taroudant, Ait Melloul		
SIPP	Rte Biougra, Ati Melloul		
Netamar	Rte Biougra, Ati Melloul		
SPCM	Rte Biougra, Ati Melloul		
Phyto Sud	Rte Biougra, Ati Melloul	240934	

end

LIST OF GROUPS VISITED AND MEETINGS HELD
BY THE MARKETING DIVISION
OF
MAGHREB AGRICULTURE

Groupe	Responsibles	Reference	Telephone	Locale
Salam	Amanouz Blaid	7509L		Dour ait Hammou
	Bouhdoud HJ Ayad	7413H	241034/1155	Ait Melloul
	Bairouk Lahoucine	75171	818161	Biougra Centre
	Oulhind Mohamed	7553J		Douar Ait Moulloud, Rte Biougra
	Archa Ahmed	7605P		Khmiss Ait Amira
OCE	Oullious Mohamed	7537Z	818115	Douar Tine Said; CR Safia Chtouka
	Ait Allal HJ Houcine	7431C	241242	Km 6 rte Biougra
	Kayouh HJ Ali	7703V	526877/6105	Av. General Kettani, Agadir
	Ameziane Lahcen		834300/09/10	Al. Tassu a BP 513 Inezgane
	Fillani	7425T	240337/0851	Rte Admine Ait Melloui,Cercle
	Gentil Mohamed	7529X	241949	BP 40, Biougra Centre Douar Erteim Ouled
	Hamdaoua Aissa	7715K	818144	Teima
	Gdire HJ Mohamed	7513P		Biougra Centre
	Zoubir HJ Larbi	7405W	818051	Rte Taroudant, A.M
	Ait Allal HJ Houcine	7431E	241083/0581	Km 6 Rte Biougra
	Mouttya Mohamed	7525	818244/221472	Les Chalets Biougra
	Faiz HJ Mohamed	7449O	270528/1696	Lot no. 230, Rte Biougra, Ait Melloul
AgriSouss	Mouisset	7201C	833207/13/834676	ZI Tassila, BP 278, Agadir
	Bouchoukou HJ Brahim	7423R	319215	CR Temssia Douar, Temssia P. Ineeqgane
	Coop Azro	7417L	242903/1689	ZT Ait Melloul
	El Hiba Mohamed	7711G	526097/6836	Ouled Teima Centre

Groupe	Responsibles	Reference	Telephone	Locale
Private	Frutesma Manuel	7561R	21193/845534	17 Impasse de Baghdad, Agadir
	Sosso Alaoui My Ahmed	7503		16 Rue de l'Atlas, Agadir
	Parolex Javamir	7523C	818444	Siege Sociale Bloc F, No 17, Biougra
	Gemuse Fruchte	7723S	319276/77	Km 25 Rte Taropudant, Ait Moussa
	Tidrarine Lahoucine	7457	822485	30 Rue du Caire, Q Residentiel, Agadir
	Madjomar Bennour	2515X/2502 S	342918	QL 83/84 Azu Marrakech
	Abdellatif Mounir		232504	421 Imm. Moukhtar, Soussi Av. El Hammra, Ba'6
	Gouy Yini Andre	7549	021132/838875	12 rue Dakar
	Sidalalubouin	7557W	825514/840415	14 Impasse Amman, Ag
	Gouy Gini Andre	7534W	818454/818016	11 Rue Dakar
	Louryssem Philip	7017E	243740/42	Lotissement Adjeddig No. 57 A.M.
	Gallea		845237	SBI Medv, MM Mouritania Ag
	Zachdoud	7547D	241968/70	Imm. Baldouh No. 2 Km Rte Taroudant, A.M.

end

Members of the Mbrouka Cooperative who Met with the Marketing Division of Maghreb Agriculture

Reference	Member Name	Telephone
3409 F	Addil	
347 R	Aassila Mohamed	
5310 U	AbelloucBoujemaa	
598 A	Abouabassi Ali	
3489 Z	Abounaime & Abdelaaz	
111 T	Aderdour Lahouncine	244141
4640 R	Agris Statrs	
3718 P	Ait Allah Assou	240521
2913 P	Ait Bakkal Brahim	
2479 S	Ait Bakkal Mohamed	
311 M	Ait el Trach Haj Laa	
2619 U	Ait el Trach Larbi	
1727 C	Ait el Trach Said	
3456 G	Ait Fakir Mohamed	
3162 L	Ajana Mohamed	220556
1875 ,	Akziz Mohamed	
2327 E	Amghar Ahmed	244100
1856 Z	Amghar H. Sliman	
4480 S	Arsalan Omar	
222 P	Assahmour Lahcen	242903/4100
4030 F	Bel Khrof Lhoucine	
6902 C	Ben Lahcen Ouakrim	
4933 B	Bouchtaoui & Abdelilah	
2486 C	Bougari HJ Said	
2801 S	Bougari M'Barek	
1519 R	Bouiha Brahim	241991/1387
122 H	Boutha Mustapha	
7076 P	Boulguid Lahcen	242138
3999 U	Boumkouk Miloud	844763/823983
4548 R	Boutalibi Ahmed	
610 M	Boutalibib Lahoucine	
1496 B	Boutouadi HJ Larbi	
1749 B	Boutouadi Said	
3543 N	Cooperative M'Brouka	
7114 H	Bieri Ayad	222219
2916 P	Domaine Amai	

REFERENCE	MEMBER NAME	TELEPHONE
4846 Z	Domaine Raja	
4027 C	Bomaine Rosalie	
6500 Y	Bomaine zakia	
6000 U	El Bguir Hassan	
2463 C	El Bguir Lahcen	
155 R	Le Fadili Ahmed	
2547 R	El Garani Abderramhim	
83 Y	El Garani Adberrahim	
849 V	El Garani Mohamed	
1671 P	El Hiba Mohamed	526067
472 M	El Hilali Abdelmaid	
6068 T	El IHilali Haj Brahim	
161 A	El Kaihal Abdeaaziz	
2640 S	El Karoumi Brahim	
4895 T	El Khatate	
2820 V	El Massi Abdelaaziz	
2534 R	El Mouden Ahmed	02-406549
6186 W	El Ouafi	
4213 E	Elbergui Abdelaaziz	
5601 H	Elbergui Thami	
2929 X	Expl Mar. Erreda(Rach)	
3445	Fadili Mohamred	
6010 H	Farissi & Charate	222193
3127 W	Rarissi & Rachid	
1094 N	Farissi Nacer	
4023 V	Fdili Boujmaa	
5250 G	Fouad	
965 W	GTM	
1021 J	GTM II	
1724 W	Grach H. Ali	
1240 V	Ghaissan Mustapha	834567
2896 V	Ghengli Salah	
2130 Y	H. Mouisset Brahim	
416 C	H. Mouissat Moussa	
600 C	Hachadi	
4101 H	Hailaliu Ahmed	
5304 Y	Hailali Mohamed	
162 B	Haymoud	
2372 D	Haymoud M'Bark	
3434 H	Hilali Abdelmajid	

REFERENCE	MEMBER NAME	TELEPHONE
1550 J	Hilali Ahmed	
2453 P	Hilali Ali et Consor	
5216 S	Hilali Brahim	
3412 X	Hilali Freres Lahcen	
2805 W	Hilali M'Barek	
3401 S	Hilali Mahjoub	
5109 D	Hilali Med. B. Laarbi	
1409 G	Hilali Mohamed	
841 V	Oprimex	
5240 T	Jnah Haj M'Barek	
2800 R	Jnah M'Bark	
3423 T	Jnah Mohamed	
1731 G	Jnah Said	
332 K	Joubir Youssef	
4940 S	Kabbaj Abdelillah	841950
5519 W	Kabbaj Mohamed	841950
4306 F	Kaihal Bouih	
5778 F	Kaihal Brahim	
2229 V	Kaihal Miloud	
6044 S	Kayouh Haj Laarbi	526816
3019 G	Krich Mohamed	
4004 C	Mouadili Mohamed	241714
1717 P	Mouisset Abdel Aaziz	
4474 M	Mouisset Abdel Latif	
3478 S	Mouisset Abdel Majid	
25910 O	Mouisset Abderazzak	833207
3469 T	Mouisset Abderrahman	
1730 F	Mouissat Habib	
5074 Y	Msefer	
4341 R	Msefer Mohamed	
700 K	NTCI	
1863 A	Ouasty Ahmed	
4416 A	Oublal Abdelhadi	
1848 X	Oublal Frares	
3276 K	Oued Bouslham	242542
3906 T	Rabiet Rbati	
4463	Rbati	
5108 C	Saada	
4660 Y	Sadik Bihi	
4550 T	Sadik	

REFERENCE	MEMBER NAME	TELEPHONE
492 J	Sadiq Said	
3232 M	Sadiki Ali	
1858 S	Sadki Brahim	
3380 W	Said Ben Mohamed	
2832 D	Salam	
3000 K	Sapexo	
2792 J	Sasma	
1574 K	Sbaiti Thami	
72 D	Sebaay Abdelaaziz	
2539 J	Sedki Hj M'Barek	
4239 H	Sedki M'Barek	
2911 N	Sadki et Bougari	
4715 A	Selloum Bouchaaib	823566
1305	Serhan Mohamed	
2557 E	Serhane Omar	
415 B	Touami	
747 L	Touzani Abderrahmane	
3400 T	Touzani Dom. Lakhmiss	
3407 D	Zahidi Mohamed	848141
3867 D	Znaibar	
4953 X	Zniber Socuprom	
247 R	Zoubir Youssef	241083

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B.

Technical Report for Project in Agadir (Ait Melloul)

AMARIS AIT MELLOUL
SEPTEMBER 1997 ACTIVITY REPORT

SEEDLINGS PRODUCTION

Seedling production slowed down by the end of August. Amaris seedlings production was devoted mainly to tomato (more than 90%), followed by pepper and melon. For tomato 'Daniella' cultivar was the leading cultivar. Other cultivars such as 'Gabriella', 'Argenta', and others were also produced. Pepper cultivars were 'Andalous',' Drago' and 'Pical'. 'Arava', was the melon produced this month.

GENERAL CLEANING, INSECT CONTROL AND TRAYS AND PEAT DISINFECTION

AMARIS has now a tradition to clean from time to time the greenhouse surroundings by a general treatment. Cleaning and treatments were also done for the different equipment and for the screen using 1:1000 household bleach called *Javel*. *Decis* was used as a general treatment around the greenhouse space to limit the growth and spread of pests and avoid their invasion. Disinfection of propagating frames and trays was done with *Javel* also. Peat disinfection was done by *Cryptonol*. A general operation of weed control was done manually as soon as the seedling production began to slow down.

The medium 'tray substrat peat' used was always disinfected using 2ml/liter (30ml/15 liters) of Cryptonol. The same treatment was used again at the seedling emergence at 1ml/liter. This treatment is used to prevent soil diseases to which seedlings are generally sensitive at the germination stage.

EQUIPMENT RENEWAL AND MAINTENANCE

A new pumping machine was purchased and fixed at the irrigating head station. This machine was purchased in order to avoid irregularities in water flow and have a better control of f3ertigation. This will solve many problems generated through the use of the main pumping machine. Propagating steel frames were painted against rust and arranged in order to limit their deterioration. As before, the wooden frames were fixed continuously.

PHYTOSANITARY AND GROWTH CONTROL

As stated in previous reports, peat disinfection was made of 2ml/liter of Cryptonol prior to sowing and 3 days after seedling, appearance at a rate of 1ml/liter. Insecticide treatments were more frequent than the previous month. Preventive and curative treatments against leaf minor in tomato were done twice with Vertimec (50cc/hl) at about 2-week intervals, and with Trigard (100cc/hl). The latter compound was more effective that the first. Leaf minor is a serious insect that can last in the leaves and reduce severely the production if not treated at the nursery. Treatment against other insects was done using Decis and Tamarron. Use of Paclobutrazol was used for etiolated plants. Benlate, Rovral, Ridomil and Dithane45, were used for fungi control, either once or twice depending on the product. These were used only as preventative treatments against, damping off, Botrytis and Downey mildew.

MAINTENANCE

Bedding is always done to complete filling of the tray cells. A thin layer of perlite was spread over the trays to limit evaporation. Movement of the trays is usually done to have a homogeneous growth in similar trays. Growth was done by the end of the first week with extra plants disposed of from the different trays. Defoliating was completed for eggplants, by taking off dead leaves or those damaged by worms. Shading sheets were rolled off above plants to permit enough light and produce a better seedling.

GRAFTING TRIAL

This is a preliminary trial, done as a preliminary experiment for tomato grafting. Thirty-two scions were made of 'Daniella' shoots with 3 fully expanded leaves and were grafted upon a tomato rootstock. Two grafting methods were used: *splice-tip grafting* and *stem perforation*.

Humidity was maintained near 100% R.H., in a glass close container. After three days, grafted plants were put under shade. 5 days later they were evaluated and 25/32 of the plants have undergone hardening, gave good results, and are growing now normally.

Other experiments were planned for this month to test the effect of scion and rootstock stage, the grafting method and degree of humidity and time span in the closed chamber on grafting.

WATER AND PLANT ANALYSIS

Results of water analysis shows that the Amaris well water is a good water for irrigation, but care should be taken when irrigating. Magnesium (7.16meg/liter) and Calcium (5.82meg/liter) shows that these elements are high and should not be supplied when irrigating. Also, Magnesium can even cause a problem for Potassium availability, and we should make adjustments when giving Potassium fertilizers. Carbonates and other components are acceptable.

Using selected leaves and coltyledones, taken from both, selected deficient plants and healthy plants for 'Daniella' and 'Gabriella' tomato, showed that the deficiency was of potassium and nitrogen. As we stated for water analysis, high levels of magnesium and calcium in the water can antagonize potassium and calcium. This can corrected when watering plants without low or no calibrated fertilizer program.

In order to have better plants, the fertilization program should start at an earlier seedling stage and the equilibrium should take in consideration water quality (high Mg., Ca, Bicarbonates, etc.,...)

AMARIS AIT MELLOUL

C.

Technical Report for Project Activities in Azemour

TECHNICAL REPORT FOR ACTIVITIES CARRIED OUT
AT THE
AMARIS NURSERIES PROJECT SITE IN AZEMOUR

PLANT PRODUCTION AND MAINTENANCE

JULY 1997 - Field Plantation

Tomato – for this trimester, Amaris started with the plantation of 3.5 hectares. After soil plowing and leveling a first irrigation was given. The beds were covered with a plastic mulch and methyl bromide was used a local disinfection treatment. Plantation was started on July 30. 'Graziella' belonging to Zeraim Company from Israel is the cultivar chosen. As the plants were established, sticks were fixed along the lines to handle the plants.

Strawberry – general maintenance consisted of weed control and fixation of stakes. Irrigation, fertilization with treatment with fungicides and insecticides.

Artichoke – cleaning was made and irrigation was stopped during this period. This allows the plant to rest.

Asparagus – weed control, irrigation with saline water and treatment against rust.

Melaleuca – maintenance consisted mainly in irrigation and fertilization.

TOMATO GREENHOUSE PLANTATION

Five hectares of greenhouses were prepared, soil was plowed and leveled and as for the field plantation was made but we used 'Shelry' from the same company as above (Zeriam Company).

SEEDLING PRODUCTION OPERATION

After preparation and disinfecting the media. Sowing of seeds was done for the rootstock code '302' belonging to Zeraim Company from Israel and also for 'Sherly' and other seeds to be used in different trails. Crafting was done later using 'Sherly and rootstock '302'. Both normal seedlings and grafted seedlings were fertigated and treated as required

Ornamental Nursery

Maintenance of plants; irrigation and fertilization
Plant propagation
Container transplanting

August 1997 Field Plantation

'Graziella' tomato plantation and maintenance – follow up of tomato plantation and disinfecting treatment for two others plots. Fixation of stakes and installation of synthetic curtain as wind breaks. Irrigation and fertilization and maintenance of irrigation canals

Cultural Practices under Cararian Greenhouses

Operations consisted of plowing, installing plastic mulch, irrigation of the grafted 'Sherly' tomato, eggplants, melon and pepper for growers.

September 1997 Field Plantation

Maintenance of the 3.5 hectares of 'Graziella' tomato. Main operations were de-shooting and removing the basal leaves.

Maintenance of Cararian Greenhouses

Some cararian greenhouses were fixed. The soil under greenhouse number 1 was disinfected. Plant maintenance consisted of staking and de-shooting of grafted tomato. Irrigation, fertilization and phytosanitary treatment were also practiced.

Nursery

Main activities were: maintenance and irrigation of plants.

Trials

Experimental objectives
Testing tomato nematode resistance

Material and methods
4 tunnel greenhouses – (1) treated with methyl bromide
4 tomato cultivars: T5022, Bodor, BB239, and 5920

Plantation calendar

Plastic tunnels (1) and (2): July 22, 1997; cultivars T5022 and Bodor
Plastic tunnel (3): July 24, 1997; cultivars T5022, Bodor and BB239
Plastic tunnel (4) August 2, 1997; cultivar T5022, Bodor and 5920

Tomato experimental design

Tunnel #	Plantation					
1	7/22/97	B T B T	O 5 O 5	D 0 D 0	A 2 O 2	R 2 R 2
2	7/22/97	T B T B	5 O 5 O	0 D 0 D	2 O 2 O	2 R 2 R

3	7/24/97	BB239 T5022 Bodor T5022	Bodor BB239 T5022 BB239	T5022 Bodor BB239 Bodor

4	8/02/97	5920 T5022	T5022 5920	T5022 5920	T5022

Germination

Date	Cultivar	Weight	Seeds nb.	Germinat %	Germinat time
6/25/97	T5022	10g	3740	48%	6/28/97
6/25/97	BB239	1g	374	63%	6/28/97
6/25/97	Bodor	5g	1426	76%	6/28/97
704/97	T5920	10g	3300	67%	7/09/97

Tomato Yield (Kg)

Tunnel	Time	T5022	Bodor	T5920	BB239
1	9/29/97	120	105		
Methyl	10/10/97	80	63		
Bromide	10/06/97	50	48		
	10/10/97	52	56		
	10/12/97	53	54		
2	9/29/97	15	17		
No	10/10/97	25	13		
treatment	10/06/97	18	24		
	10/10/97	34	29		
	10/12/97	29	28		
3	9/29/97	51	36		14
No	10/10/97	53	16		43
treatment	10/06/97	53	17		43
	10/10/97	87	18		58
	10/12/97	29	6		37
4	9/29/97				
No	10/10/97	3	4	5	
treatment	10/06/97	30	8	10	
	10/10/97	40	14	30	
	10/12/97	36	28	28	

VISITS

Several growers visited Amaris during this summer. They have been welcomed by our technicians and have received the necessary information regarding our techniques and results of tomato trials.

We also had a visit from the head of SASMA. He came for the purpose of making a comparison of our grafting experiments with theirs. SASMA has experimented on tomato grafting this year at their experimental station.

January 1997 saw visits from Mr. Legal and the entire technical staff of Maraissa Company, Azura Exporter Group, in order to get all data on the grafting procedure refined by Maghreb Agriculture. They prospected these techniques in order to create their own grafting nursery in the south. Since then, they have built their nurseries for grafting and sold some grafted plants of tomato during the summer 1997 campaign. Additionally, they produced 2,000,000 plants grafted for their own demand plantations (culture).

In February 1997, head members of the Ministry of Agriculture in Tunisia for the Forestry Department visited the Amaris nursery and other various sites displaying the different varieties of wood plants like Eucalyptus, Acacia, Cyprus, etc. In addition, head members of the Ministry of Agriculture of Germany and well-known personalities from GTZ working on the Argan field visited the Amaris Ait Melloul.

Members of the Ministry of Forestry of Yemen came to visit the nursery in March and April 1997. Technicians from Water and Forest Ministry of Morocco (Ben Sergao Branch; Souss Region) were also in attendance.

May 1997, brought a group of 8 (eight) Yemenis visitors to the nursery.

Frequently we have the visits from farmers of the region and other professionals, such as Professor Soudi Brahim from I.A.V. (Institut Agronomique et Veterenaire) Hassan II, to Amaris in order to analyze the feasibility to re-utilize used water and mixed soil and water use. As well as for informal data comparison in the work of our nurseries and theirs on their individual farms.

D.

Overview of the Grafting Activities

GRAFTING PROJECT FOR THE AMARIS NURSERIES

PREAMBLE

The present proposal for a project to produce seedlings (grafted and normal ones) aims on estimated annual production of 5 million plants this between Azemour and Ait Melloul Nurseries.

This study used data of trails on tomato and melon carried out in the Souss Massa and Marrakech region in addition to the Azemour zone.

INTRODUCTION

The Moroccan demand (especially in Agadir region) of grafting plants is holding a great potential for producing vegetable seedlings, and ha s a great promising future in horticultural activities.

Soil fatigue and environmental considerations and the need for profitability make grafting a necessary and urgent technique to offer to the Moroccan producers and exporters of vegetables.

OBJECTIVES OF GRAFTING

1. This brings a Phytosanitary solution to many problems that occur from the soil.
    - Example: Melon grafted plants are resistant to: Fusariose, Verticilliose, Nematodes, strains of agrobacterium, etc.

2. Also, with grafting plants (tomato or melon) there will be no need for the farmer to treat the soil with Methyl Bromide, which is very costly (a $4000US$/ha savings) in addition to eliminating risks of polluting the underground water.

3. The use of the proper conduct of grafting plants will increase the yield and the quality of the fruits. Trails have shown that grafting significantly increases the yield by 30% to 40% compared to non-grafted plants.

   The trials done in the Souss Massa region during the 1995 campaign brought:
    - Better fruit size, better appearance of fruit skin, almost no "dècheis," and all these factors brought to the producer an increased yield of 61.4%

4. In summary, we can tell that for more investments by the farmer, he will get greater savings during each campaign for all his charges and more revenues.

- Higher price of the plants
  - Reducing the number of plants by hectare by 50%
  - Reducing labor costs
  - Reducing the use of Phytosanitary products
  - No need of soil treatments (for the melon)

- Better Production, because more vigorous and resistant plants
  - Better yield
  - Better caliber of fruits
  - Better shape and coloration of the fruits
  - Better percentage of export fruits

5. Finally, the main advantage is that the producer is insured of getting his production and profits. Unlike if he continued to use un-grafted plants that can die during the campaign or that can produce sick fruits or very low yield and maybe no profit at all.

CONCLUSION

Now, to sum up the situation of the action to be taken by the AMARIS NURSERIES, and the trilateral project, we have learned that there are some serious producers that seem to have understood (by experience or knowledge) the differences and the advantages in using grafted plants instead of normal plants, even if these plants are more expensive that the others

The challenge for us is now to satisfy this demand and be prepared for the melon campaign. We know that the farmer needs the grafted plants to be ready to transplant from the end of December to the end of February. As a result of the obvious demand in grafted plants (for vegetable crops) in Morocco, we have then agreed with Dr. Dov Pasternak (from the Ben Gurion University), to send Mr. Nissim Sroussi (the Morocco Project Technical Advisor) to go for training in Israel.

FOLLOW-UP

Mr. Sroussi's training was completed during the month of September, after his return in mid-October, he started the trials of grafting, in order to be operational in mid-November. Data collected during the technical study on grafting (vegetables: melon or tomato) indicated that the time needed in the nursery is 50 to 55 days for getting quality

Grafted plants to transplant, this means that all equipment and staff should be prepared and organized for the beginning of November. Of course, we have made this possible by studying the subject for three months, but we are requiring from you the budget necessary to activate the processes in order to show the Moroccan producers and farmers that we really are up dated producers and working for them properly.

E.

Summary of Completed Project Research Activities

SUMMARY LIST OF COMPLETED PROJECT RESEARCH ACTIVITIES

STATUS REPORT OF THE MOROCCO PROJECT RESEARCH ACTIVITIES - SEPTEMBER 1997				
ADAPTIVE RESEARCH ACTIVIITIES (AZEMOUR, MOROCCO)				
TOPIC	**PRINCIPAL INVESTIGATORS**	**BEGIN**	**END**	**STATUS**
1. growth regulators	Sroussi & Mounaz	Jan-96	Feb-97	completed
2. nematode resistant tomatoes: indeterminate/determinate	Sroussi & Mounaz	May-95	Feb-97	completed
3. melaleuca	Mounaz	Jul-92	Sep-97	completed
4. asparagus grown with saline water	Sroussi & Mounaz	Jul-92	Feb-97	completed
5. artichokes grown with saline water	Sroussi & Mounaz	Jul-92	Feb-97	completed
6. raspberries	Sroussi & Mounaz	Jan-94	Sep-97	completed
7. grafting vegetable crops	Mounaz & Mokhtari	Aug-96	Sep-97	completed
8. hardening of tissue culture propagated date palm trees	Lahlou & Pasternak	Apr-96		completed
Cooperative Research Activities (Israel)				
Topic	**Principal Investigators**			
1. chilling of raspberry roots	Mills	Apr-96	Sep-97	completed
2. breeding of nematode resistant tomatoes (completed)	Barr	Jul-92	Dec-95	completed
3. growth suppression on green house tomatoes	Pressman	Jan-93	Jun-96	completed
4. verticordia	Ben Dov	Jul-92	Sep-97	completed
5. micropropagation of ornamental eucalyptus	Mills	Jul-92	Jul-95	discontinued
6. physiological and nutritional studies of onions	Rabinovic	Jul-92	Oct-94	discontinued
7. economic and marketing study	Pohoryles	Jul-92	Jan-95	completed
Collaborative Research Activities (Israel & Morocco)				
Topic	**Principal Investigators**			
1. truffles	Tsur/Achour	Jul-92	Sep-97	completed
2. argan	Nerd/Aameur	Dec-94	Sep-97	completed

F.

Technical Report on the "Domestication of Truffles"

BEN-GURION UNIVERSITY OF THE NEGEV
THE INSTITUTES FOR APPLIED RESEARCH

אוניברסיטת בן-גוריון בנגב
המכונים למחקר שימושי

BGUN-ARI-66-96
Limited

CULTIVATION OF ANNUAL TRUFFLES

Annual Report for 1996

Varda Kagan-Zur[1] and
Nurit Roth-Bejerano[2]

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Submitted to AID-MERC
(File No. 86484101)

December 1996

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ATTACHMENT F

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We did not get any *Terfezia boudieri* fruiting bodies this year and were therefore restricted to studying plants mycorrhized by the one and only fruiting body we had obtained earlier.

Plants kept in the growth-room maintained a very low level of mycorrhization; among those transferred to an outdoor plot, after about two years we found that the *Cistus* plants had maintained their typical mycorrhiza while the *Helianthemum* plants no longer appeared to be mycorrhized by the original mycorrhiza. As we wished to disturb the plants as little as possible and also to ensure that root samples obtained indeed belonged to the study plant, we took our samples from an upper layer of the soil, near the plant shoot. This practice may create a bias against finding mycorrhizas, as it is mostly the young and active roots that are well mycorrhized and these—naturally—occur farther away from the shoot as the plant gets older. We therefore intend to dig out the whole plot in the coming truffling season, next spring.

In June 1996, Dr Zur obtained *Terfezia boudieri* mycelium from Dr. G. Chevalier, INRA, Clermont-Ferrand, France. This mycelium was used both for inoculation of *Cistus incanus*, and for molecular analysis of the mycelium. *C. incanus* seeds were incubated with a mycelial inoculum under sterile conditions in an artificial agar medium; associations were checked by sacrificing several test tubes every week from two to five weeks following inoculation. Associations were readily observed, but disappeared upon transfer of inoculated seedlings to soil; it is therefore not possible at this time to study the resemblance of the mycorrhizas formed by the new mycelium to

the ones obtained with the above-mentioned single fruiting body. DNA was extracted from the INRA mycelium and subjected to PCR amplification using primers for the ITS (Internal Transcribed Spacer) of the rDNA region. This ITS region, which is moderately variable, is being increasingly used to distinguish species from each other. RFLP and sequence analysis of the ITS piece obtained showed a striking resemblance to *T. arenaria* (*leonis*) ITS, the only feature distinguishing an otherwise identical sequence being the addition of a single nucleotide at position 69. The identity of this mycelium to our local *T. arenaria* will be further investigated. Its ability to infect annual *Helianthemum* plants will be examined when new seeds become available, because the ones presently in our possession have lost their viability.

G.

Technical Report on the "Domestication of Argan"

THE INSTITUTES FOR APPLIED RESEARCH
BEN GURION UNIVERSITY OF THE NEGEV

Domestication of Argan (*Argania spinosa* L.Skeels) as an oil crop

PHENOLOGY, BREEDING SYSTEM AND FRUIT DEVELOPMENT

Final Report 1996

Avinoam Nerd[1], Vered Irijimovich[2] and Yosef Mizrahi[1,2]
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Submitted to the US-AID foundation - Middle East Regional Corporation Program

Beer Sheva, Israel January 1997

ATTACHMENT G

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ABSTRACT

Aspects of the reproductive biology of argan were studied with the aim to domesticate the tree as an oil crop. Flowering of fertigated trees cultivated in the Negev Highlands of Israel was confined to the spring months. The flowers were found to be protogynous, the stigma protruding from the flower before anthesis. Results of different pollination treatments showed that a pollen vector was necessary for pollination and that fruit set was significantly higher in cross and open pollination (7-9%) than in self pollination (0.5%). Pollen transfer by wind was restricted to short distances, and flies (Calliphoridae) were proved to be involved in pollination. Fruits ripened nine months after anthesis, exhibiting bisigmoidal growth curve.

METHODOLOGY, RESULTS AND DISCUSSION

Flowering and shoot elongation were recorded for two consecutive years in well-watered argan trees planted in the Negev Highlands For the investigated trees (n=6), the main flowering period was confined to 3-4 weeks in the spring (end of April and May), while the shoot growth period was less regular and depended on year or tree. In general, significant growth occurred in the spring and early summer. Flower clusters were usually initiated on shoots of the previous growth season. Our observations coincide with those reviewed by Nouaim et al. (1991), showing that in Morocco argan flowers in April and May. However, according to the observations of Ferradous, Bani Aameur and Dupuis (1995), flowering in certain areas in Morocco can begin earlier and last longer, namely from October to March; early (October-November) and late flowering trees (February-March) were observed, and some trees reportedly flowered throughout the wet season. Since detailed environmental data were not presented by the authors, it is not possible to establish what the inductive conditions were; however, it was stressed that availability of water in the soil influenced flowering.

Argan flowers are small (0.4-0.5 cm width) and sessile. Morphologically (Cornu 1897; Perrot 1907), the flower consists of five hairy green sepals, a pale green corolla with five lobes, five stamens alternating with five staminodes, and one pistil; the superior hairy ovary contains two to four loculi with one ovule in each loculus. Flower phases indicate protogynous dichogamy (The first sign of flower development is the appearance of the stigma at the top of the closed bud. A few (up to four) days later the style emerges, after which the sepals open and the anthers release their pollen. Flowers stay open for two days, and then the corolla abscises. Pollen germination on the stigma (stigma receptivity) was low (24%) before emergence of the style and high (60-70%) after its emergence and throughout anthesis. Germination percentages obtained for the pollen samples used in the stigma receptivity study averaged 63.3±1.2%, well within the range recorded for *in-vivo* pollen germination at advanced stages of pistil development. This indicates that our *in-vitro* method (Irijimovich 1995) is useful for predicting pollen quality in argan. The viability of argan pollen collected from wild stands in Morocco, as tested by acetocarmine staining (Belmouden, Bani-Aameur and Dupuis 1995), was usually found to be high (68.3-99.5%); this value, however, was not correlated with germinability.

Germination percentage on the stigma was similar for self and foreign pollen, but differing among trees. Tube elongation rate was also similar, and in both instances the tube reached the base of the style within 72 h post pollination. However, foreign pollen led to significantly higher fruit set, namely 6.5±1.9% vs 0.5±0.2% for self pollen. It is therefore concluded that some degree of postzygotic discrimination probably occurs in argan. We also found that the percentage of fruit set was similar for open and cross pollination.

Fruit set failed in bagged shoots, indicating that a pollen vector is needed for effective pollination. After a day with moderate north-west wind (6.5-10 km h^{-1}), pollen was detected on slides placed 1.5 m from the tree (8-28 grains cm^{-2} on slides facing south and east), but not on slides placed at a distance of 6 m. The flowers, which lack nectar but have a typical strong fragrance, attracted many insects, particularly flies of the family Calliphoridae. The visiting insects were found to

be covered with argan pollen; they were presumably implicated in pollination. The dichogamous nature of the flower, its partial self sterility, and the need for a pollen vector appear to be traits that ensure fruit set by cross pollination.

Measurement of fruit growth parameters was initiated, when fruits reached a length of 0.7-0.9 cm (beginning of June), fruits of this size tending to develop and reach maturity. Significant drop of flowers and small fruits occurred prior to this stage. Results presented in show that dimensional growth (length and diameter) was rapid between July and August and then declined, the fruits reaching their final size in winter, approximately nine months after anthesis. Fresh weight growth of whole fruit was characterized by a double sigmoidal curve and consisted of three distinct stages: I) an early period of rapid growth, II) a suspended growth period, and III) a late period of rapid growth. A pronounced gain in fresh weight occurred for the pericarp in stages I and III, for the drupe in stages I and II, and for the kernel in stages II and III. The drupe wall hardened in stage II, and coloration occurred in stage III. Accumulation of dry matter and oil in the kernel coincided with its period of fresh weight increase. It was of interest to find that although the fruit of argan is a berry (Cornu 1897; Perrot 1907), its pattern of growth is similar to that shown for typical fleshy drupaceous fruits such as peach and apricot. This is presumably related to the unique structure of the berry, which consists of a fleshy pericarp enclosing a large, thick walled drupe which develops from the integuments of the seeds.

According to our observations (unpublished) in a non-irrigated plot at a site located in the southern coastal plain of Israel (400 mm annual rainfall), where conditions are milder than at Ramat Negev, growth of fruitlets 0.2-0.3 cm long that set in the spring was interrupted during the summer on most trees. The fruitlets resumed growth in the autumn (September-November). Arrested fruit growth correlated with drought was also reported for stands in Morocco, where the fruit growth period can extend from 8 to 16 months (Belmouden, Bani Aameur and Dupuis 1995). This flexible pattern of fruit development shifts fruit growth to seasons with favorable growth conditions and allows fruit production under the dry conditions of its natural habitat. However, this feature may be a

disadvantage for a modern orchard, because it is associated with irregular fruiting and a long fruit growth period. Our study at Ramat Negev suggests that the continuous and short fruit growth period obtained in our study is probably associated with watering.

CONCLUSIONS

Several aspects of the reproductive biology of argan were examined with a view to promoting the development of the tree as a horticultural crop. The results of the breeding system studies indicate that argan flowers are partially dichogamous and that cross pollination promotes fruit set. A high degree of diversity may therefore be expected among the progeny of the same tree. Hence, it is not recommended that solid-clone orchards be established after selection of desirable clones for cultivation. Cultivation of argan trees leads to regular fruiting, with concentrated flowering in spring and continuous fruit development.

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H.

Summary of Adaptive Research in Morocco

VERTICORDIA VARIETY RESEARCH

The scientist responsible for this research is Mr. Y. Ben Dov. I did not hear his comments regarding not sharing results. But if he did so, it was a great mistake. All the results of all research carried out in Israel are recorded in the periodical Technical Reports which we have submitted to USAID through the SDSU Foundation. The Moroccans should have access to this information through SDSU Foundation. The specific species of *Verticordia plumosa*, which is the most suitable for our conditions, is not yet ready for commercialization. For this reason we are not yet recommending it to Israel's farmers, and definitely not yet to Moroccan farmers. Yossi Ben Dov on the other hand has shared a lot of his experience with Morocco. 1) He supervised the production of *Melaleuca* in Azemour. 2) Provided the seedlings, which he propagated in Israel. 3) He conducted with Karim Lahlou the marketing study for *Melaleuca*. 4) More recently he taught the nursery staff in Morocco, how to best propagate Eucalyptus species from seeds.

ADAPTIVE RESEARCH IN MOROCCO.

Selection of suitable greenhouse tomato cultivars
Research was carried out over three seasons. The *Daniella* and *Graciella* cultivars were most suitable and are now the most common in Morocco. The following tomato hybrid crops tested represent 90% of the market in Morocco:

1. *Daniella* tomato hybrid for long life from *Hazera,* tested and approved by Maghreb Agriculture at its introductions
2. *Gabriella* tomato hybrid for long life from *Zeriam* (also, in melon varieties). They now represent around 70% of the national market share or demand.
3. All *Galia* melon types from *Hazera* and *Zeriam*

SELECTION OF OPEN FIELD TOMATOES TOLERANT TO NEMATODES.

Screening was carried out during 3 seasons. Sixteen (16) outstanding cultivars were found.

SELECTION OF GREENHOUSE MELONS

About seven (7) cultivars were tested. The cultivar C_8 was found to be most suitable for autumn production, and the *'Aruca'* cultivar is most

suitable for early spring production. Moroccan growers have adopted both cultivars.

Selection of the Nematode Tolerant Cultivars

The trials were carried out over two seasons. The cultivar 593 preformed best and was given the name '*New Graciella*.' It is now growing commercially in Morocco.

Comparative studies between the Israeli and the Spanish Grafting Techniques for Melons and Tomatoes

The Israeli technique was found to be the only workable technique for melons. It was also much better in tomatoes. The AMARIS nurseries have adopted this technique.

Induction of Earliness in Artichoke

Spraying with giberellic acid resulted in 40 days earliness in blue artichoke cultivars but it had no effect on the green cultivars.

Introduction of Raspberries to the Moroccan Coastal Area.

Eight American cultivars with low chilling requirements were tested. The cultivar 277 was found to be a very prolific yielder. Seedlings of this cultivar were sold to the Mekknes, Marrakech and Agadir areas.

Use of Saline Water for Irrigation of Asparagus and Artichoke

Local saline well water (EC_c ~4.5dS/m) was used to irrigate four asparagus cultivars and three artichoke cultivars. Although results were satisfactory, this procedure still needs to be adopted by local growers.

New Melaleuca Species for Decorative Branches

Three melaleuca species new to Morocco were introduced. One species (*Melaleuca sp*) was most suitable for the local conditions. Marketing of this species should start in the winter of 1997/1998.

As for the Israeli research all have been transmitted in pages which you received. The Eucalyptus tissue culture research should also be included.

I.

Summary of the Cooperative Research Activities in Israel

85

THE MOROCCAN COOPERATIVE AGRICULTURE
RESEARCH PROGRAM

Summary of Activities in Israel

Prepared for the end-of-program evaluation

July 1997

Contribution of Israeli Participants to the Moroccan Cooperative Agriculture Research Program

Background

The Moroccan Cooperative Agriculture Research Program was designed to assist the private sector in Morocco to adopt state-of-the-art technologies on plant propagation and to introduce to Morocco new horticultural crops for the export market. Accordingly, most of the budget was allocated to the Moroccan counterpart. Most of the activities in Israel (or by Israeli experts) were designed to assist the Moroccan program.

Activities

- Training
  Four Moroccan University graduates were trained in Israel, as follows:
  a) Five months of training in micropropagation plus three months of training in conventional propagation;
  b) Three months of training in conventional propagation with emphasis on production of transplants;
  c) One month course on micro-irrigation'
  d) One month course on marketing.

- Support to the Azemour site
  a) Planning and engineering supervision of all production units;
  b) Training on handling of Melaleuca;
  c) Training on rooting techniques for woody ornamentals;
  d) Market research and economic studies;
  e) Training on propagation of forest trees.

- Research to Support the Activities at Azemour
  a) Determination of the effects and after-effects of paclobutrazol – a dwarfing agent – on tomato and melon seedlings;
  b) Breeding and selection of nematode-tolerant determinate tomatoes for open-field production;

c) Domestication of Verticordia, a new species for decorative branches;
d) Micropropagation of ornamental eucalyptus;
e) Effect of artificial chilling of raspberry shoots on flower induction.

- Collaborative Research
  a) Domestication of argan as an oil-producing tree crop;
  b) Development of truffles as annual crops.

In addition, two joint research programs were submitted for funding to AID/CDR, one on domestication of argan and the other on domestication of salt grass. The first was submitted with scientists of the Ibn Zohar University at Agadir (Dr. Fouzia Bani Aameur) and the second with Dr. Redouan Choukr-Allah from the Hassan II Institute at Agadir.

Technology of Developed (Older) Vegetable Transplants

Abstract

E. Pressman, Katerina Rosenfeld and Rachel Shokod

Earliness in fruit-set and harvesting are of great importance for the tomato as well as other vegetable growers. Earliness enables growers to harvest and export high-quality fruits during the high prices season, thereby increasing their incomes.

For early production in the fall the grower must transplant the seedlings into the greenhouse during the summer. Two major obstacles interfere with this approach and must be considered:

a) Transplanting takes place under very high temperature conditions which severely affect the plants development and especially the flowers shape, viability and functioning
b) In the summer the plants are vulnerable to whitefly , the major vector of the yellow mosaic virus

For preventing the whitefly penetration the greenhouse should be thoroughly covered by an insect-proof net which causes an additional elevation in temperatures.

For early production and marketing in the spring transplanting should take place in the winter, which means that the plants, particularly outdoor vegetables, are exposed to low temperatures and other stresses like wind and hail.

By developing methods for shortening the time from transplanting to fruit set and harvest, the farmer will be able to delay the planting-out, until more suitable weather conditions prevail, and yet be early in the market. One of the alternatives for

shortening the time from transplanting to harvest is using more developed, older, transplants. These transplants may bear flowers or even young fruitlets. However, in order to obtain transplants of reasonable price they should be grown at a relatively high density in the nursery. Overcrowded population of the plants may cause ethiolation, which severely reduces their quality. Therefore, controlling the height and size of the transplants is a prerequisite for keeping them in a suitable, commercial shape. The traditional techniques for controlling the transplant size are by using growth retardant. Alternatively, mechanical treatments for obtaining the same purpose are under intensive research and development.

The effect of paclobutrazol, a growth retardant, was studied. Its optimal concentration and the effect of the seedling age on its response to the treatment were determined in greenhouse and open field table tomatoes, in cherry tomatoes and melons. The effect of this chemical was compared with that of mechanical treatments (MT) and with CCC.

As expected, treatment with paclobutrazol (PP) markedly decreased the height of tomato seedlings and of melons. The effects of CCC and of mechanical treatments were smaller, but significant. Retarding the seedling size prevented their ethiolation, and brought about a shorter, stronger, and healthier transplant.

The treated seedlings were much easier for handling and transplanting than the non-treated ones. Retardation of the shoot generally leads to a more developed root system, which is of a great advantage for the start and establishment of the transplant. Regarding plant developmental rate, following transplanting, the MT-treated plants were faster than the PP-treated ones. Indicating that the release from the MT stress, in contrast to PP, is an immediate one.

All the plants that had been developed from older transplants set fruits which were harvested much earlier that the control (transplanted at the commercial stage) plants. These results confirm our assumption that using older transplants enables earliness in fruit harvest. Furthermore, it was found in some of the experiments the PP and to a lesser extent MT (which was originally used only for preventing ethiolation), caused further earliness in tomatoes. In melons CCC was found to enhance female flowering. Therefore, in addition to their effects on the seedling quality, the use of growth retardant or MT can be a very beneficial procedure also when earliness is requested. Another benefit of using older transplants for shortening the time from planting-out harvest, is the possibility to grow two corps in one season. This is especially important for a single, concentrated harvest of tomatoes.

Development of Verticordia Species for the Ornamental Industry

Objective

To domesticate species of *Verticordia* for the floral industry

Introduction

Verticordia is a western Australian genus belonging to the Myrtaceae family. Verticordia species are perennial shrubs varying in height from 40 to 180 cm. The flowers of species of this genus are usually very attractive and relatively long living. To date, attempts to domesticate these species have failed because of problems of multiplication and plant nutrition.

Experimental

Of the 100 species in this genus, we have collected propagation material of 11 species. From the 11 species, we selected *Verticordia plumosa* because it is relatively easy to propagate from seed and cuttings, it develops fast, it has fewer nutritional problems, and it produces abundant flowering branches and recovers well after pruning.

The following experiments were conducted:

- Effect of phosphorus nutrition;
- Grafting trials;
- Study of rooting techniques.

In addition, initial marketing trials were conducted. Based on the positive results, a semi-commercial plot of V.plummoisa was planted in a reclaimed sand dune, and a follow-up program was developed.

Micropropagation of Ornamental Eucalyptus

Progress Report

Submitted by Dr. David Mills, July 1997

The work carried out through 1996 is described and summarized in a progress report submitted in January 1997 as well as in an annual report that has just been submitted. Basically, the present project ended in February 1997, but some work continued due to the tong-term nature of the experiments. For example, in April we were able to transplant four individual plants representing four clones belonging to two different species of eucalyptus that had been propagated in tissue culture. Three of the plants belong to three clones of *E.ficifolia* and on plant to *E. torwood*. The plants were first acclimatized in a growth room, then transferred and grown for 1-2 years in the

greenhouse, and finally, transplanted to the yard at the Institutes. We will follow the growth and determine phenological characteristics in the coming two years.

Previously we reported on initial work on raspberry in the framework of MERC. Since February 1997, we have been engaged with two activities: (1) propagating two cultivars of raspberry in 10 liter pots outdoors and, (2) monitoring growth and development of raspberry plants that were exposed to artificial chilling in winter and now growing in a greenhouse.

In this experiment raspberry plants were then out of the growing pots. In half of the population the roots were kept in the substrate, while in the other half the substrate was removed gently. Plants were stores a 4°C for 0, 200, 400, 800, and 1200h, then repotted in the greenhouse. The major findings were as follows: only plants exposed to 800 and 1200 h of cold flowered in the first wave of flowering 9which began in March). Not many plants responded to the chilling, probably because of the short length of the stored branch (10-40cm). In the second wave of flowering (starting in May), all plants of all treatments, but mainly those exposed to 200 and 400h of cold, flowered and fruited. Fruits of the plants grown in the greenhouse reached 6g, while the normal fruit weight of field-grown plants is 2g. The experiment is still underway, and data have yet to be analyzed.

Domestication of Argan as an Oil Crop – Modern Cultivation and Reproductive Biology

Avinoam Nerd and Yosef Misrahi, Ben-Gurion University of the Negev,
Beer-Sheva 84 105, Israel

Argan is a wild tree native to southwestern Morocco appreciated for its edible, highly nutritional oil, which is extracted from the kernels of the drupe-like fruit. The oil, which is produced entirely from wild trees, is consumed mainly in Morocco, where it commands twice as high a price as olive oil. Argan oil is distinguished by its high concentrations of linoleic acid and tocopherol and by its stability to high temperatures (five times that of olive or soybean oil).

In a feasibility study conducted in the Negev desert of Israel, irrigated argan seedlings exhibited a high growth rate and precocious yielding. Estimated oil yield (6th year) for high yielders was 1.0kg per tree, which was ~1/5 of the oil produced by olive trees of the same age growing in the area. Oil was 50-56% of kernel weight. The low oil yield was related mainly to the low total kernel weight (5-8% of fruit dw). The conclusion was that development of improved oil yielders is crucial for successful adopting of argan as a crop.

Studying the reproductive biology of argan is essential for the formulation of a breeding program and for rational orchard management. Flowering time and fruit development were followed for two consecutive years in well-watered argan trees planted in two regions: a) Negev Highlands (low winter temp, fresh water) and b) southern Arava (high summer temp and brackish water). Fruit growth was continuos in the Negev Highlands but was withheld during the hot months in the southern Arava (brackish water and harsh summer temp). Arrested fruit growth is a known phenomenon in Morocco, where it is attributable to water stress.

Fresh weight growth of the whole fruit was characterized by a double sigmoidal curve and consisted of three distinct stages, similar to that shown for typical fleshy drupaceous fruits such as peach and apricot. Flowers are protogynous, the stigma protruding from the flower before anthesis. Pollen germination on the stigma (stigma receptivity) was low (24%) before emergence of the style but high (60-70%) after its emergence and throughout anthesis. Germination percentage and tub length was similar for self and foreign pollination but foreign pollen let to significantly higher fruit set, namely 6.5± 1.9% vs. 0.5±0.2% for self pollen. It is therefore concluded that some degree of postzygotic discrimination probably occurs in argan. The flowers, which lack nectar but have typical strong fragrance, attracted many insects, particularly flies of the family Calliphoridae.

Two ovules were the dominant number among ovaries versus a single kernel among fruits. The general trend was the abortion of one ovule. Analysis of fruits obtained from different habitats of argan in Morocco and orchards in Israel indicated that stone weight may be a criterion for seed content, and it is expected that trees bearing heavier stones will have higher oil content in the fruit. However because smaller stones have a higher percentage of seed (relatively thinner wall), trees with smaller stones will produce a higher oil yield than those with larger stones for the same stone yield.

Conclusions

a) Cultivation of argan leads to regular fruiting, with concentrated flowering.
b) The growth curve of the fruit was similar to that shown for typical drupaceous fruits and was arrested at the beginning of the period in a region with harsh summer conditions and salty irrigation water.
c) Argan flowers are partially dichogamous, self-compatible, but cross-pollination promotes fruit set. Flies attracted to the strong scent of the flowers are the main pollen vectors.
d) High degree of diversity may therefore be expected among the progeny of the same tree. Hence, it is not recommended that solid-clone orchards be established after selection of desirable clones for cultivation.
e) Stone weight may be a criterion for selection of improved oil yielders.

Developing Truffles as Annual Crops

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Our aim was to study the potential for cultivation of the North African black desert truffle *Terfezia boudieri* as an annual agricultural crop. *T. boudieri*, which enters into symbiosis with annual *Hilianthemum* species, was to be cultivated on poor, sandy, high-pH calcareous soils such as are found in desert areas using minimal irrigation. Desert truffles, the fruit-bodies of symbiotic fungi, are an important element of the diet in arid zones throughout the world. Most truffle-symbiont pairs are perennial, but there are some that grow symbiotically on the roots of annual plants. Cultivating truffles on an annual basis has several advantages over cultivation of perennial couples: 1) a shorter wait before the plot starts producing; 2) with annuals the whole plot can be harvested at one go, mechanically or manually; 3) assuring survival of the symbiosis over the dry season is not a concern when growing annuals. Since nothing was actually known on the subject of cultivating desert truffles, we had to start from scratch. The time span allocated for this project was, therefore, too short for achieving the final goal. In addition, due to unexpected logistical problems, even achievable tasks were somewhat hampered. For example: in spite of three trips, only one bona-fide *T.boudieri* fruit body reached us. It was too old for us to try and isolate mycelia and start an axenic culture.

Nevertheless, we have used the one fruit body to demonstrate that both annual and perennial plants were able to enter into mycrorhizal associations with germinated spores of that one specimen. In pots, several months following inoculation, microscopic fungal aggregates were observed which seemed to be initiations of fruit bodies. Unfortunately, these never grew beyond the microscopic size, which may mean that cooperation between several plants is necessary for fruit bodies to be produced.

Following transfer of mycorrhized plants to an outdoor bed, mycorrhized roots could be detected but were not profuse. Furthermore, in some instances we could not be sure that the mycorrhizas we found and analyzed were actually *Terfezia boudieri* mycorrhizas, since we had no means of ascertaining the identity of fungal mycelium. For the same reason, we were unable to ascertain whether any *T. boudieri* mycelia existed at all around the roots. We encountered the same identification problems with local Negev truffles, as well as with introduced *Tuber melanosporum – Cystus incanus* mycorrhizas. We therefore attempted to adapt some of the established molecular methods of finger-printing to our needs.

DNA was extracted from *T. boudieri* mycelium kindly provided by Dr. G. Chevalier of France, and subjected to PCR amplification using primers for the ITS (Internal

Transcribed Spacer) of the rDNA region. This ITS region is moderately variable, and is being increasingly used to distinguish species from each other. RFLP and sequence analysis of the ITS piece obtained show striking resemblance to *T.arenaria* (leonis) ITS. Only one nucleotide, added at position 69, distinguishing T. boudieri from the otherwise identical sequence of *T. arenaria*. It appears that either the fruit body from which our mycelial culture originated was mistakenly defined as *T. boudieri*, or that the ITS marker is not usable for distinguishing between *T arenaria* (local Negev perennial truffle) and *T. boudieri* in mycorrhizas and soil. The PCP product of the microsatellite DNA was far more variable, but this marker is itself highly variable, even within a species. Therefore, in our case, in which we are limited to using a mycerlial culture unconnected to the original fruit body, the PCR product cannot be used to devise a fingerprint for our mycorrhizas.

A method for identifying fungal mycelia in soil is now under study.

Final Report: 1993 – 1996

Applied to Moroccan Cooperative Development Project

Submitted by Moshe Bar and Nehama Gilboa
Department of Plant Genetics, A.R.O, The Volcani Center, Bet-Dagan

Research Objectives

This project was aimed to develop determinate type F_1 hybrids to improve production and quality of fresh market tomatoes in Israel and Morocco.

The project was expected to result in higher yield, improved firmness and quality of the fruit (color, flavor) and improved pest resistance.

Results

- The project was carried out according to the workplan activities and timetable
- Cultivar evaluation – a varietal trial including commercial cultivars from different sources and experimental F_1 hybrids from our breeding work was performed every year in the main production areas of Morocco and Israel. Data on vegetative grows yield and fruit quality parameters have been recorded.
- In 1996, based on the breeding activity, new F_1 hybrids combinations were generated. These combinations showed very good performance in vegetative growth, fertility, fruit size, shape, and uniformity and resistance to the important pathogens: Verticillium wilt, root knot, nematodes, fusarium wilt race 1, which are found in Morocco and Israel.

J.

Summary of the Joint Proposal on Argan

SUMMARY OF JOINT PROPOSAL ON AGRAN
BY
MOROCCAN AND ISRAELI SCIENTISTS

Argan (*Argania spinosa* L.(Skeels) is a medium-sized evergreen tree endemic to a broad dry region in south-western Morocco. The Argan tree is the main component of the forest in this region, and ecosystems are heavily dependent on it. As a multi-purpose tree, Argan is of very considerable socio-economic value for the rural people of the area, who extract a fine edible oil form the kernels of the fruits. Argan oil is distinguished by its high content of nonsaturated fatty acids, including linoleic acid, and its culinary value, and it commands high prices in local markets. The rural population also used the timber of the Argan tree for firewood and charcoal. In additions, leaves and fruits are an important component in the diet of foraging livestock. Because of overexploitation of Argan for wood and forage, and also due to clearing for urban development and crop planting, the area under Argan has been declining year by year, and the Argan forest is now under threat of extinction.

The present research project, which involves cooperation between Morocco and Israel, is aimed at promoting the preservation of Argan in its natural areas (Morocco) and preparing the background for cultivation of the tree as an oil crop (Israel). The concept underlying the activity of the Moroccan group is that a proper understanding of the effect of environmental factors on the productivity of the tree. The idea of the Israeli group is that Argan has very considerable potential as anew oil crop for arid zones and that the way to realize this potential is to select high oil yielders for cultivation and develop appropriate
agro-techniques.

The research in Morocco will concentrate on studying Argan diversity – mainly as it relates to fruit and oil production – in a wide spectrum of biogeographical zones. In Israel variation in growth fruit and oil production will be examined in cultivated genotypes. In both countries, criteria for selecting high oil yielders will be determined and genotypes will be selected for planting. In addition, efficient see and vegetative propagation methods will be developed.

K.

Collaboration Accomplishments – report prepared by Project Coordinators, November 14, 1996

SUMMARY

COLLABORATION ACTIVITIES OF THE MOROCCAN COOPERATIVE AGRICULTURAL RESEARCH PROJECT

November 14, 1996

COLLABORATION RELATED TO AMARIS PRODUCTION ACTIVITIES

Palmdat Tissue Culture Laboratory

Genillé near Tours
Mr. Alain-Noel Hamon
November 11, 1996

1. Project coordinators, Mr. Driss Lahlou, Dr. Dov Pasternak and Dr. Bonnie Stewart, met with the laboratory owner to discuss collaboration in production of date palms. He has many years of experience in Morocco. Mr. Hamon has selected clones of dates that are tolerant of Fusarium (Bayoud). This disease has spread all over Morocco except Marrakech and is moving to Algeria and Tunisia. The only effective way to overcome the problem is to plant varieties tolerant to this disease.
2. Mr. Hamon has eight clones that are tolerant and they have been tested by INRA (France) to verify their effectiveness against this disease. INRA will provide a certificate to this effect.
3. Mr. Hamon is ready to provide Amaris with in vitro plants of the
4. Fusarium tolerant varieties and will provide guidance on the hardening process.
5. Amaris will begin production trials in March 1997.
6. Clon-Tech Inc., Ventura, California and Rancho Tissue Technologies, Inc., San Diego, California:
   »Both companies were contacted. They produce in vitro date palms, but do not have clones tolerant to Fusarium. No other tissue culture laboratories in the United States produce date palms at this time.

Marketing of Melaleuca

Melaleuca was introduced for the first time in Morocco by Israeli scientists.

1. The first week in December 1996, a joint Moroccan-Israeli mission will travel to Holland, France and Italy to investigate marketing of melaleuca produced by this project.

2. Israel has experience in marketing melaleuca and knows the market.
3. The team members will be: Mr. Yossi Ben-Dov from Israel and Mr. Kareem Lahlou from Morocco.

Production of Forestry Seedlings

1. Mr. Yossi Ben-Dov from Israel will visit Amaris Azemour and Amaris Agadir to provide consultation on Forest Seedlings.
2. Already Amaris has begun production of 500,000 seedlings of forest trees of the following species:
   Eucalyptus gomphocephala
   Casuarina equisetifolia
   Acacia cyanophyla
   Acacia

The objective is to produce annually up to 10 million tree seedlings to be sold to the Department of Forestry in Morocco.

SCIENTIFIC COLLABORATION

Scientific Exchange: Israel/Morocco

1. Dr. Fouzia Bani Aameur
   University Ibnour Zohr, Agadir
2. Dr. Mohamed Achouri
   Hassan II Institute, Agadir
3. Professor Mimoun Mokhtari
   Hassan II Institute, Agadir

All three scientists will travel to Israel in February 1997 to collaborate with their Israeli counterparts. Two Moroccan Scientists will attend and present their research at a regional conference on Desert Development.

Collaboration with the Forest and Water Administration in Morocco

1. Mr. Jader Hamma, Director, Department of Forestry in all of Southern Morocco. Project coordinators met with him in Agadir to discuss problems of forestation in the arid area of Morocco (south of Agadir), on November 12, 1996. We discussed the magnitude of the desertification problem in Morocco.
2. Mr. Hanan Abderrahman, Director Water and Forest Administration and Soil Conservation for Morocco, Rabat, November 13, 1996. Professor Pasternak presented the unique experience of The Institute for Applied Research of Ben Gurion University in the introduction and selection of trees for arid lands. (drought and salt tolerant and sand dune fixation).

Mr. Hanan showed at great deal of interest for the scientific collaboration between the Institute of Forest Research in Morocco and Ben Gurion University. Mr. Hanan attached great importance for collaboration with the departments of Forestry in Israel and Morocco. He requested Dr. Pasternak to initiate collaboration as soon as possible. Mr. Hanan acknowledged the experience of Israel in forestation and emphasized that the number one priority for the Sahara in Morocco in forestation.

Mr. Hanan invited Dr. Pasternak to visit the Institute of Forestry Research in Morocco in January 1997, to plan collaboration between the Institute of Forestry Research in Morocco and the Institute of Applied Research at Ben Gurion University. Mr. Hanan emphasized the importance of these two collaborative activities for Morocco.

This collaboration represents new State to State, as well as institute to institute linkages. Furthermore, this confirms achievements of important project goals.

Environmental Impact of Project Activities Combating Environmental Pollution

Grafting tomatoes and melons

1. The existing commercial varieties of tomatoes and melons do not possess all the resistances to soil-born diseases and pests. Grafting of commercial varieties onto tolerant wood stock is a method of producing tolerant plants.
2. The use of these plants will eliminate the need for chemical treatment of the soil, which represents a critical step towards combating environmental pollution.
3. Mr. Nissim Sroussi, permanent technical advisor, trained the staff at Azemour nursery and Agadir nursery in the techniques of grafting.
4. Commercial production will begin in December 1996 with the objective of introducing this new approach to Moroccan producers in different regions of Morocco. We estimate that the introduction of this process in Morocco will take two to three years.

Nematode resistant tomatoes

1. Open-Field: An Israeli project scientist has developed nematode tolerant varieties of tomatoes for open-fields. Trials were conducted in Israel and Morocco for three years. Continued

testing will be done by selected farmers in the Azemour and Agadir areas.

2. Greenhouse: Nematode tolerant green house varieties were developed by Israeli seed companies. These varieties are being tested for the second consecutive year at Azemour. In addition, seedlings will be provided to local farmers for testing.
3. Use of Nematode tolerant tomatoes will reduce the dependence on chemical treatment of the soil.

Fusarium tolerant Date Palms

1. Introduction of Fusarium tolerant date palm varieties as described in the previous section will eliminate the need of chemical treatments of effected soils.
2. This activity will re-establish date palms in the Sahara area which will contribute to combating desertification; help to provide a means of income for the population of the oasis; and help to stabilize the population in that area.

Meeting

The three project coordinators, Mr. Lahlou, Dr. Pasternak and Dr. Stewart, met with Mr. Rachid Lakhdar, Director of Plant Protection and Food and Drug Administrative unit in Rabat Morocco. Project activities related to environmental protection were explained to Mr. Lakhdar. He expressed his strong support for these activities. He emphasized the government and King Hassan II's commitment to environmental concerns.

MEETING WITH GOVERNOR OF SOUSS AREA

Project coordinators met with the governor of the Souss, Mr. M'Jahdi Ahmed in Inezgane-Ait Melloul. The governor said that the Souss Region is responsible for 70% of the agricultural production in Morocco. Mr. M'Jahdi Ahmed said there was a great need for new technologies and crops for the region, he expressed great appreciation for the Morocco Project contributions to the agriculture of his region. He offered his assistance and support to the project.

This report was prepared by:
Mr. Driss Lahlou, Morocco
Dr. Dov Pasternak, Israel
Dr. Bonnie Stewart, United States

L.

Project Accomplishments – report prepared by Moroccan Coordinator, Mr. Driss Lahlou, May 1997

Accomplishments
of the
Moroccan Cooperative Agricultural Research Project

A Tri-lateral Project with Morocco, Israel and the United States
Funded by the U.S. Agency for International Development

Prepared by:
Mr. Driss Lahlou, President
Maghreb Agriculture
Morocco Project Coordinator

AMARIS Project is financed by the USAID, it was created in 1992 in Azemour with a view to meet the farmers' demand in terms of production of market seedlings and to introduce new techniques.

CO-OPERATION

- Visit to Morocco of the Israeli Minister of Agriculture
- Visit of the Steering Committee
- Visit to Israel of Mr. Driss Lahlou in 1984
- Meeting with the Ministers of Foreign Affairs and Agriculture on several occasions
- Visit of the United States Ambassador together with the USAID staff
- Desert Summit in 1993
- Economic Conference for the Middle East & North Africa: 500 visitors, 1200 members, and 100 countries

During this economic conference, our AMARIS Project was in the lead of the projects presented for Moroccan-Israeli co-operation. During the conference, two Israeli Ministers, including the Minister of Agriculture and many Moroccan farmers visited the site, where they had lunch and had the opportunity to visit our facilities. Contacts were made between Moroccans and Israelis.

Several journalists from Europe, Israel and the Middle East, representing newspapers and TV stations covered this event. In fact, a film was immediately broadcast in the evening of that very day on several international stations.

CO-OPERATION WITH MOROCCAN MINISTRIES

The results we obtained are notified to the Ministry of National Agriculture. Such ministry decides on the positive aspects that will be widely disseminated to farmers throughout Morocco. Several agencies of the Ministry of Agriculture involved in extension and outreach services pay frequent visits the site of AMARIS Project such as:

- SO.DE.A. (Agricultural Development Company)
- SASMA
- The Agricultural Service Regional Agricultural Development Boards cooperatives, each consisting of hundred of farmers, who visit us both in Agadir and Azemour.

We organize on average one visit every three months to our facilities. Such visits provide the opportunity to display products and know-how and to teach how to prepare quality seedlings (healthy and vigorous). These visits also provide the farmers with a chance to look at our experimental species irrigated with salty water containing up to 4 g of salt per liter, as we have in the Azemour region.

- ASPARAGUS, seedlings from the United States
- RASPBERRIES, seedlings from the United States
- MELALUCA, ornamental seedlings from Israel
- ARTICHOKES

On the other hand, we have introduced several ornamental species from Israel, with a view of a better adaptability to our conditions and a larger diversification. In the same, we introduced this year, for the first time in Morocco a watermelon variety, seedless, supplied by the American firm *PEETO SEED*. This variety is valued in Europe. We are trying to make it available to our farmers to help them diversify their products destined to the export markets.

We have also introduced the melon variety "GALIA" from Israel since the first year of the project. We have been the first to introduce the Israeli tomato variety "DANIELA", after a trial period, we have been able to disseminate it. The tomato variety "DANIELA" presently covers 95% of the tomato growing areas of Morocco, and our farmers export every year about 130 000 tons of this product.

PRODUCTION OF FOREST SEEDLINGS

The year 1996 was characterized by a close co-operation with the Ministry of Agriculture's Forestry Service. This has lead to a first Agreement on the production of 500 000 forest-seedlings in the AMARIS nurseries destined to the reforestation of forest. Four varieties have been produced:

- CASUARINA
- ACACIA CYANOPHYLLA
- EUCALYPTUS GOMPHOCEPHALA
- ACACIA CYLOPS

PRODUCTION OF VEGETAL GRAFTING

See detailed survey, DHL'ed to Dr Bonnie Stewart in San Diego, during April 1997. See study faxed to Dr Bonnie Stewart in San Diego "Vegetal Grafting Pilot Study".

VISITS

These visits were arranged for farmers and technicians of the Ministry of Agriculture and private sector. Familiarization days are organized for farmers by the AMARIS Project.

VISIT TO ISRAEL

Several visits have made to Israel by the members of the Management Committee made up of American, Israeli and Moroccan scientific researchers. During this visit, they made several contacts in various agricultural sectors:

- Ben Gurion research Institute
- International Agricultural Exhibit (AGRITECH)
- Leading agricultural sectors

During the last Agricultural Exhibit (AGRITECH 96) held in Tel Aviv, we contacted our farmers and arranged for them a visit. They visited AGRITECH and saw the new Israeli techniques that could be adapted to the Moroccan conditions in the areas of irrigation, agricultural machinery and other technologies.

VISIT TO MOROCCO

Alternately, similar visits are made by American and Israeli technician-researchers. Likewise, various Israeli firms visited us and assisted us since the launching of the Project. We have contacted both small, medium size and large farms or associations or co-operatives which gather hundreds of farmer each, throughout Morocco. All of these farmers visit the AMARIS site on a regular basis, where they get practical applications in connection with new techniques.

TRAINING SESSIONS

Each year, we get groups of students accompanied by their teachers, coming from various Moroccan Institutes such as:

- The Agronomic & Veterinary Institute of Rabat
- The Agronomic Institute of Agadir
- The Suihla Technical & Agricultural Institute of Marrakech
- The Chaouia Technical & Agricultural Institute
- The Agricultural Mechanics Vocational Qualification School of Khouribga

Upon completion of their studies, many of these students come to AMARIS to get training, they spend two to six months in our Agadir and Azemour sites.

Over the last few years, we trained up to 50 trainees per year in both AMARIS sites.

In the same time, we sent to Israel thanks to our Israeli partner Ben Gurion University, five technicians and engineers to attend technical training courses in various sectors:

- Farm management
- Marketing of agricultural enterprises
- Irrigation
- In-vitro farming: tissues, farming, technologies
- Nurseries, production

During their training, trainees made contacts with the leading agricultural sites in Israel, thanks to the Ben Gurion University. Contacts were also made with TV and newspapers.

Jewish families of Moroccan origin also hosted these trainees settled in Israel.

SEMINAR

The major event that marked the year 1996, was the seminar organized in April 1996 by our American, Israeli and Moroccan three-party Foundation, in co-operation with the Hassan II Institute of Agadir, in presence of the Governor of Inezgane-Agadir, Parliamentarians of the Agadir province and representatives of Associations and Co-operatives. The topic of this Seminar was the marketing and production techniques of horticultural products.

Eminent experts and researchers from the United States, Israel and Morocco contributed actively to the seminar, which was highly appreciated by the attendance (300 farmers/exporters). It was a seminar that responded to an actual need concerning marketing (commercial outlooks, and diversification of horticultural products).

MARKETING

- Number of customers of AMARIS Ait Melloul: 30 customers
- Number of customers of AMARIS Azemour: 30 customers
- Number of firms, associations, exporting groups, agencies contacted by the Marketing Section of AMARIS:
    1. Number of people visited: 1500
    2. Number of exporting groups and packaging stations: 100
- Number of Monthly magazines:
  "Le Monde Agricole" magazine sold in kiosks: 3 issues
    1. Presentation of the Project
    2. Seminar of April 1996
    3. Introduction of Vegetal Grafting

  This publication has a circulation of 7000 to 10 000 copies, i.e. a readership of 49 000 to 70 000.

- Number of government or private firms contacted by the Marketing Section of AMARIS: about 1 500.
- Number of exporting groups: about 10.
- Number of packaging stations visited:
- Number of distributors of seeds and phytosanitary products visited: 20
- Other agricultural firms visited: 20
- Other government agencies: 10

The seminar held in Agadir in April 1996 had an attendance of about 300 farmers, and with the second publication of the professional publication "Le Monde Agricole"; nearly all professionals were sensitized. A third issue of this publication in March 1997, featuring the Announcement of the production of Vegetal Grafting, was a definite success for the AMARIS Nurseries.

M.

Morocco Project Group and Individual Visitations

MOROCCO PROJECT GROUP AND INDIVIDUAL VISITATIONS

1992	**November 2 - 13**	**Technical Committee Meeting (Morocco)** Dr. Bonnie Stewart Dr. Irit Rylski Dr. Josef Elkanna Dr. Michael Reid Mr. Itzhak Ayalon Dr. Dov Pasternak Dr. Eleizer Speigel Dr. Samuel Pohoryles Dr. Itzhak Peretz Dr. Uri Drori
1993	**January 10 - 18**	**Steering Committee Meeting (Israel and Morocco)** Mr. Harry R. Albers Dr. Al Johnson Mr. Hassan Alami Ms. Frea Sladek Dr. Bonnie Stewart Mr. Itzhak Peretz Mr. Itzhak Ayalon Mr. Driss Lahlou Dr. Dov Pasternak
	April 26 – May 8	**Technical Committee Meeting / AgriTech (Israel and Morocco)** Dr. Michael Reid Dr. Dov Pasternak Mr. Allal Chibane Mr. Driss Lahlou Mr. H. El-Mekki Dr. Irit Rylski Dr. Josef Elkana Dr. Bonnie Stewart Mr. Itzhak Ayalon Mr. Uri Drori Mr. M. Nadir Mr. Eleizer Speigel
	September 11 - 19	**Annual Audit Preparation (Morocco)** Mr. Frank DiSanto Dr. Bonnie Stewart Mr. Rober Benshoff
	September 19 - 26	**Equipment Consultation and Procurement (Morocco)** Mr. Itzhak Ayalon
	October 22 – 30	**Steering Committee Meeting (Morocco)** Mr. Frea Sladek Dr. Dov Pasternak Mr. Harry R. Albers Dr. Bonnie Stewart Dr. Samuel Pohoryles Dr. Lechaim Naggan Mr. Itzhak Peretz
	December 2 – 9	**Moroccan Attendance to "Planning, Management and Extension" Conference** Mr. Karim Lahlou
	December 3 – 12	**Israeli Scientific Consultation and Training (Morocco)** Mr. Moshe Bar Dr. Irit Rylski

1993	**December 12 - 20**	**Israeli Technical Assistance (Morocco)** Mr. H. Arakrat
1993 - 1994	**December 31 - January 10**	**Israeli Marketing Research and Equipment Assistance (Israel , United Kingdom and Morocco)** Mr. Itzhak Ayalon
1994	**January 5 - February 28**	**Moroccan Market Development (France)** Mr. Karim Lahlou
	January 28 - February 4	**US Technical Consultation / Assistance for Raspberry and Asparagus planting (Morocco)** Dr. Richard Jones
	January 16 - February 17	**Israeli Research Study - Verticordia Specimen Collection (Australia)** Dr. Yossi Ben-Dov
	February - April	**Israeli / Moroccan Collaborative Research Study - Truffle Specimen Collection (Morocco)** Dr. Varda Kagan Zur
	March 19 - 28	**Israeli Marketing Research and Equipment Assistance (Israel, United Kingdom and Morocco)** Mr. Itzhak Ayalon
	April 22 - May 1	**Project Review Meeting (Morocco)** Dr. Bonnie Stewart Dr. Dov Pasternak
	June 23 - 27	**Technical Committee Meeting (Morocco)** Dr. Dov Pasternak — Dr. Richard Jones Mr. Allal Chibane — Dr. Ben Ami Bravdo Mr. Eleizer Speigel — Dr. Yoseph El-Kana Dr. Michael Reid — Dr. Bonnie Stewart Mr. Hammouton El-Mekki — Dr. Mohamed Nadir Dr, Irit Rylski — Mr. Uri Drori
	August 1 - 7	**Project Evaluation and Review (Morocco)** Dr. Bonnie Stewart
	August 30 - September 5	**Technical Review and Consultation (Morocco)** Dr. Irene Rylski
	September 1 - 9	**Technical Review and Consultation (Morocco)** Dr. Richard Jones
	October 5 - December 5	**Moroccan Travel to Israel to Attend Irrigation Technology training course** Mr. A. Hassan

1994	**October 7 - 14**	**Steering Committee Meeting (Morocco)** Mr. Harry R. Albers Dr. Ron Hopkins Ms. Frea Sladek Dr. Dov Pasternak Mr. Itzhak Peretz Dr. L. Naggan Dr. Bonnie Stewart Dr. Samuel Pohoryles
	November 8 - 23	**Israeli Travel for Bid Collection / Project Meetings** Mr. Itzhak Ayalon
	December 7 - 18	**Management Meeting / Evaluation Teem Briefing (US / Morocco)** Dr. Bonnie Stewart
	December 12 - 15	**Israeli Travel for Management Meeting/Interview (Morocco)** Dr. Dov Pasternak
1995	**January 4 -1 2**	**US Travel - Project Evaluation/Review (Israel)** Dr. Bonnie Stewart
	January 5 - 8	**Israeli Travel for Project Evaluation (Israel)** Dr. Dov Pasternak
	January 5 - 31	**Israeli Travel - Consultation / Review (Morocco)** Mr. G. Regev
	January 18 - 19	**Israeli/MoroccanTravel for Budget Review (France)** Dr. Samuel Pohoryles Mr. Driss Lahlou
	January 23 - February 2	**US Travel - Project Evaluation/Review (Morocco)** Dr. Bonnie Stewart
	February 20 - May 31	**Israeli Travel - Project Technical Assistance (Morocco)** Mr. G. Regev
	March 5 - 13	**Israeli Travel - Truffle Collaboration (Morocco)** Dr. Varda Kagan-Tsur
	March 16 - 23	**US / Israeli Travel - Management Review/Planning (Morocco)** Dr. Bonnie Stewart Dr. Dov Pasternak
	April 25 - May 9	**Israeli Travel - Agran Tree Research (Morocco/Italy)** Dr. Avinoam Nerd

1995	**May 7 - 14**	**Israeli Travel - Technical Advise for Ornamentals/Melaleuca (Morocco)** Mr. Yossi Ben-Dov
	May 21 - 27	**US Travel - Management Review/Planning (Morocco)** Dr. Bonnie Stewart
	June 1 -30	**Israeli Travel - Technical Assistance (Morocco)** Mr. G. Regev
	June 25 - 28	**Israeli Travel - Technical Review (Morocco)** Dr. Dov Pasternak
	August 21 - 27	**Technical Committee Meeting Travel (Morocco)** Dr. Dov Pasternak — Mr. Allal Chibane Mr. Uri Drori — Ms. Nadia Chouri Mr. Mbarek Fatmi — Dr. Eleiger Speigel Dr. Bonnie Stewart — Dr. Michael Reid Mr. Hammoutou El-Mekki — Dr. Richard Jones
	October 22 -25	**Moroccan Travel - Project Management (US)** Mr. Driss Lshlou Mr. Karim Lahlou
	November 30 - December 6	**Steering Committee Meeting (Morocco)** Dr. Dov Pasternak — Ms. Frea Sladek Mr. Harry Albers — Dr. Samuel Pohoryles Dr. Bonnie Stewart
	December 14 - 15	**Israeli Travel - Tomato Experiment (Morocco/Spain)** Dr. Moshe Bar
1996	**April 10 - 17**	**Technical Committee Meeting and Seminar (Morocco)** Dr. Richard Jones — Dr. Bonnie Stewart Dr. Dov Pasternak — Dr. Michael Reid Mr. Eleizer Speigel — Mr. Karim Lahlou Mr. Driss Lahlou — Mr. Omar Mounaz Ms. Nadida Chouri — Mr. Fouad Akesbi Mr. Nissim Sroussi — Dr. Irit Rylski
	May 11 - 14	**Moroccan Travel - AgriTech (Israel)** Mr. Driss Lahlou
	June 23 - July 7	**Moroccan Travel - Computer Training/Local Agriculture Observation (US)** Ms. Nadia Chouri

1996	**September 5 - 8**	**Moroccan Travel - Year 5 Project Management Meeting (US)** Mr. Karim Lahlou
	November 10 - 16	**Israeli Travel - Date Palm Research (France)** Dr. Dov Pasternak Dr. Bonnie Stewart Mr. Driss Lahlou
	December 8 - 17	**Collaborative Travel - Marketing Fact Finding Trip (Netherlands, France, Morocco)** Mr. Karim Lahlou Mr. Yossi Ben Dov
1997	**May 14 -17**	**Moroccan Travel - MERC Pre-evaluation (Egypt)** Mr. Driss Lahlou Dr. Bonnie Stewart Ms. Nadia Chouri
	July 22-August 9	**Collaborative Travel - MERC Final Evaluation** Dr. Bonnie Stewart — Mr. Nissim Sroussi Dr. Dov Pasternak — Dr. Irit Rylski

N.

List of Trainees at Amaris Nurseries, April 1995 – September 30, 1997

TRAINEES
APRIL 1995 – SEPTEMBER 1997

AMARIS AZEMOUR

CENTRE DE QUALIFICATION AGRICOLE DE TAROUDANT

AQUINI, Jamâa Ornamentals	08/21/95 through 11/30/95

CENTRE DE QUALIFICATION AGRICOL DE BIR MEZIOUI KHOURIBGA

KANISSI, Brahim Agriculture Machinery	11/03/95 through 03/03/96
MOUNIM, Abdellatif Agriculture Machinery	11/03/95 through 03/03/96
BEL GHAZOUANI, Mustapha Polyculture	04/05/96 through 08/15/96
CHAIF, Rachid Polyculture	03/08/96 through 07/30/96
NJILI, Fatna Polyculture	04/25/96 through 07/25/96
ELLIHOUNI, Fatima Polyculture	04/25/96 through 07/25/96
EZZIKARI, Souad	9/9 through 3/97
MAKHROUTE, Faliha	9/96 through 3/97
L'MBAREKI, Faliha	9/96 through 3/97
EL GAZ, Fatiha	9/96 through 3/97
CHOUKRY, Soumia Agriculture Management	04/08/97 through 07/31/97
MOUAKIL, Samira Agriculture Management	04/08/97 through 07/31/97
EL-HAILI, Rachida Agriculture Management	04/08/97 through 07/31/97
RHARIF, Omar Agriculture Management	04/08/97 through 07/31/97

TRAINEES
APRIL 1995 – SEPTEMBER 1997

AMARIS AZEMOUR

CHERRAJI, Abdelaziz Agriculture Management	04/08/97 through 07/31/97
SERBOUTI, Abdelkrim Agriculture Management	04/08/97 through 07/31/97
ZEHRAOUI, Mohamed Agriculture Management	04/08/97 through 07/31/97
EL KHATOUR, Abderrazak Agriculture Management	04/08/97 through 07/31/97
BEN LBHIDH, Mohamed Agriculture Management	04/08/97 through 07/31/97
DAMIR, Hafid Agriculture Management	04/08/97 through 07/31/97
MOUAKIL, Samira Agriculture Management	04/0897 through 07/31/97
EL HAILI, Rachida Agriculture Management	04/0897 through 07/31/97
RHARIF, Omar Agriculture Management	04/0897 through 07/31/97
CHERRAJI, Abdelaziz Agriculture Management	04/0897 through 07/31/97
SERBOUTI, Abdelkrim Agriculture Management	04/0897 through 07/31/97
ZEHRAOUI, Mohamed Agriculture Management	04/0897 through 07/31/97
EL KHATOUF, Abderrazak Agriculture Management	04/0897 through 07/31/97
BEN LBHIDH, Mohamed Agriculture Management	04/0897 through 07/31/97
DAMIR, Hafid Agriculture Management	04/0897 through 07/31/97

TRAINEES
APRIL 1995 – SEPTEMBER 1997

AMARIS AZEMOUR

CENTRE DE QUALIFICATION AGRICOL DE CHAOUIA

BALDIRI, Ali	9/96 through 11/30/96

ECOLE DU SOUIHLA MARRAKESH

SMARI, Khalifa	11/96 through 3/97
SOUKRATE, Maria	11/96 through 3/97

TRADE INSTITUTION TRAINEES

ESSAHBI, Said
Open Field Irrigation

ANTIFI, Hassan
Greenhouse Maintenance

FEKKAK, Abdeslam
Greenhouse Maintenance

AMENZOU, Brahim
Agriculture Machinery

TAOUSS, Mustapha
Fertilization Treatments

IDRESSI, Reddad
Fertilization Treatments

INSTITUT PRINCE SIDI MOHAMED

ANNOUAR, Ghizlane Agriculture Management	03/31/97 through 04/26/97
AIT TOUCHEN, Fatima Agriculture Management	03/31/97 through 04/26/97

INSTITUT AGRONOMIQUE HASSAN II D'AGADIR

AMAHRIR, Hakim Seedling Production	12/25/95 through 02/25/96

INSTITUT TECHNIQUE AGRICOLE DE LA CHAOUIA BEN AHMED

ZOUHEIR, Nora Seedling Production	04/08/96 à ce jour

TRAINEES
APRIL 1995 – SEPTEMBER 1997

AMARIS AGADIR

MEKKNES UNIVERSITY

BOUAZZA, Homman	07/97 through 08/95

INSTITUT TECHNIQUE HORTICOLE DE MEKNES

ELWATI, Abdellatif	08/01/96 through 08/10/96

INSTITUE AGRONOMIQUE ET VETERINAIRE HASSAN II, AGADIR

IHTITEN, Lahcen	11/21/96 through 01/16/97
BOUSKOU, Naima	12/08/96 through 01/16/97
IHTITEN, Lahcen	11/21/96 through 04/11/97
FECHTALOU, Abdelhadi	12/20/96 through 05/24/97

INSTITUT AGRONOMIQUE DE ERRACHIDIA

ABRACH, Hammou	01/17/97 through02/05/97

INSTITUT AGRONOMIQUE D'ELMOHAMADIA

FECHTALOU, Abdelhadi	12/02/96 through 05/24/97

FACULTÉ DE SCIENCE DE FÉS

EL AROBI, Ahmed	12/26/96 through 02/14/97

TRADE INSTITUTION TRAINEES

SAAID, Mohamed
Grafting Technique for Melon

RADIK, Mustapha
Grafting Technique for Melon

EL AROBI, Ahmed
Grafting Technique

ZAHIDI, Mustapha
Irrigation

WAFIDI, Abdelkadir
Installation of Irrigation Equipment

TRAINEES
APRIL 1995 – SEPTEMBER 1997

AMARIS AGADIR

AACHAKI, Abdelghani
Installation of Irrigation Equipment

EL AAREJ, Bouchaib
Greenhouse Management

EL BOURICHI, Abdelaziz
Greenhouse Management

LAMHAKKAR, Abdellouahed
Fertilization Treatments

ABACHE,Hamou
Water Plant Production

AMI, Aicha
Suivi des Essais de Demonstration

RATSSI, Miloud
Suivi des Essais de Demonstration

NABAGH, Mohamed
Irrigation and Fertilization of Plants

EL HAREM, Mohamed
Irrigation and Fertilization of Plants

KARBAL, Hanane
Grafting

AAFIFI, Othmane
Grafting

BEN GURION UNIVERSITY OF THE NEGEV – INSTITUTE FOR AGRICULTURE AND APPLIED BIOLOGY

Moroccan Trainees (Trained in Israel)

LAKHISSE, Khadija
Agriculture Administration

LAHLOU, Karim
Agriculture Marketing

TRAINEES
APRIL 1995 – SEPTEMBER 1997

BEN GURION UNIVERSITY OF THE NEGEV – INSTITUTE FOR AGRICULTURE AND APPLIED BIOLOGY

AININ, Hassan
Water Management Technology

AGDID, Fatima
Tissue Culture Technologies

ZOUBIR, Saddik
Seedling Nursery Production