

PURDUE UNIVERSITY
International Education and Research
International Programs in Agriculture



**PORTUGAL UNIVERSITY
INSTITUTES
DEVELOPMENT PROJECT**

(Contract AID/NE-C-1701)

**REPORT ON
SHORT-TERM STAFF ASSIGNMENT**

**Submitted by
DR. WILLIAM L. SIMS
Department of Vegetable Crops
University of California
Davis, California**

June 17 through July 18, 1985

PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT
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SHORT-TERM STAFF ASSIGNMENT
AT THE
UNIVERSIDADE DE EVORA
EVORA, PORTUGAL

June 17 - July 18, 1985

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Appendix A -- Program of the 4th Technical Workshop on
Processing Tomatoes

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PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT

Report on Short-term Staff Assignment

Submitted by
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AREA OF CONSULTANCY

Short-term advisor on Horticultural Production Systems

DURATION OF ASSIGNMENT

June 17 through July 18, 1985

PORTUGUESE COUNTERPARTS

Dr. Carlos A. M. Portas and Antonio M. Calado

SCOPE OF WORK

1. Investigate potential horticultural research for Portugal with emphasis on the Alentejo Region.
2. Observe and provide assistance to the Crop Science Department of the University of Evora.
 - 2.1 - Research project on mechanized production of tomatoes for processing (METI).
 - 2.2 - Research project on production of melons for market (MENA).
 - 2.3 - Research project on production of cruciferous plants (PROBRA).
3. Introduce germplasm for horticultural crops.
4. Discussion of irrigation problems on tomatoes for processing.
5. Present three seminars on horticultural vegetable production and technology.

DAILY ITINERARY

- June 17-18' Air flight from Kansas City, Missouri (previously on 6/13 had flown from Sacramento, California to Kansas City) to New York City and Lisbon, Portugal.
- June 18 Was met at the Lisbon Airport by my Portuguese counterparts, Dr. Carlos Portas and Eng^o Agron. Antonio M. Calado. Then motored by automobile to Evora. Checked into Mitra Guest House and rested during the remainder of the afternoon. Later had dinner and discussions with Dr. Truman G. Martin, professor of animal breeding, and Dr. Timothy Baker, agricultural economist, of Purdue University, regarding orientation and living accomodations at the Mitra Guest House.
- June 19 During A.M. met with Maria do Carmo, AID Administrative Assistant, Evora University, for briefing and discussion regarding financial and administrative matters for my visit. Also visited with Professor Ario Lobo Azevedo, Rector, University of Evora.
- During the P.M., was introduced to several faculty members of the Crop Science Department located at Mitra and with Mr. Pedro Silveira, manager of the University farms and the guest house.
- June 20 Again met with Maria do Carmo regarding per diem payment and administrative matters. During the P.M., was introduced to additional faculty members including Maria Rosario, agronomy and soils lecturer, and held preliminary discussion with Eng^o Agron. Antonio Calado regarding my itinerary during my visit in Portugal.
- June 21 Held discussions with Antonio Calado at Mitra regarding the staff of horticulture and other departments located at Mitra and the University of Evora. Also spent time reviewing the agenda for the program of the 4th Technical Workshop on Processing Tomatoes to be held June 27th at Mitra and June 28th at Coruche.
- June 22-23 Free time on weekend.
- June 24 Trip with Antonio Calado to the Sorraia Valley area near Mora where we visited the SOPRAGOL tomato processing factory and held discussions with Eng^o Agron. Fernando Magalhaes, director and manager of SOPRAGOL, a privately owned cannery. This company processes 1,200 tons per day of raw tomato product mainly into 55 gallon metal drums under aseptic conditions of 28-30% tomato paste for export to U.K and Canada.

- June 25 Presented a seminar to students and faculty of the departments of horticulture, farm machinery and irrigation at UE entitled, "Systems Approach to Growing Tomatoes for Mechanization in California." Some 30 to 40 persons were in attendance and a number of questions were asked by those in the audience. During the afternoon, further discussions on the Technical Workshop were held with Antonio Calado.
- June 26 Prepared for presentation to be given at the Technical Workshop on Processing Tomatoes at Coruche.
- June 27 Attended the first day of the 4th Technical Workshop on Processing Tomatoes which was held at Mitra. The opening session was presided over by Professor Ario Lobo Azevedo, Eng^o Agron. Carlos Frazao (president of the Portuguese Horticultural Society). Nine papers were presented during the day on such subjects as varieties, growth regulators, insecticides, herbicides, fungicides, seed production and professional training of factory management personnel. I was asked to serve as Chairman of the afternoon session. (See Appendix A for the workshop program.)
- During the evening, Dr. Carlos Portas and I spent several hours discussing the horticultural programs in Portugal.
- June 28 During the second day of the Workshop, the venue was moved from Mitra to Coruche where an additional five papers were presented during the morning session on subjects of irrigation, fertilization, planting equipment and I presented a paper entitled, "New Technology Used in the Production of Processing Tomatoes." Attendance on both days of the workshop was 150-175 persons whom had been invited to attend.
- June 29-30 Free time on weekend.
- July 1 Enroute to Badahoz, Spain to meet with representatives of several processing tomato factories.
- July 2 Antonio Calado and I visited with Eng^o Agron. Angel Rodriguez del Rincon, director of the Centro de Capacitacion y Experiencis Agraris, in Don Benito, Spain. Eng^o Rincon and two other persons from the regional extension service conducted us to several processing tomato fields. A number of problems with irrigation management and diseases were encountered. We also visited research trials at Rincon's experiment station dealing with irrigation, weed control, variety evaluation and fertilization. Also viewed field trials on peppers, potatoes, onions and asparagus.

- July 3 On the second day of our visit in the Badahoz area we were escorted by extension service personnel from the area on a visit with other visitors from Madrid and Morocco to a dehydration plant located at Montijo (Agro-Tex. s.a.) where the manager, Mr. Cayetano Lopez Sanches, showed us through the factory where potatoes, onions, leek and tomatoes are processed. We also visited a processing tomato factory in Montijo where a great deal of modernization using new Mencini equipment from Italy was taking place. The director of the factory was Eng^o Hilario Ferrero Oltra. He also manages a factory in Don Benito.
- July 4 Antonio Calado and I visited the F.I.T. (Fomento da Industria do Tomate, lda.) tomato processing factory located at Marateca near Setubal. Eng^o Agron. Reinaldo J. F. Mendes Barata, general director, took us on a tour of tomato production fields. Their plans are for processing 9,000 tons of paste in 1985 and increasing to 12,000 tons in 1986. Many new changes and renovations are taking place in the factory. Higher plant capacity and greater efficiency are their goals. Their varieties of tomatoes are Petopride, H-30, Rio Grande and Rio Fuego. The factory supplies its growers with the transplants and advances to them fertilizers and chemicals for pest management. Their label is ACIL.
- July 5 Worked in my Mitra office in preparation for seminar to be presented in Lisbon.
- July 6 Reviewed horticultural reports on research at my Mitra office during the morning
- July 7 Worked in Mitra office during the afternoon.
- July 8 Discussed teaching program in Horticulture I and II and research programs on tomatoes, melons and crucifers with Antonio Calado.
- July 9 Antonio Calado and I visited the I.N.I.A. field research station at Coruche and reviewed the irrigation and variety evaluation research trials during the morning.
- During the afternoon, we visited the tomato factory and mushroom houses of TOCAN near Pegoes. This factory is privately owned. Approximately 800 tons of tomatoes per day are processed into paste. There are also 10 mushroom houses which at present represents one of the largest mushroom facilities in Portugal. However, two new facilities are presently under construction in Portugal.

- July 10 Antonio Calado and I met with the Regional Director of Ribatejo and Oeste, Jose Francisco Martins Chicau, in his Villa Franco office. Then Eng^o Agron. Caldeira, director of the regional vegetable crops division in the Ribatejo and Oeste district, Antonio and I drove to Lourinha which is some 95 kms from Lisbon on the west coast of Portugal where we visited a large packing house and field operations of LOURIFRUTA. Mr. Rui Silveria, field manager for the Cooperative, was our host. There are 400 growers in the Cooperative with a total of 2,500 hectares. They were packing green beans, tomatoes and cucumbers for fresh market shipment in Europe. Cabbage and onions were being packed for domestic markets. A freezing plant is also located in this facility where they were repacking green peas. There are presently 160 ha in greenhouse production of vegetables. This area has an excellent climate for growing cool season vegetables and protected cultivation of vegetables during winter months. They do have problems with salinity and a shortage of available water. Also visited a new planting of white asparagus which will be for export.
- July 11 Antonio Calado and I met with two extension service technicians from the Ribatejo area and visited the melon variety trials (PROBRA) in the Salvateria and Villa Franco area. A large number of watermelon and cantaloupe varieties from the USA and Europe were being evaluated. We also met Mr. Jose Luis Rocha, Regional Director in Samora Correia. We visited several production fields of tomatoes and peppers where several disease problems were encountered. The problems appeared to be those of Fusarium associated with irrigation management in the heavier clay soils. These problems were discussed with the growers during our visit. A phytophthora root problem on bell peppers was also observed and the problem accentuated by over irrigation on the heavy soil. We also visited a 17 ha field of white asparagus being grown for export.
- July 12 Visited in Evora office with Maria do Carmo and then enroute to Algarve area for a visit with Antonio Monterio to observe the protected cultivation program.
- July 13 Weekend free time.

- July 14 Spent the afternoon with Dr. Antonio Monterio, professor from Lisbon University, visiting several commercial plastic greenhouse operations on tomatoes, melons, beans, and other horticultural crops in the Algarve area. Irrigation water in the area is obtained mainly from wells which are 100 to 300 meters in depth. The water table level is said to be dropping which is causing problems with some of the wells in the area. Plans are being made to construct several new dams in the mountains surrounding the area. This should help alleviate the water availability problem and open up more land for cultivation. This area is very good for protective cultivation of vegetable crops and for production of fresh market grapes, citrus and other fruit crops.
- July 15 During the morning, Dr. Antonio Monterio and I visited the Faro Agricultural Research Station. Ms. Bock of the GTZ (West Germany AID program) project conducted me on a tour of the research projects at the station on fresh market tomatoes and melons grown in plastic greenhouses. They are conducting excellent projects on irrigation management and variety evaluation in plastic greenhouses using good technical instrumentation. Cultivar evaluation is also being studied on several tropical fruits including passion fruit, kiwi and avacado. The GTZ project has also built new administrative and laboratory buildings which certainly are an asset to the area. Also met with the Regional Director of the Algarve area at the station.
- July 16 Enroute to Lisbon. During the afternoon prepared for seminar to be presented at the University of Lisbon in the Section of Horticulture.
- July 17 Met with Jose Luis Almeida Pinheiro and other USAID personnel at the American Embassy during the morning and held discussions on the report of my visit to Portugal.
- During the afternoon Dr. Monterio conducted me on a tour of the grounds and research facilities of the Section of Horticulture, Technical University of Lisbon. Cooperative research in the plastic greenhouses is being done with the meteorological department. We also visited the Botanical gardens under the direction of the University. Later I presented a seminar on "Agricultural Development Systems Program and Protected Cultivation in Egypt" and then was shown a film on the production of melons in the Ribatejo area and another on the production and harvesting of cork. These films were shown by

Manuel Rodriguez at the Portuguese Horticultural Society headquarters in Lisbon.

Later in the evening my wife and I were invited to dinner and music entertainment as guests of the Portuguese Horticulture Society. It was a beautiful ending for our trip to Portugal and deeply appreciated.

July 18

Departure for New York and California.

ACCOMPLISHMENTS WITH RESPECT TO OBJECTIVES OF THE ASSIGNMENT

1. Investigate Potential Horticultural Research for Portugal with Emphasis on the Alentejo Region

During my assignment in Portugal (June 18 - July 18, 1985), I had the privilege and pleasure of visiting various production areas for vegetable crops from the Ribatejo and Oeste regions, Tagus, Sorraia, Sado, Caia, Alentejo to the Algarve region in Southern Portugal. Each region has its uniqueness for the production of vegetable crops. However, there are research areas or disciplines that cut across several of the regions.

As an example, the tomato crop, whether grown for processing or fresh market, is the most important vegetable grown in most of the regions. Therefore, cultivar evaluation for processing tomatoes as well as other vegetables is an important area for continuing and potential research. This area of research as well as for melons and crucifer crops will be discussed further under the METI, MENA, and PROBRA projects.

The Alentejo region is the second leading processing tomato production area in Portugal and the history of its prominence in exporting tomato paste is well known. With the entry of Portugal in 1985-86 into the European Common Market, tomato production in the Alentejo region will become even more important. Tomato paste quality from this district is very good and the climate and soil is ideal for the production of processing tomatoes which makes it very competitive with other Mediterrean tomato production countries such as Spain, France, and Italy.

The lack of rain during the harvesting season is a real advantage. Also, the flood of refugees from Angola and Mozambique after 1974 has relieved the labor shortage which was experienced earlier and labor costs are lower than competitive countries. Fresh market vegetables also now have a new market in the EEC.

Thus, potential horticultural research areas are those related to irrigation methods and management including water consumption, sprinkler and drip irrigation for conservation, salinity, use of plastic mulches, management of plastic greenhouses for protected cultivation, and postharvest studies. All areas related to cultural practices such as fertilizer placement, seed priming, plant densities, and pest management are also potential research areas. Better methods of handling, inspection and shipping are essential for maintaining top quality to compete in the Common Market.

2. Observe and Provide Assistance to the Crop Science Department of the University of Evora

2.1 Research project on mechanization production of tomatoes for processing (METI).

Since 1970, I have followed closely the progress of mechanized production of processing tomatoes in Portugal and particularly in the Alentejo region. The refugee and social situation has changed tremendously the mechanization picture for machine harvest. However, mechanized production methods should continue and have continued. These include research and extension on seedbed preparation, direct seeding and transplanting, fertilizer management, irrigation, chemical weed control, pest management, variety evaluation, seed

priming, growth regulators and ripening agents and bulk handling and fruit inspection.

The research conducted in the METI project has continued to progress and certainly Dr. Carlos Portas and Eng^O Antonio Calado and others who have so faithfully carried on with the project are to be commended for their fine work in this program. Progress reports on several projects in the METI program were presented at the Technical Workshop on Processing Tomatoes held during my visit in Portugal and attendance at the meetings indicated continuing interest in the project. This project should be continued and additional financial support should be made available.

I visited the research plots at Coruche with Antonio Calado and was pleased with those experiments on cultivar evaluation, weed control, direct seeding, fertilization and irrigation. The experiments were well designed and I am confident that meaningful results will be obtained. There were over 110 tomato varieties from various regions of the world in the trials. I do feel this number of entries should begin to be reduced as it is so difficult to manage. Three or four varieties of the top performers should be selected for larger trials with commercial growers and processors.

2.2 Research project on production of melons for market (MENA).

I visited the cultivar evaluation experiments near Villa Franco with Antonio Calado and two extension service technicians from the Ribatejo region. I was impressed with the

number of cultivars and their growth to date. I believe this is a very worthwhile and perhaps the most important part of the MENA project. However, if the results are to be meaningful, careful attention must be paid to irrigation management of the trial. For example, I did note that some rows had only alternate furrow irrigation while others had every row irrigation. This will effect the performance of varieties. Variable cultural factors should be avoided.

The technicians should be commended for the tremendous task in evaluation that is before them. More University and Ministry supervision will be required for this project. Irrigation and fertilizer experiments should be added to the project in the near future. I would also like to recommend that the trials remain in the Ribatejo region as it is a major melon production area. Demonstration trials could be held in other regions with the growers.

2.3 Research project on production of cruciferous plants (PROBRA).

Likewise, I believe this to be a very worthwhile project and recommend its continuance. I also believe and recommend that the research should be done at the Coruche experiment station. Supervision would be enhanced and costs reduced with the work located at Coruche as research technicians are already working there in relation to the METI project. Also transportation costs for supervision from Evora would be minimized with several projects at the same location. Cultivar evalua-

tion is an urgent need of this project. I have forwarded numerous cultivars on several cruciferous from several commercial seed companies in the USA and Europe. These should be evaluated this fall, winter and spring.

3. Introduce Germplasm for Horticultural Crops

Prior to my visit to Portugal, I contacted the plant breeders and international representatives from major seed companies and universities in the USA and informed them of cultivar evaluation trials to be conducted in Portugal in 1985 and 1986 on tomatoes, melons, and crucifers. I requested seed to be sent to Portugal for the trials and am pleased that now several hundred seed samples have been received following this request.

4. Discussion of Irrigation Problems on Tomatoes for Processing

Antonio Calado and I have had very profitable discussions related to the irrigation research work he is supervising at the Coruche experiment station on processing tomatoes. I concur with his experimental design and commend him for the job that he is doing in this respect. Several different varieties are being grown under different water regimes. The information obtained should be very valuable and helpful to the grower in producing higher yields and better quality tomatoes for processors.

Irrigation management is the number one factor in producing tomatoes. Antonio should be encouraged and supported in continuing his irrigation experiments. We visited several commercial fields of tomatoes in the Ribatejo region together and discussed irrigation practices with the growers.

5. Present Three Seminars on Horticultural Vegetable Production and Technology

During my visit, I presented three seminars on the subjects as requested.

- "Systems Approach to Growing Tomatoes for Mechanization in California," presented to students and faculty of horticulture, irrigation, and farm machinery at the University of Evora, June 25, 1985 (30-40 persons attended). Was well received.
- "New Technology Used in the Production of Processing Tomatoes," presented to 200 persons attending the 4th Technical Workshop on Processing Tomatoes at Coruche. Was well received.
- "Agricultural Development Systems Program and Protected Cultivation in Egypt as Relevant to Portugal," presented to Section on Horticulture, Technical University, Lisbon, July 17, 1985. Small but enthusiastic group (8 or 9 persons).

6. Protected Cultivation for Vegetable Crops

Dr. Antonio Monterio, professor, Technical University, Lisbon, has been conducting research for several years related to protected cultivation of vegetable crops. This research has dealt mainly with production in plastic greenhouses and under plastic tunnels. Eng^o Antonio Calado has also conducted experiments in plastic greenhouses at MITRA.

I would like very much to encourage this work as I feel it has major significance to the future of protected cultivation of vegetable crops in Portugal which I consider as a sleeping giant for the production of warm season vegetables during the winter months for export to Europe and other countries. The low construction costs of the greenhouses, operation, and low labor costs make production in Portugal competitive with any country in the world. Distance to the market is another real plus.

This work needs to be vigorously supported in funding and additional staffing. In addition to research, there should be increased emphasis placed on training and extension in this work. The Lourinha and Algarve districts are already making inroads into protected cultivation but other districts are also suited to this type of culture.

IDENTIFICATION OF PROBLEMS AND RECOMMENDATIONS FOR SOLVING THEM

Most of the problems have been identified in the discussion of previous topics. However, additional serious problems do exist in lack of adequate funding for the research projects. These include needs for additional equipment, personnel, and transportation. It was unbelievable that adequate supervision of research work at field stations located away from Evora was lacking because transportation was not available.

In some areas both lack of water and salinity were problems. Drip irrigation can help as well as new salinity tolerant cultivars with some crops such as tomatoes.

More information and technology transfer is needed on the use of plastics, drip irrigation, and protected cultivation. There is also a need for more training in extension and research both at home and abroad. More short courses on various topics are needed for research and extension workers as well as growers and processor fieldmen.

There is a real need for more research and extension in the area of postharvest physiology.

ACKNOWLEDGEMENTS

It is difficult to know where to begin in acknowledging so many people who have been so helpful and wonderful in making my visit to Portugal so enjoyable and successful. It would have been impossible without them. Vivian L. Rider, administrative assistant of the International Programs Office at Purdue University; Maria do Carmo, administrative assistant at Evora University; Rector Ario Azevedo, Dr. Carlos Portas, Eng^o Antonio Calado, Dr. Antonio Monterio and others were so generous with their time and support in making things happen easier. I want to express my deepest appreciation to each of you for your thoughtfulness and assistance. Also, a very special thanks to my counterparts, Dr. Carlos Portas for the use of his automobile during my visit and to Antonio Calado who endured me daily for so much of the time.