PD ABN-086 90923

Peanut Collaborative Research Support Program

Peanut CRSP
The University of Georgia
Georgia Experiment Station
Griffin, Georgia 30223-1797
U.S.A.

United States Agency for International Development

Grant No. DAN-4048-G-00-0041-00

PEANUT

COLLABORATIVE RESEARCH

SUPPORT PROGRAM

THE EXTERNAL EVALUATION PANEL

REPORT FOR THE PEANUT CRSP

1996

Supported by USAID Grant No. DAN-4048-G-00-0041-00
and the Participating U.S. Universities and
Host Country Institutions

PREFACE

The purposes of the 1996 Annual Evaluation of the Peanut Collaborative Research Support Program (Peanut CRSP) are to review and evaluate the accomplishments since the 1994 External Evaluation Panel Report on the Peanut CRSP, and the Peanut CRSP Grant Extension Proposal 1996-2001. These evaluations fulfill the objectives of the External Evaluation Panel (EEP) and provide advice to management and principal investigators on attaining Peanut CRSP goals.

The primary information sources for the evaluation of the research accomplishments since 1994 are the 1995 Annual Report: "Improving Global Production and Use of Peanut for Economic Growth, Human Nutrition, and Environmental Sustainability" of Peanut CRSP, and contacts with individual investigators. Information sources also include the report "The Peanut CRSP, Grant Extension Proposal 1996-2000 ... in a Nutshell ... " and individual presentations of new thrusts in the proposed extension at a Peanut CRSP Meeting held in Griffin, Georgia, May 28-30, 1996.

The review was conducted by Dr. John P. Cherry, Director, Eastern Regional Research Center, ARS, USDA; Dr. C. Milton Coughenour, Emeritus Professor of Rural Sociology, University of Kentucky; Dr. David Hsi, Emeritus Professor of Plant Pathology and Genetics, New Mexico State University; Dr. Robert Schilling, Head, Oil and Protein Development Program, Centre de Cooperation Internationale en Recherche Agronomique pour le Development, France; Dr. Joseph Smartt, Reader in Botany-Biology, University of Southampton, United Kingdom; and Dr. Handy Williamson, Professor and Head, Department of Agricultural Economics and Rural Sociology, University of Tennessee. (Absent was Dr. Bo Bengtsson, Professor in International Crop Production Science, University of Agricultural Sciences, Uppsala, Sweden).

The Scope-of-Work for the Review was as follows:

1. Evaluate past performance of Peanut CRSP.
   (a) Review accomplishments in the 1995 Annual Report.
   (b) Review and rate progress of individual projects over the past five years of the grant.

2. Evaluate the new Peanut CRSP Grant Extension Proposal 1996-2001.
   (a) Examine the global scope, disciplines and constraints based on past accomplishments and EEP recommendations.
   (b) Evaluate structural recommendations, e.g., research results.

3. Make recommendations for future EEPs.
   (a) Number of members and disciplinary make-up.
   (b) Usefulness of results framework in evaluations.
   (c) Lessons learned to pass on to future members.

TABLE OF CONTENTS

INTRODUCTION 1

PROJECT RESEARCH PERFORMANCE 1

TX/BCP/WA

Disease-Resistant Peanut Varieties for Semi-Arid Environments 1

NCS/BCP/TP

Peanut Varietal Improvement for Thailand and the Philippines 1

TX/MM/SG

Mycotoxin Management in Peanut by Prevention of Contamination and Monitoring 2

NCS/IM/TP

Management of Arthropods on Peanut in Southeast Asia 3

GA/PV/N,TP

Peanut Viruses; Etiology, Epidemiology and Nature of Resistance 3

AAMU/FT/BF

An Interdisciplinary Approach to Optimum Food Utility of the Peanut in SAT Africa 4

GA/FT/TP

Appropriate Technology for Storage/Utilization of Peanut 5

GA/PH/CAR

Postharvest Handling Systems for the Small Peanut Producers 5

SUMMARY OF EEP'S RATING OF THE CRSP PROJECTS 7

MANAGEMENT ENTITY (ME) OF PEANUT CRSP 7

FUTURE EEP STRUCTURE 8

REVIEW OF THE GRANT EXTENSION 8

THE CRSP CONCEPT AND ITS IMPLEMENTATION BY PEANUT CRSP 9

RECOMMENDATION 10

PEANUT CRSP 1996 EEP REVIEW

INTRODUCTION

The External Evaluation Panel (EEP) gave high performance ratings to all those involved with the Peanut Collaborative Research Support Program (Peanut CRSP), the Management Entity (ME), Board of Directors (BD), Technical Committee (TC) and especially the Principal Investigators (PI), Co-Principal Investigators (Co-PI), research teams and collaborators, support personnel and cooperating institutions, industries, agencies, missions, etc., for the high quality research work that was accomplished and technologically transferred to users with the allotted funding (see page 7). The plans and goals for the future are impressive and the EEP hopes that the comments or suggestions made in this report are taken constructively; the role of the EEP is to assist the members of Peanut CRSP successfully attain their plans and goals through the external review process.

PROJECT RESEARCH PERFORMANCE

TX/BCP/WA - Disease-Resistant Peanut Varieties for Semi-Arid Environments; Dr. O.D. Smith, Texas A&M University, Dr. P. Sankara, University of Ouagadougou, Burkina Faso, Amadou Ba, ISRA, Senegal, and O. Kodio, IER, Mali, PI's.

The objectives of this difficult and important project cover a broad range of varietal tolerance to diverse bio-environmental stresses that have an important economic impact but do not occur simultaneously nor regularly in all regions of West Africa. It has therefore been necessary in a first exploratory phase, to evaluate diverse tolerant cultivars in different West African regions, and screening for those performing the best under prevailing disease pressures. No artificial infection was used in these trials, so that results depended upon natural inoculum which can be very variable. Moreover, planting conditions in Burkina Faso often led to very variable stands that prevented proper interpretation of results. It should be noted that the Peanut CRSP conducted at the University of Ouagadougou, Burkina Faso, did not develop sufficient coordination with the leafspot tolerance program conducted by other national institutions.

In spite of the shortcomings, satisfactory progress on the program's objectives have been made. The results available should now permit the identification and evaluation of the major pests prevailing in West Africa and to define a varietal ideotype meeting the identified constraint to accordingly orient the subsequent phases of research.

The previous EEP review rating (1994) of this program remains the same for the 1995 report.

NCS/BCP/TP - Peanut Varietal Improvement for Thailand and the Philippines; Dr. T.G. Isleib, North Carolina State University, Dr. A. Patanothai, Khon Kaen University, and Dr. R.M. Abiley, University of the Philippines Los Banos, PI's.

In a very real sense this project breaks new ground, the greater bulk of previous peanut research has been carried out either in warm temperate regions such as the U.S. or in semi-arid tropical environments like India and Africa. These environments have the feature in common that only a single crop is produced annually. In the humid tropics it may be possible to produce the crop at any time of the year. The question then becomes one of some complexity and can be considered in terms of the following:

(a) What is the optimal growing season in terms of yield and pest and disease management?
(b) Is it possible or desirable to produce crops successively in a specific locality?
(c) Is it necessary to select different varieties for production at various times of the year (e.g., pre- or post - rice crop)?
(d) Is it possible to raise levels of yield to those which can be produced in warm temperature or semi-arid tropical conditions?

General concerns which have been addressed are the universal problems of rust, the leafspots and the soil borne pathogens such as Sclerotium rolfsii and aspergilli species. Problems of local and regional interest addressed include Cylindrocladium Blackrot (CBR) in North Carolina, and leafhopper damage in the Philippines and Thailand.

In this project the problems were effectively tackled and good progress was achieved. The breeders in all three institutions are energetically developing and releasing new, improved cultivars. The criticism of this project made in the 1994 review that communication between the scientists in the three locations could have been better has been addressed and the EEP agreed to raise the ratings on implementation and management criteria from 3 to 3.5. It was also considered appropriate to raise the institutional development rating from 4 to 4.2. The excellent rating of the remaining three criteria remained.

TX/MM/SG - Mycotoxin Management in Peanut by Prevention of Contamination and Monitoring; Dr. M.N. Beremand, Texas A&M University, Dr. A. Ba, Institute Senegalese de Recherches Agricoles, Dr. A. Kane, Senegal Institute de Technologie Alimentaire, Dr. R.T. Awuah, University of Science and Technology, Ghana, Ms. K. Kpodo, Food Research Institute, Ghana, PI's.

The EEP compliments the positive interactions developed between the U.S. scientists at Texas A&M University and the Ghana scientists at the University of Science and Technology, and Food Research Institute. The significant accomplishments by the Texas A&M University scientists in the identification of the entire sterigmatacystin (ST) pathway of Aspergillus nidulans are noted.

No activity for 1995 was reported by the Senegal scientists at both the Agricultural Research Institute and Food Technology Institute, thus resulting in slightly lower ratings by the EEP in two criteria, namely achievement of objectives and implementation and management of project, for the program in its entirety.

The EEP, however, gives this collaborative research project the highest possible ratings for the other three criteria, namely institutional development, adequacy of science and technical merit and application of results on the strength of major research accomplishments by the U.S. and Ghana scientists as reported in the 1995 Annual Report.

NCS/IM/TP - Management of Arthropods on Peanut in Southeast Asia; Dr. R.L. Brandenburg, North Carolina State University, Dr. M. Keerati-Kasikorn, Khon Kaen University, Dr. Turnjit Satyavirut, DOA-Thailand, Dr. V. Ocampo, University of the Philippines Los Banos, Dr. E. Cadapan, University of the Philippines Los Banos, PI's.

The goal of effective management of arthropod pests that limit peanut production is very important, and the objectives address the gaps in knowledge for the reduction of pest constraints. The principal conclusion of the 1994 EEP report was that, although substantial progress had been made on the objectives, the extent of accomplishments was disappointing. In large measure, the lack of early progress had been due, the EEP noted, to factors outside the control of the project leadership. The 1995 Annual Report indicates that further significant progress was made on several important objectives such that the EEP has upgraded the earlier evaluation for nearly all aspects of this project.

The EEP especially noted the progress made in identifying disease resistant cultivars, an increase in information regarding insect disease vectors, and of economic thresholds. There is a good complementarity in studies of pest ecology, cultural practices, and biological control. There is evidence of greater in-country collaboration in the Philippines in regional tests of Integrated Pest Management (IPM) strategies. There remains a need to develop a general pest control strategy and further evaluation is needed of the costs of alternative pest control techniques. The EEP believes that the scientific leadership and collaborative relationships, which have been developed in recent years, auger very well for continued significant contributions to this project.

GA/PV/N,TP - Peanut Viruses; Etiology, Epidemiology and Nature of Resistance; Drs. J.W. Demski and Mike Deom, University of Georgia, Dr. P. Olorunju, Institute of Agricultural Research, Nigeria, Dr. S. Wongkaew, Khon Kaen University, PI's.

At first sight, the virus question appears to be one of great complexity since prevalence of viruses and their economic impact varies on a worldwide basis. The major virus problem of Africa, (Groundnut Rosette Virus (GRV) is of no consequence in Asia or America. Peanut Stripe Virus (PStV) is found in North America and Southeast Asia but is more damaging in the latter area. In Asia, Bud Necrosis Virus (PBNV) is very damaging especially in Thailand. It is apparently related to Tomato Spotted Wilt Virus (TSWV) which causes the most serious problem in North America. Interestingly, the universal Peanut Mottle Virus (PMV) is of little economic importance.

Rosette resistance was identified in West Africa over thirty years ago and is being bred into short season varieties which are now needed in Nigeria and the Sahel to cope with climatic change. The quest for virus resistance in peanut has focused strongly on the possibility of transforming them by incorporation of the virus capsid protein gene. This offers real hope of achieving resistance to the major virus pathogens.

The progress made since the inception of this project in the early 1990's has been outstanding. It has been rated excellent on all criteria. The enthusiasm and energy displayed by the U.S. PI was truly remarkable as was the ready and effective collaboration in the host countries. In transforming the peanut it is worth

noting that not one but four different approaches have been employed. This is a tribute to the thorough and energetic approach which was characteristic of Dr. Demski and his co-workers. Hence, in light of the 1995 Report, there is no reason to alter the very high opinion the EEP formed of this report which was rated excellent (5) on all criteria.

AAMU/FT/BF - An Interdisciplinary Approach to Optimum Food Utility of the Peanut in SAT Africa; Dr. M. Elena Castell-Perez, Alabama A&M University, and Dr. A.S. Traore, University of Ouagadougou, Ms. K. Kpodo, Food Research Institute, Ghana, PI's.

The program improves use of peanut for human consumption in Semi-Arid and Tropical West Africa (Burkina Faso, Ghana). The objectives are to increase utilization of peanut in more refined-processed forms; to improve packaging of peanut and peanut products to increase shelf-life; to utilize peanut flour (after oil extraction) to improve protein value of cereal-based foods; and to improve the methods of storage, postharvest handling and inventory management.

Good formulas of weaning foods using maize, sorghum, rice and peanut flours and milk were developed in Burkina Faso. This is helping to solve a nutrition problem with infant weaning foods. The development of optimum package size and material to maintain nutritional and microbiological quality of packaged peanut paste is now a technology that is available in Burkina Faso because of the work at the University of Ouagadougou. This technology is being transferred to a peanut paste factory CITEC-HUILERIE in Bobo Dioulasso. Technologies worked on at Alabama A&M University and the University of Ouagadougou for peanut fortified staple foods, "toe" and "kisra" are developed. Use of extracts from Allium sativum to inhibit aflatoxin formation by Aspergillus flavus are in progress in Burkina Faso and should be strengthened at the University of Science and Technology, Kumasi, Ghana.

In Ghana, the program is new and is identifying the degree of the problems with postharvest handling and aflatoxin contamination in peanut. Work to develop extruded peanut products (including blended foods with sorghum) and determine their nutritional and functional properties is progressing, although slowly. In Ghana, this effort should be strengthened by including blended peanut-cowpea products. No mention of developing extrusion technologies in future studies in Ghana, is presented in the plan of the 1995 Annual Report.

Progress in achieving the objectives (score: 4.5) and their implementation and management (4.5) continues (but needs a stronger commitment to strengthen progress). Institutional development is occurring including efforts to strengthen student (both undergraduate and graduate) programs (score increased from 4.7 to 5.0). Adequacy of the science, its technical merit (4.7) and applicability of science (5.0) are meeting the needs of the industry and consumers. Strong collaboration is in place between the U.S. and host country institutions. Marketing studies need to be strengthened to encourage use of the advancing technologies.

GA/FT/TP - Appropriate Technology for Storage/Utilization of Peanut; Dr. L.R. Beuchat, University of Georgia, Dr. P. Chompreeda, Kasetsart University, Dr. V.V. Garcia, University of the Philippines Los Banos; Dr. L.S. Palomar, Visayas State College of Agriculture, the Philippines, PI's.

The project has achieved the development and transfer of processing technologies to utilize acceptable peanut and peanut products in traditional and new foods in Thailand and the Philippines. This is based on consumer survey responses and intuition-insight to consumer behavior. Marketing studies are underway to ascertain the potential sales of these products. Technology transfer to village scale peanut processors emphasizing housewives in the Kud-Jab and Huay-Bong-Nua village areas of Thailand, linked to the Department of Agriculture and Extension, and Kasetsart University also in two rural areas of Leyte, the Philippines, linked to Visayas State College of Agriculture. Socio-economic surveys are showing a positive impact of these technologies on the families involved in the project. The effectiveness of a mold metabolite from Cladosporium fulum in controlling the growth of aflatoxigenic aspergilli species is enhancing the storage stability of refrigerated peanut.

A 5-week course on "International Quality Evaluation and Utilization of Food Legumes" organized at Kasetsart University, Bangkok, in cooperation with the Department of Technical and Economic Cooperation, Office of Prime Minister, Thai-AID projects, was extremely successful in training personnel from 13 Southeast Asian and neighboring countries. Student graduate and undergraduate programs at institutions in both countries are models for Peanut CRSP. Presentations, conference participation and publications are very impressive supporting the productivity of these researchers.

These achievements scored outstanding ratings of 5 for all evaluation criteria of achieving objectives, implementation and management, institutional development, adequacy of science-technical merit and application of research. Credit goes to the leadership of the Principal Investigators and the team of researchers from U.S. and host countries.

GA/PH/CAR - Postharvest Handling Systems for the Small Peanut Producers; Dr. M.S. Chinnan, University of Georgia, Dr. J. Lindsay and Mr. A.K. Sinha, Caribbean Agricultural Research and Development Institute, Jamaica and Belize, PI's.

This project continued developing a global model for evaluating the acceptability and profitability of peanut postharvest systems. Most notable was to adapt these technologies to the available natural and economic resources and to the areas' existing climatic, socioeconomic, infrastructural, and industrial conditions. The EEP concluded that the project has demonstrated improved performance, especially in 1995.

During the EEP's review in 1994, the assessment, based on achievement of objectives; implementation and management; institutional development; adequacy of science and technical merit; and applicability of research, were: 4.3; 5.0; 4.7; 4.3 and 4.7, respectively. Enhanced recent performance produced

a) increased rating of achievement of objectives to 4.5,
b) adequacy of science to 4.7, and
c) applicability of research to 5.0.

The rationale for those scores is as follows:

(a) In Belize, processes for improving the quality and flavor of locally manufactured peanut butter were developed. Planned training was completed to increase sensitivity to and the ability to test for aflatoxin.

(b) In Jamaica, work with the United Farmers Multipurpose Cooperatives (UFMC) trained personnel on the use of postharvest threshing technology. Marketing, processing and utilization of peanut products and successfully completing a socioeconomic survey which included 60 percent of the farmers in St. Elizabeth Parish were completed.

(c) In the U.S., Georgia continued support of the training component, and development and sharing of six publications and presentations occurred. Two publications covered "CARDI-Payne Extension and Impacts In Jamaica" and "Acceptance And Purchase of Peanut Butter in Belize."

The EEP noted that substantial progress has been made in improving postharvest operations in the Caribbean region. This has been accomplished, in spite of having funds drastically reduced during the last five years. Perhaps the most significant point to note is the project's contribution to the overall Peanut CRSP through the successful execution of surveys and socioeconomic analyses. A foundation has been laid for others to follow, or parallel in the future. Socioeconomic understandings will remain central and crucial to the ultimate and sustained success of all CRSPs.

SUMMARY OF EEP'S RATING OF THE CRSP PROJECTS IN 1994 AND 1996*

A. TX/BCP/WA Disease Resistant Peanut Varieties for Semi-Arid Environments
B. NCS/BCP/TP Peanut Varietal Improvement for Thailand and Philippines
C. TX/MM/S,G Mycotoxin Management of Peanuts by Prevention of Contamination and Monitoring
D. NCS/IM/TP Management of Arthropods on Peanuts in Southeast Asia
E. GA/PV/N,TP Plant Viruses: Etiology Epiolemiology and Nature of Resistance
F. AAMU/FT/BF An Interdisciplinary Approach to Optimum Food Utility of the Peanut in SAT Africa
G. GA/FT/TP Appropriate Technology for Storage/Utilization of Peanut
H. GA/PH/C Postharvest Handling Systems for the Small Peanut Producers

	TX/BCP/WA A	NCS/BCP/TP B	TX/MM/S,G C	NCS/IM/TP D	GA/PV/N,TP E	AAMU/FT/TP F	GA/FT/TP G	GA/PH/C H
1	4.2	5.0	4.3*	4.0*	5.0	4.5	5.0	4.7*
2	4.0	3.0	4.3*	4.5	5.0	4.5	5.0	5.0
3	4.3	4.0	5.0	4.0*	5.0	5.0	5.0	4.7
4	4.3	5.0	5.0	4.0*	5.0	4.7	5.0	4.7*
5	4.0	5.0	5.0	4.2	5.0	5.0	5.0	5.0*

* Scores adjusted from those originally reported in the EEP 1994 (see text for explanation).
1. Achievement of objectives
2. Implementation and Management
3. Institutional Development
4. Adequacy of Science and Technical Merit
5. Application of Research

MANAGEMENT ENTITY (ME) OF PEANUT CRSP

The ME of the Peanut CRSP has given excellent leadership in guiding and coordinating programs since its inception in 1982. The EEP supports the addition of an Associate Program Manager position (first Dr. Keith Ingram and now, Dr. Tim Williams) approved by the USAID because of the increasing responsibilities of this office. The enhanced ME with the help of the Board of Directors, Technical Committee, Principal Investigators, Research Scientists, Expert Panel and EEP has successfully added new constraints and geographical regions in the 5-year extension plan (1996-2001) of Peanut CRSP and in fully exploiting the power of computers, e.g., communication-management tools.

The EEP strongly recommends the continuation of the present structure of the ME consisting of Program Manager, Associate Program Manager, Executive Secretary, and half-time Secretary positions. The EEP

considers one of the strengths contributing to Peanut CRSP's ability to attain its goals is the continuous and dedicated leadership of Dr. David Cummins, Program Manager. He has been Peanut CRSP's only Program Manager assisting in the initial planning of the grant (1980-1982) and leading it since 1982, except for a two-year sabbatical leave in the Philippines (1986-1988).

FUTURE EEP STRUCTURE

The present EEP makes the following recommendations on this subject:

1. The Panel should not exceed seven members to maintain/facilitate discussion and decision-making and control of costs.

2. Members should be highly qualified senior scientists with broad disciplinary competence and international research experience.

3. Coverage of research disciplines/areas rather than representation, should be the guiding principle in selection of EEP candidates with respect to disciplinary and/or regional interest.

4. On occasion, the work of the EEP might be enhanced by addition of regionally-based associates, serving as consultants for specific review tasks.

5. Some continuity of EEP membership is desirable for efficient working of the EEP.

REVIEW OF THE GRANT EXTENSION

The EEP fully supports the "Grant Extension Proposal, 1996-2001, for Peanut CRSP." Especially noted is that most of the recommendations made in the EEP's 1994 Report are incorporated into the new Proposal. Substantial technical and economic advancement has occurred in many host countries because of strong collaborative research programs between U.S. and host country researchers. Appropriate priorities are set for the constraint areas including Aflatoxin Contamination; Production Efficiency; Socioeconomic Forces; Postharvest and Marketing Technologies; and Training, Information and Program Support. The awarded projects cover these five priorities and have strong potential for advancing health and family welfare and value-added industries in both advanced and developing countries.

The EEP noted that the high priority area in its 1994 Report of seed multiplication and distribution in developing countries was not covered. While the Peanut CRSP would not be expected to fund a seed multiplication "industry," it is recommended that research on the organization and efficiency of the seed multiplication and delivery system - its agencies, support groups and producers - be included in the

socioeconomic program. Growth in peanut production is dependent on the timely availability of quality planting seed.

While most constraints to peanut production and utilization are local or regional, some, such as leaf spot, and hand-operated power planting, harvesting, thrashing, shelling, etc., machines are global. The new information technologies may permit development of global strategies for disease control, and pre-, postharvest farming-processing assistance. Additionally, inter-CRSP programs, e.g., Cowpeas, Sorghum-Millet and Soybean, should be strengthened.

Peanut CRSP is applauded for strengthening efforts on socioeconomics and adding new geographic areas to the research program.

The proposed entry of the Peanut CRSP into Eastern Europe is an exciting prospect. Whereas peanut producers on other continents, Asia, Africa, the Americas and Australia have become part of what might be called a global peanut community, those in Europe and the Mediterranean area generally have not. Thirty years ago interest in the peanut crop in Israel and Egypt was probably at its peak from which it has declined into virtual insignificance internationally. However, at the present time interest in the crop has burgeoned in the Eastern Mediterranean, especially Turkey. Bulgaria has had a sustained post-war interest in the crop and could become a focus for re-igniting interest elsewhere in Southeast Europe and the Mediterranean. In the Mediterranean, the crop is or has been of interest on the African shore, Morocco, Algeria, Tunisia, Libya and Egypt. European interest seems fragmentary, cultivation can be seen in Spain (the Balearics for example) and could certainly be successful elsewhere. The limiting factor appears to be water. Where water can be supplied the prospects appear to be very encouraging. Water control by furrow irrigation could ensure crops free from many global diseases (leafspots, rust and aspergilli species) and if more productive cultivars were to be developed, production of excellent quality aflatoxin-free products could reasonably be expected. This would add a significant dimension to involvement with and commitment to the peanut crop - worldwide.

The future plans should allow Peanut CRSP to explore new ventures and leverage additional funds because contacts with support agencies, including Missions, Regional Bureaus and other institutional resources are broadened.

THE CRSP CONCEPT AND ITS IMPLEMENTATION BY PEANUT CRSP

The CRSP concept was extremely imaginative, not to say brilliant, in that it was designed in the first place on the basis that all participants in the program stood to benefit. This not only generated support for CRSP proposals in Congress, but were in tune with the sentiments of the population at large who by and large are sympathetic to the ideals of Third World development. The direct funding at the institutional level minimized misdirection and the existence of an independent EEP to monitor progress has ensured proper accountability.

The psychological approach has also been very perceptive. The host country PI's being cast in the role of collaborators with the U.S. PI being primus inter pares, removed the possibility of those in developing countries perceiving themselves as being patronized. Benefits were clearly reaped by host countries. The perceptions of U.S. scientists were developed and their horizons broadened. In addition, the biological and socioeconomic understandings of all personnel involved were deepened and imaginations enhanced by what was observed and the prospects for future visions enhanced.

In Peanut CRSP, the CRSP ideal was brought to successful fruition by a combination of the quality of both the scientific personnel engaged and the skillful management which kept the program on track without unnecessary interference but with more than adequate support and encouragement. The whole venture has been extraordinarily successful, a startling contrast to the many unsuccessful exercises that have served only to generate despair in those who wish to see the developing world actually develop.

RECOMMENDATION

The EEP strongly recommends that the 5-year extension plan (1996-2001) of Peanut CRSP be fully funded by USAID beginning with the $2.89 million requested for FY 96-97.