

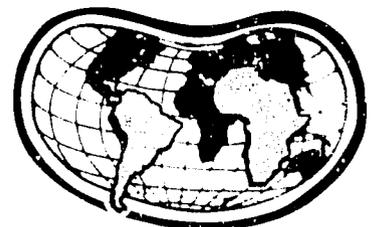
1984 ANNUAL REPORT

part two

*external
review
panel*

THE BEAN/COWPEA
COLLABORATIVE RESEARCH SUPPORT PROGRAM (CRSP)

MICHIGAN STATE UNIVERSITY



1984 REPORT
EXTERNAL EVALUATION PANEL

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(CRSP)

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ACKNOWLEDGEMENTS

The EEP acknowledges with gratitude the cooperation of all US and HC groups associated with the Bean/Cowpea CRSP in providing the necessary materials, making arrangements for in-country travel and meetings, and facilitating the flow of communications and travel that were required for this very complex review.

Special appreciation is extended to the Host Country institutions and government officials, as well as the on-site USAID personnel, who went out of their way to accommodate the requirements of the ERP mission. The success of this effort reflects the extent of their critical cooperation.

The EEP is indebted to the MO for its strong support during the extended, seven-month review process. Without the MO's help with countless details, the review would not have been possible. The Panel was assisted in valuable fashion by Dr. B. L. Pollack, the AID Program Officer for this CRSP, throughout its deliberations during its Annual Meeting in Atlanta. The Panel extends its best wishes to Dr. Pollack as he enters retirement and welcomes Dr. Harvey Hortik.

REPORT OF THE BEAN/COWPEA CRSP EXTERNAL EVALUATION PANEL FOR 1984

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1984

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SUMMARY

This is the third annual evaluation of the Bean/Cowpea CRSP by the External Evaluation Panel. Eighteen research and training collaborative projects on beans (twelve) and cowpeas (six) make up the CRSP. There are no free-standing projects in the US without HC partnerships. These projects involve nine US lead universities, one US research institute, and counterpart institutions/agencies in thirteen cooperating countries. The CRSP has been underway for four years, with its individual projects having been active for two to three and one-half years. While some of the lead universities are responsible for only one project, five US universities have two projects each and one US university has three projects. Some of the projects enjoy the support of more than one US institution; in one such project there are five cooperating US universities. In addition, there are several individual researchers having assignments which cross projects. On both a formal and informal basis, projects test one another's materials and individuals act as advisors to one another, offering different disciplinary perspectives. These relationships are increasing, even cross-nationally, as a result of the successes of individual projects and the rotating involvement of project researchers on the Technical Committee.

The 1984 External Evaluation of the Bean/Cowpea CRSP began in June 1984 and ended in January 1985. In contrast to 1983 when each overseas CRSP site was visited, 1984 EEP site visits were mainly to US lead institutions. Visits to collaborating overseas institutions were limited to those whose activities required special attention and support. The Annual EEP Meeting was held in Atlanta, Georgia, January 6-10, 1985, where reports of these site visits were reviewed along with CRSP technical reports and Management Office reports. Of the eighteen projects, ten were rated satisfactory for continuation without major changes or adjustments. Five were judged satisfactory for continuation with identified changes or adjustments. Two were recommended to be restructured and one was recommended to be phased-out in 1985.

As in the past, the EEP considered the overall management of the CRSP, with special regard to the performance of the CRSP Management Office. The Management Office is firmly based in and adequately supported by the management structure of Michigan State University. The EEP is much impressed with the devotion,

industry and competence of the staff of the Management Office and with the remarkably wide range of tasks which they perform effectively. The Panel recommends that the Management Office be strengthened by making the post of Deputy Director, now half-time, full-time and by adding a full-time typing position. The Panel noted that no external audit has been conducted on CRSP activities, either in the US or abroad.

In the first years of this CRSP, the EEP has directed attention mainly to individual CRSP projects. This has been done and the Panel judges that with several noted exceptions, CRSP projects are well-established and progressing satisfactorily towards the accomplishment of their objectives. Notwithstanding these individual CRSP achievements, the Panel recognizes the need to move to consideration of the global impact of the Bean/Cowpea CRSP, with special attention given to its place in existing national and international arrangements for bean and cowpea research. Several "first approximations" on the status of specific topics were volunteered by EEP members during the Atlanta meeting and are included in this report. More thorough and comprehensive evaluations of such topics will be prepared in the future.

A principal shortcoming of the CRSP is that its potential for becoming a key component of the existing (and evolving) international research system for beans and cowpeas is not being exploited fully. Opportunities for regional and global networks and interactions between and among CRSP projects in Africa and Central and South America exist but will languish unless necessary specific program arrangements are made.

Figure 1. The Bean/Cowpea CRSP Organizational Chart

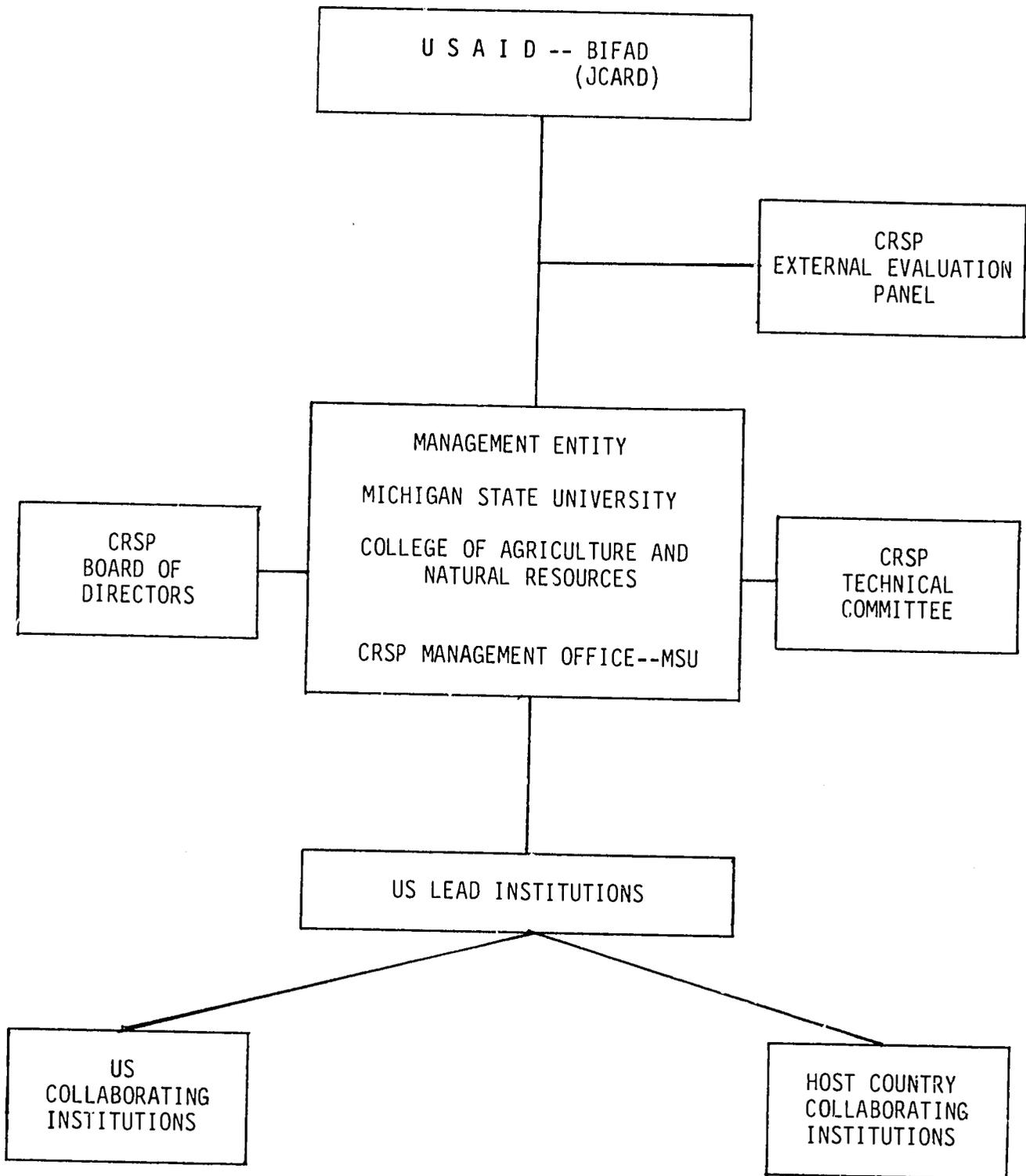


Figure 2. Location of Collaborating Institutions in the United States and Collaborating Host Countries in Latin America.

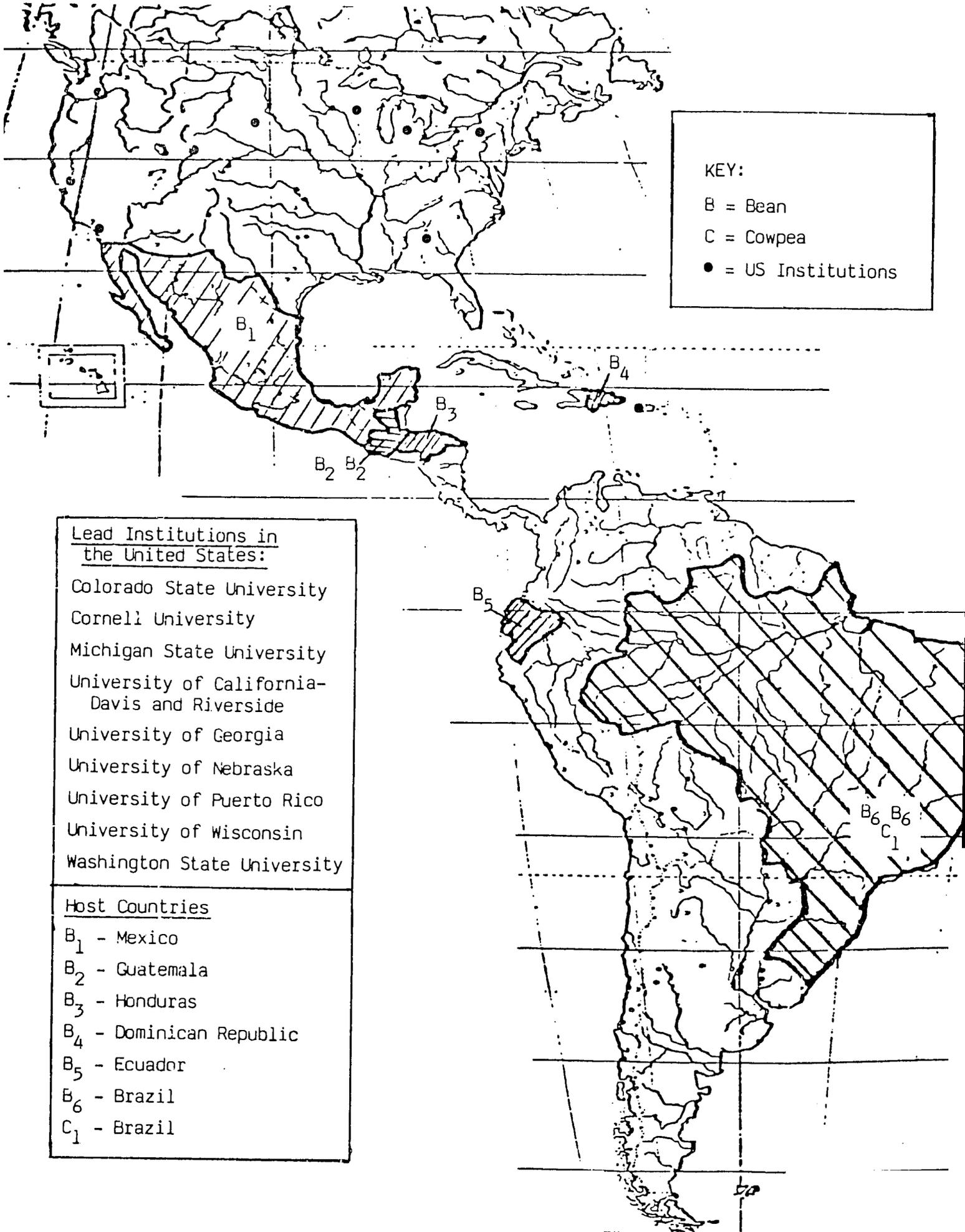
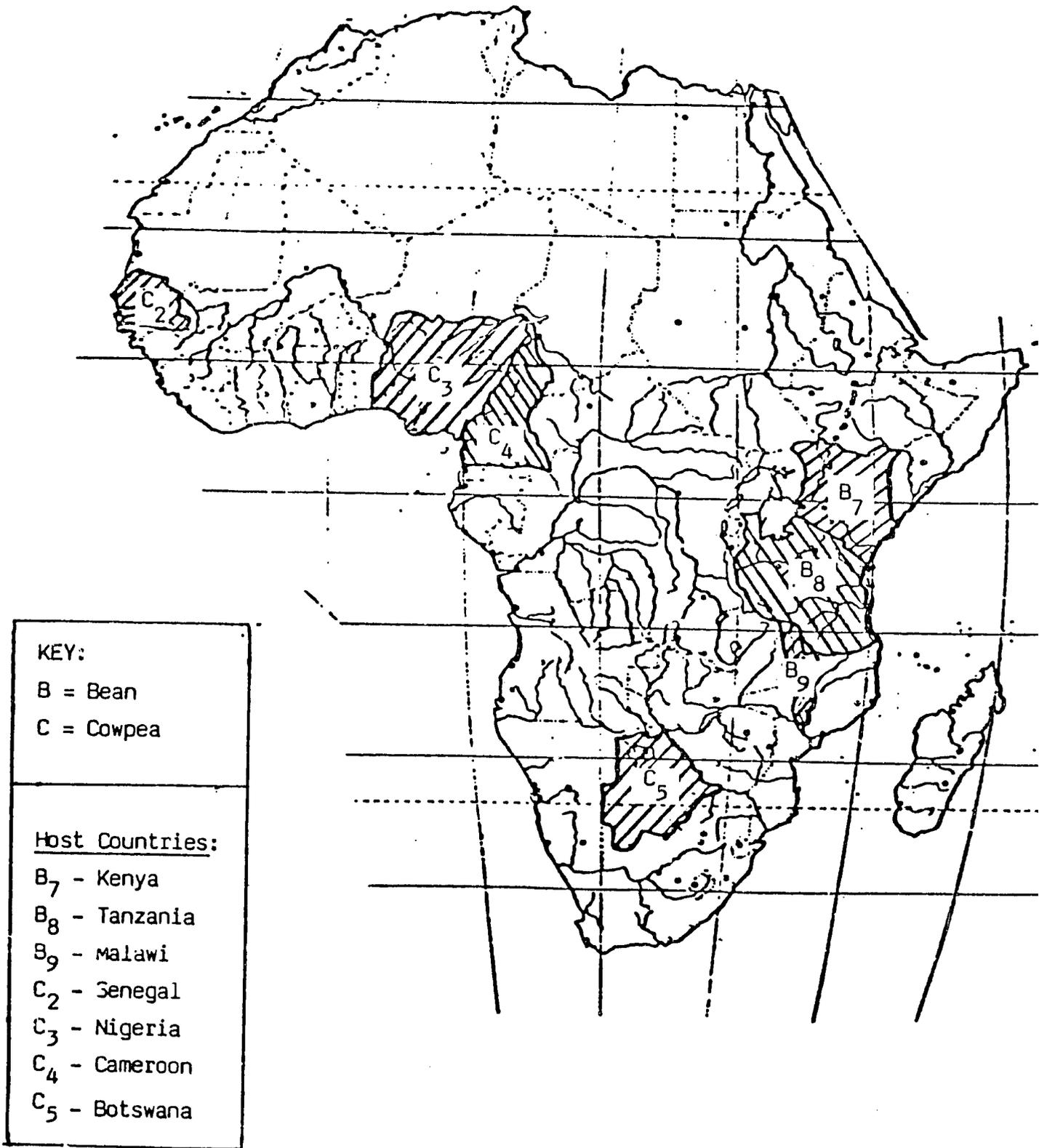


Figure 3. Location of Collaborating Host Countries in Africa.



BEAN/COWPEA CRSP PROJECT INSTITUTIONAL ROSTER

Host Country Institution

Lead US Institution

Ministry of Agriculture
Development of Integrated Cowpea Production
Systems in Semiarid Botswana

BOTSWANA

Colorado State University

Empresa Brasileira de Pesquisa
Agropecuária (EMBRAPA)
Insect Pathogens in Cowpea Pest Management
Systems for Developing Nations

BRAZIL

Boyce Thompson Institute

EMBRAPA
Identification of Superior Bean-Rhizobia
Combinations and Utilization in Cropping
Systems Suitable for Small Farms in Brazil

BRAZIL

University of Wisconsin

EMBRAPA
Improved Techniques for Development of Multiple
Disease Resistance in Phaseolus vulgaris L.

BRAZIL

University of Wisconsin

L'Institut de Recherche
Agronomique au Cameroun
Pest Management Strategies for Optimizing
Cowpea Yields in Cameroon

CAMEROON

University of Georgia

Secretaría de Estado de Agricultura
Biology, Epidemiology, Genetics and Breeding
for Resistance to Bacterial and Rust Pathogens
of Beans (Phaseolus vulgaris L.)

DOMINICAN REPUBLIC

University of Nebraska

DOMINICAN REPUBLIC
Secretaría de Estado de Agricultura University of Puerto Rico

Improvement of Bean Production in the
Dominican Republic through Breeding for
Multiple Disease Resistance in the
Preferred Standard Cultivars

ECUADOR
Instituto Nacional de Investigaciones Agropecuarias (INIAP) Cornell University

Agronomic, Sociological and Genetic
Aspects of Bean Yield and Adaptation

GUATEMALA
Instituto de Ciencias y Tecnología Agrícola (ICTA) Cornell University

Agronomic, Sociological and Genetic
Aspects of Bean Yield and Adaptation

HONDURAS
Escuela Agrícola Panamericana (EAP) University of Puerto Rico

Improvement of Bean Production in Honduras
through Breeding for Multiple Disease Resistance

INCAP
Institute of Nutrition of Central America and Panama (INCAP) Washington State University

Improved Biological Utilization
and Availability of Dry Beans

KENYA
University of Nairobi, Kabete University of California, Davis

Improvement of Drought and Heat Tolerance
of Disease Resistant Beans in Semiarid
Regions of Kenya

MALAWI

Bunda College of Agriculture

Michigan State University

Genetic, Agronomic and Socio-Cultural Analysis of
Diversity among Bean Landraces in Malawi

MEXICO

Instituto Nacional de Investigaciones
Agrícolas (INIA)

Michigan State University

Improving Resistance to Environmental Stress in
Beans through Genetic Selection for Carbohydrate
Partitioning and Efficiency of Biological
Nitrogen Fixation

NIGERIA

Ibadan University
University of Jos

Michigan State University

Medical Aspects of Feeding Cowpeas to Children

NIGERIA

University of Nigeria, Nsukka

University of Georgia

Appropriate Technology for Cowpea Preservation
and Processing and a Study of Its Socio-Economic
Impact on Rural Populations in Nigeria

SENEGAL

Institut Sènégalais de
Recherches Agricoles (ISRA)

University of California-
Riverside

A Program to Develop Improved Cowpea Cultivars
for Production and Utilization in Semiarid Zones

TANZANIA

Sokoine University of Agriculture,
Morogoro

Washington State University

Breeding Beans for Disease and Insect Resistance
and Determination of Economic Impact on
Smallholder Farm Families

THE 1984 REVIEW PROCESS

The 1984 External Evaluation process was governed primarily by results of the Bean/Cowpea CRSP Three-Year Extension Review conducted by the JCARD Panel on CRSPs and the Agricultural Sector Council Sub-Committee on Cereal Grains and Legumes on May 22, 1984. That review recommended continuation of funding for the overall CRSP beyond FY 85. Because of the need to permit individual CRSP projects to operate an additional year, recommendations for extensions of funding were to depend largely upon the 1984 EEP evaluations. The 1984 process therefore was guided by the specific need to make follow-up reviews at the Host Country and US sites of troubled projects, as well as at all US sites. These were accomplished with strong support from Host Country, USAID Mission and/or US Embassy personnel and the Management Office.

Visits to the US and Host Country sites began in June 1984. This review process continued intermittently until December and culminated in the Annual Meeting held in Atlanta January 6-10, 1985. As in previous reviews, final evaluations were based on discussions of site visits, technical reports prepared by CRSP Principal Investigators and other reports and information supplied by the Management Office. Management Office representatives and AID/Washington program officers provided needed background information, clarifications and useful perspectives of USAID and BIFAD procedures, interests and policies regarding the CRSP.

PROJECT EVALUATION REPORTING METHODS

Following the EEP Annual Meeting, a draft report was prepared by the EEP Chairperson with assistance from the MO and distributed to the members for their changes and approval. A final draft was reviewed and approved by the Chairperson.

Project Evaluation Scales

Each project was assessed in seven categories. These categories are related to the in-country review protocol agreed upon at the beginning of the process. The categories are as follows:

1. Administration of Project
 - 1.1 Host Country
 - 1.2 United States
 - 1.3 AID
 - 1.4 Interaction
2. Technical Personnel
 - 2.1 Host Country
 - 2.2 United States
 - 2.3 Collaboration
3. Project Progress
 - 3.1 Log Frame/Consistency of Objectives with Activities
 - 3.2 Achievement of Natural Science Objectives
 - 3.3 Achievement of Social Science Objectives
 - 3.4 Achievement of Training Objectives
 - 3.5 Publications/Information Dissemination
 - 3.6 Food and Nutritional Component
 - 3.7 Consideration of Women in Development (WID) Issues
 - 3.8 Application to Systems Used by Small Farmers
 - 3.9 Contribution to Development in the Host Country
4. Linkages
 - 4.1 Host Country
 - 4.2 AID Projects
 - 4.3 International
5. Overall Major Project Strengths/Deficiencies
 - AID Mission Involvement
 - Host Country and US Commitment
 - 5.1 Strengths
 - 5.2 Deficiencies

6. Response to Prior EEP Project Recommendations
7. Overall Recommendation Rating

The items within each of the seven categories were assessed using the scales presented below.

Overall Recommendation Rating:

General project performance was considered with each project receiving one of four recommendations: #1 continuation with no major changes, #2 continuation with some changes recommended, and #3 restructure (involves major changes in activities, including termination and/or addition of activities) and #4 phase out (termination by the end of FY 85).

Five-Point Category Evaluation Scale (for items 1-3.8, 4 and 6):

Within a project each category was judged to be either Exceptional (E), Highly Satisfactory (HS), Satisfactory (S), Less than Satisfactory (LS), or Unacceptable (UA). In some cases a specific criterion was not applicable and thus was rated Not Applicable (NA).

Contribution to Development in the Host Country (for item 3.9):

Evolving development potential was evaluated on the basis of Limited (L), Potentially Limited (PL), Potentially Important (PoI), Potentially Useful (PU), Already Important (AI), Highly Promising (HP), Long-Term Potential (LTP), and Beginning to Show Potential Worldwide Significance (WW).

Overall Major Project Strengths/Deficiencies (for item 5):

Brief descriptive statements included in texts of Project Evaluation Profiles.

GLOSSARY OF ACRONYMS

AI	Already Important
ATIP	Agricultural Technology Improvement Project
BIFAD	Board for International Food and Agricultural Development
BNF	Biological Nitrogen Fixation
BOD	Board of Directors
BTI	Boyce Thompson Institute
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (International Center of Tropical Agriculture)
CNPAF	Centro Nacional de Pesquisa de Arroz e Feijao (National Center of Research for Rice and Beans)
CRSP	Collaborative Research Support Program
DR	Dominican Republic
E	Exceptional
EAP	Escuela Agrícola Panamericana (Pan-American Agricultural School)
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária (Brazilian Enterprise for Agricultural Research)
EEP	External Evaluation Panel
HC	Host Country
HS	Highly Satisfactory
ICTA	Instituto de Ciencias y Tecnología Agrícola (Institute of Agricultural Science and Technology)
IICA	Instituto Interamericano de Ciencias Agrícola
IITA	International Institute of Tropical Agriculture
INCAP	Instituto de Nutrición de Centroamerica y Panamá (Institute of Nutrition of Central America and Panama)
INIA	Instituto Nacional de Investigaciones Agrícolas (National Institute of Agricultural Investigations)
INIAP	Instituto Nacional de Investigaciones Agropecuárias (National Institute of Agricultural Investigations)
IRA	Institut de la Recherche Agronomique au Cameroun
ISRA	Institut Sênégalais de Recherches Agricoles (Senegalese Institute of Agricultural Research)
JCARD	Joint Committee for Agricultural Research and Development
LS	Less than Satisfactory
LTP	Long-Term Potential
MO	Management Office
NA	Not Applicable
PCCMCA	Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios (Central American Cooperative Program for the Improvement of Food Crops)
PI	Principal Investigator
PU	Potentially Useful
PoI	Potentially Important
S	Satisfactory
SAFGRAD	Semiarid Food Grain Research and Development Project
SEA	Secretaria de Estado de Agricultura
SODECOTON	Cotton production cooperative in Cameroon
TC	Technical Committee
UPR	University of Puerto Rico
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WID	Women in Development

PROJECT EVALUATION PROFILE

BOTSWANA • COLORADO STATE UNIVERSITY (Initiated July 1982)
deMooy

Development of Integrated Cowpea Production Systems in Semiarid Botswana

RECOMMENDATION RATING: 1

REVIEW:

Facing the situation of very limited and unpredictable rains, the main objectives of this project are (1) to devise tillage and planting practices which will allow the planting of cowpeas immediately when sufficient rain has fallen and (2) to produce varieties adapted to the conditions of the country, including very low input requirements.

This project continues to be dynamic and is increasingly being integrated into the national agricultural research and extension programs in Botswana. There is increasing collaboration with the ATIP project which conducted a baseline survey for the CRSP in two areas, analyzed the data and wrote reports and is beginning to test technology coming from the CRSP. These activities will increase as the ATIP puts relatively less emphasis on multiple visit surveys and more on field trials. Continued efforts in enhancing this relationship will improve the research/validation/extension methodology for all agricultural commodities in Botswana. Additional baseline information was obtained from within the project and from other sources.

A CRSP screening trial verified that the early, erect variety ER₇ was superior under Botswana conditions. It was subsequently released by the Government of Botswana and created a great deal of enthusiasm. Continued attention to improvement of cultivars similar to ER₇ and research on the technique of blending cultivars to provide multi-purpose products (leaves for human consumption, forage for livestock and grain) should be encouraged. Implements, adapted by the CRSP in cooperation with the engineering department of the DAR, to facilitate planting are ready for testing. The collection of germplasm has grown to 700 lines collected in Botswana. The project should immediately address the slow progress made in training Botswanan personnel. The research is satisfactory and should continue without major changes.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-S
Interaction-S
2. Technical Personnel
Host Country-LS
United States-HS
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-E
Achievement of Social Science Objectives-S
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-LS
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-E
AID Projects-S
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

BRAZIL • BOYCE THOMPSON INSTITUTE (Initiated October 1981)
Roberts

Insect Pathogens in Cowpea Pest Management Systems for Developing Nations

RECOMMENDATION RATING: 1

REVIEW:

The principal problem with this project identified in the 1983 annual review--the lack of a working research counterpart PI--has been solved. Mr. Bonifacio P. Magalhaes has been named as the Brazilian Principal Investigator. However, more depth of professional staff is needed in Brazil, especially in cowpea entomology and insect pathology.

Noteworthy progress continues to be made in this project. More than fifty new pathogen isolates were discovered in Brazil in 1984. Considerable progress was made in the establishment of cowpea pest colonies there. The screening and development of biological assays of entomopathogenic fungi and bacteria against cowpea pests continued. The information gathering process was started on the ecology and epizootiology of mycoses of cowpea pests. Screenhouse and field trials were conducted at CNPAF of EMBRAPA and in Northern Brazil with selected insect pathogens. Research continued on the small-scale production and formulation of other insect pathogens for use in field trials. Suffice it to say, the activities of the project were appropriate to its goals.

While the first experiments at Goiania have been very promising, the development phase has not yet yielded usable results. In fact, no cowpea insects have yet been controlled by pathogens on a substantial scale in Brazil and, indeed, considerable time may well be required before that happens. However, the fact that *Metarrhizium* is already used commercially to control spittle bugs in sugar cane in Brazil suggests the economic potential of this approach to pest management.

The training program has been quite productive. A week-long course on insect pathology and microbial control was offered in Brazil for twenty post-graduate scientists. In conjunction with other training programs at CNPAF,

thirty-five additional scientists received one day of training. Further, three research interns were trained for three months or more at CNPAF. The Brazilian PI studied for five weeks in the US. In addition, the project is sponsoring M.S. training for four other participants. Finally, the potential for training in this project should be viewed as being considerable in the future. CNPAF could become a world-wide center for training on insect pathogens in cowpea pest management systems.

The project continues to hold promise for the agricultural sectors of developing countries, especially their low income farmers. However, it is in its research phase and has not yet reached the development phase. Hence, its progress can be applauded but success cannot be confidently forecast.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-HS
Interaction-HS
2. Technical Personnel
Host Country-S
United States-E
Collaboration-S
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-E
Achievement of Social Science Objectives-NA
Achievement of Training Objectives-HS
Publications/Information Dissemination-S
Food and Nutritional Component-NA
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-PU
4. Linkages
Host Country-S
AID Projects-NA
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

BRAZIL • UNIVERSITY OF WISCONSIN (Initiated February 1982)
Bliss

Identification of Superior Bean-Rhizobia Combinations and
Utilization in Cropping Systems Suitable to Small Farms in Brazil

RECOMMENDATION RATING: 1

REVIEW:

This project aims at developing superior common bean varieties capable of enhanced biological nitrogen fixation and at identifying superior strains of Rhizobium phaseoli, in an effort to reduce the need for supplemental nitrogen fertilizer in different bean farming systems. It is being developed in the Department of Horticulture at the University of Wisconsin-Madison in the US and in the CNPAF of EMBRAPA in Brazil. It also involves the Department of Microbiology and Public Health of Michigan State University, East Lansing, Michigan. It enjoys excellent back-up support and interest at all three institutions. The communication between the US and Brazilian teams is highly satisfactory.

Both superior bean selections and more effective strains of Rhizobium phaseoli have been identified, paving the way to higher bean yields at lower production costs. At the same time, cropping practices which seem to further enhance biological N₂ fixation are being assessed.

The project will produce its first Brazilian graduate at the M.S. level by the summer of 1985. It is providing graduate training to another student from the Tanzania/Washington State University/Silbernagel CRSP bean project. It also has given non-degree training to two participants from Brazil and to two more from other countries. In response to previous EEP recommendations, it is addressing the role of WID in both its US and Brazilian components and is accelerating the transfer of technology to small farmer systems in Brazil.

The project is satisfactory for continuation without major adjustments.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-HS
Interaction-HS
2. Technical Personnel
Host Country-S
United States-E
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-E
Achievement of Social Science Objectives-NA
Achievement of Training Objectives-S
Publications/Information Dissemination-S
Food and Nutritional Component-NA
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-E
AID Projects-NA
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

BRAZIL • UNIVERSITY OF WISCONSIN
Maxwell

Improved Techniques for Development of Multiple Disease Resistance in Phaseolus vulgaris L.

RECOMMENDATION RATING: 2

REVIEW:

This project is set up to develop improved technology and methodology for achieving multiple disease resistance in beans. Institutionally it is now strongly supported by both the University of Wisconsin-Madison and the CNPAF of EMBRAPA in Brazil. Adjusting to recommendations from the EEP, an External Evaluation Panel of Plant Pathologists and the Technical Committee, the project is stressing the development of reliable and efficient field and greenhouse methods to identify and breed for resistance to four (instead of six) major bean pathogens in the US and Brazil.

New PIs have taken over the program management of the project at the US and Brazilian sites. The US and Brazilian research teams are showing strong common interest in the development of improved methodologies to breed for multiple disease resistance in beans. The Brazilian team has been technically reinforced with the placement of a US resident scientist at CNPAF. Communications and joint management of the project have notably improved.

With those changes, the overall bean program at CNPAF stands to benefit, but this requires resolute and sustained efforts to accelerate and deepen the training of Brazilian participants at the graduate (M.S. and Ph.D.) as well as the informal (non-degree) levels.

The project should be continued under monitoring to insure actual implementation of recommended changes now in process.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-HS
Interaction-S

2. Technical Personnel
Host Country-S
United States-HS
Collaboration-S

3. Project Progress
 - Log Frame/Consistency of Objectives with Activities-S
 - Achievement of Natural Science Objectives-S
 - Achievement of Social Science Objectives-NA
 - Achievement of Training Objectives-LS
 - Publications/Information Dissemination-S
 - Food and Nutritional Component-NA
 - Consideration of WID Issues-S
 - Application to Systems Used by Small Farmers-PU
 - Contribution to Development in the Host Country-PoI
4. Linkages
 - Host Country-S
 - AID Projects-NA
 - International-S
5. Overall Major Project Strengths/Deficiencies
 - See text above
6. Response to Prior EEP Project Recommendations-E

PROJECT EVALUATION PROFILE

CAMEROON • UNIVERSITY OF GEORGIA (Initiated September 1981)
Chalfant

Pest Management Strategies for Optimizing Cowpea Yields in Cameroon

RECOMMENDATION RATING: 2

REVIEW:

A major, active cowpea insect research program has been developed in northern Cameroon in cooperation with the IRA. The goal is to develop methods for optimizing yield and quality of cowpeas through pest management research. Major insect pests have been identified (e.g., aphids and bruchids together account for large pre- and post-harvest losses) and increasing yields resulted when 0, 1, 2 and 3 chemical treatments were applied in the field. Because the parastatal SODECOTON has introduced the use of insecticides in production of cotton, IRA personnel are convinced that farmers in the area are likely to adopt the use of chemicals for other crops. The EEP, nevertheless, urges that attention be given to non-chemical control of insects both in the field and during storage.

Date of planting, plant density and selection of cultivars with resistance to insect pests affect yields. For one cultivar, 3236, recommendations for production have been supplied to SODECOTON, which has been given a mandate to serve as an extension service for food crops. This cultivar also yields well when intercropped with sorghum S-35. Storage studies, using both traditional and modern methods, were added to the research program in FY 84 and will be continued.

This project has been integrated into IRA's research program at the Maroua Center and considerable support has been provided, e.g., laboratory and office space, land and land preparation for field tests, vehicles for transportation, technicians and housing for one of the research counterparts. A HC PI has been identified by IRA; however, in-service training for technicians at Maroua and short-course training at IITA plus one student studying for a Master's degree at the University of Georgia will provide only minimal increase in research capability in Cameroon. Candidates for advanced study of entomology, agronomy, plant breeding, food technology or other related subjects should be nominated promptly.

Research has been initiated at Boyce Thompson Institute on basic biology of Callosobruchus, the serious storage pest, and on the aphid A. Craccivora. Identification of substances that modify insect behavior may lead to practical procedures for pest management.

The EEP concluded that most of this project's deficiencies have been corrected and judged it is satisfactory for continuation with the recommendation that greater efforts be expended to identify Cameroonians for advanced study.

SUMMARY:

1. Administration of Project
Host Country-S
United States-S
AID-S
Interaction-S
2. Technical Personnel
Host Country-S
United States-HS
Collaboration-S
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-LS
Publications/Information Dissemination-S
Food and Nutritional Component-NA
Consideration of WID Issues-LS
Application to Systems Used by Small Farmers-S
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-HS
AID Projects-HS
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

DOMINICAN REPUBLIC • UNIVERSITY OF NEBRASKA (Initiated June 1981)
Coyne

Biology, Epidemiology, Genetics and Breeding for Resistance
to Bacterial and Rust Pathogens of Beans (Phaseolus vulgaris L.)

RECOMMENDATION RATING: 1

REVIEW:

Bacterial and rust diseases of dry beans are a major constraint for both yield and seed quality of this important food crop in the Dominican Republic. Low cost technology is needed to solve these problems for the benefit of poor, small farm producers. Resistance to rust and common blight pathogens has not been stable. This project is (1) identifying pathogen strain variation and resistant germplasm and (2) determining genetic information and strategy that will lead to incorporation of greater amounts of stable resistance to bacterial and rust pathogens.

Significant findings include: (1) the reaction of leaves and pods to common blight were inherited quantitatively and different genes were involved in controlling the reaction in different plant parts; (2) a genotype x isolate interaction to common blight indicates the lines should be tested with a wide array of isolates to identify lines with broad resistance; (3) although several lines were resistant to blight in Nebraska, two were susceptible in the Dominican Republic; subsequent studies indicated that photoperiod differences in the two sites explained the increased susceptibility; (4) resistance to strains of rust were determined by two major genes in Pompadour Checa, a red mottled dry bean; and (5) no association has been detected between reactions of pathogens causing rust and blight.

Baseline survey data in the Dominican Republic indicated that abiotic and biotic stresses (insects, diseases) were the most important constraints affecting production. Research in this project is related to some of the most important biotic stresses and complements the breeding for multiple disease resistance approach used in the DR/UPR/Beaver project.

When the HC PI was replaced in FY 84, no discernible change in collaboration occurred. In addition to an especially competent research team at Nebraska, strong support and encouragement for the project are provided

both by the University of Nebraska and by the Ministry of Agriculture's research program in the DR.

Attention was given to EEP recommendations in the past year, and the EEP has found no serious weaknesses in this project; therefore, the project is satisfactory for continuation without major changes or adjustments.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-S
Interaction-HS
2. Technical Personnel
Host Country-S
United States-HS
Collaboration-E
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-NA
Consideration of WID Issues-HS
Application to Systems Used by Small Farmers-PoI
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-S
AID Projects-NA
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

DOMINICAN REPUBLIC • UNIVERSITY OF PUERTO RICO (Initiated June 1981)
Beaver

Improvement of Bean Production in the Dominican Republic Through
Breeding for Multiple Disease Resistance in the Preferred Standard Cultivars

RECOMMENDATION RATING: 1

REVIEW:

The goal of this project is to produce cultivars with multiple disease resistance and with physical and sensory characteristics preferred by consumers. Cultivars developed and tested at Mayagüez before the Bean/Cowpea CRSP was initiated provided materials that could be grown in the DR soon after this project began. Five cultivars (two kidney bean lines, two navy bean lines and one brown dry bean line) have been resistant or highly resistant to root rots, a serious problem in both Puerto Rico and the Dominican Republic. They also are resistant to bean common mosaic virus and rust races in Puerto Rico. The HC and US PIs both agree that plant breeding activities should be added in the DR, e.g., multiple disease resistant cultivars should be crossed with the Pompadour bean. In addition to developing genetic resources to control yield losses due to diseases, consideration will be given to management practices such as crop rotation and intercropping. The baseline data on traditional farming practices will be used to design these experiments.

Communication by telephone and travel by air between Puerto Rico and the DR are easy; consequently, coordination and consultation can occur frequently. The US PI was replaced during FY 84 without any loss of momentum; the HC PI was also replaced without causing any problems in continuity. In fact, the new HC PI has been connected with the bean research program in the DR for a long time; he also brings a particular interest in examining problems associated with production of high quality foundation seed.

This project and that at the University of Nebraska are complementary and exhibit effective collaboration across projects and PIs. Within the CRSP, cooperation also occurs with projects at Michigan State, Cornell and Wisconsin. Potentially, a combination of enhanced BNF and multiple disease resistance could be achieved by exchanging germplasm between Dr. Bliss at Wisconsin and

Dr. Beaver at Puerto Rico. Because of the importance of root rot resistance in Puerto Rico and the DR, cooperation with Dr. Silbernagel at Prosser, Washington, may be useful because he has been screening bean cultivars for resistance to root rots.

With respect to training, consideration should be given to selecting individuals interested in plant breeding and other areas needed in the DR for development of a well-rounded team of researchers. The EEP did not find any apparent weaknesses in the research program being conducted and therefore judged that this project is satisfactory for continuation without major changes/adjustments.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-S
Interaction-E
2. Technical Personnel
Host Country-S
United States-HS
Collaboration-E
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-S
Consideration of WID Issues-HS
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-AI
4. Linkages
Host Country-S
AID Projects-NA
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

ECUADOR • CORNELL UNIVERSITY (Initiated September 1981)
Wallace

Agronomic, Sociological and Genetic Aspects of Bean Yield and Adaptation

RECOMMENDATION RATING: Restructure

REVIEW:

The sociological research work conducted in the Pimampiro area in 1982 and 1983 identified some agronomic constraints for increased production of beans by small farmers in this region. These problems are being addressed by the grain legume program of INIAP in collaboration with the CRSP personnel. Experiments on crop management that include fertilization and planting densities were designed and conducted in farmers' fields in two growing seasons of 1984. A cultivar test to study the performance of bean varieties at different locations was also planted. This experiment was intended to prepare for a more elaborate research study of the effects of temperature on the adaptation of bean genotypes in tropical environments.

The experience gained in the highlands of Pimampiro has stimulated the interest of the sociology team to develop surveys in lowland areas of the province of Manabi where other grain legume crops, mainly cowpeas and lima beans, are intercropped with maize and produced for consumption at the farm level. The farming systems research team of INIAP has joined in this effort. The initial work in the new study zone has resulted in the collection of 155 landraces of food legumes for evaluation and characterization in future studies by the agronomy research team.

The EEP is pleased with the response to its recommendations to post one agronomist and one sociologist to work in Ecuador on a full-time basis. The proposed plan to conduct research work in Manabi on food legume species different from the common bean, Phaseolus vulgaris, implies a major change of the program goal of this CRSP; and a new Log Framework matrix to include beans and cowpea research should, therefore, be submitted for approval.

The research work conducted in Pimampiro is consistent with objectives of the project, but the proposed plan to work in this area on seed storage and other constraints already addressed by other projects in the CRSP should be conducted by INIAP and not by the CRSP personnel. The EEP notes the lack of a plan for the physiological genetics research work in 1985 and concurs that this component should be terminated in Ecuador.

In view of the above considerations, the EEP cannot provide an evaluation profile for this project.

PROJECT EVALUATION PROFILE

GUATEMALA • CORNELL UNIVERSITY (Initiated September 1981)
Wallace

Agronomic, Sociological and Genetic Aspects of Bean Yield and Adaptation

RECOMMENDATION RATING: Restructure

REVIEW:

Building on ICTA's recognized strength in utilizing an integrated socio-economic/biological approach to technology development, highly satisfactory progress continues to be made toward achieving the natural science objectives of this project. Ten black seeded bush cultivars, representing the range of adaptation classes of Guatemala, were grown at elevations of 50 to 2,400 meters with mean temperatures of 26° to 12° C, the range of temperatures at which beans can be grown in the tropics. Results showed that in the tropics, to the contrary of temperate zones, it is temperature, with a lesser effect of day-length, that influences the action of the genes to alter time of flowering, adaptation and yield. These physiological/genetic findings enhance the possibility of breeding for adaptation, improved architecture and increased bean production in the lowlands. In the highlands, these findings enhance the possibility of breeding disease resistant cultivars with higher bean yield and less maize yield reduction when these two crops are grown together. There is obvious worldwide potential from these results.

ICTA contributed to the sociological/agronomic objectives by augmenting the personnel participating in its ongoing activities in order to provide greater emphasis to beans in the Chimaltenango area. Although adjustments were made in US personnel and project objectives were modified in response to concerns of the EEP, many problems remain in the sociological component. Communication problems exist between the US Co-PI who speaks no Spanish and the HC Co-PI who speaks no English. A bilingual administrator hired by the project has facilitated communication to some extent as has the short-term and proposed longer-term bilingual American epidemiologist/sociologist located in Guatemala. However, these are not substitutes for adequate direct communication between PIs.

During 1984, one additional factor has further limited the capabilities of the CRSP to work effectively with the socio-economic unit of ICTA. Concern at Cornell about working with small farmers under present conditions in Guatemala makes it difficult to conduct sociological research for this project. This has eliminated the proposed CRSP-funded position in ICTA for a female anthropologist and would effectively restrict the resident US sociologist to the capital city, working on secondary data or primary data gathered by ICTA personnel in the field using Guatemalan funding. Although US and Guatemalan institutions have agreed to this approach, it is considered to be an unacceptable solution by the EEP.

The EEP recognizes the need for socio-economic and natural scientists to work together in the field and the benefits to be derived from this integration of activities. Although ICTA would benefit from additional sociological support in its socio-economic unit, this unit is still providing much of the information required by the natural science component.

On balance, because of the constraints imposed on the sociological component by the Human Subjects Committee at Cornell and the difficulties of providing adequate field support, the sociological component of this project cannot be recommended for extension. However, the natural science component is recommended for extension with all efforts made to facilitate continuing collaboration between the CRSP and the ICTA bean program, the socio-economic unit of ICTA and the technology testing (agronomy) team in Chimaltenango.

In view of the above considerations, the EEP cannot provide an evaluation profile for this project.

PROJECT EVALUATION PROFILE

HONDURAS • UNIVERSITY OF PUERTO RICO (Initiated March 1982)
Beaver

Improvement of Bean Production in Honduras Through Breeding for Multiple Disease Resistance

RECOMMENDATION RATING: 2

REVIEW:

The rapid turnover of the HC PI, the principal weakness of the project identified by the EEP last year, has been remedied by the appointment of Ing. Rafael Diaz to that position. Further, the US PI has changed and Dr. James Beaver now fills that position. Ing. Diaz and Dr. Beaver work admirably well together. Hence, it is not surprising that they have implemented a highly viable, productive research program at EAP and UPR. For example, during the three growing seasons in 1984 in Honduras, the following field trials were conducted: 27 in Zamorano, 24 in Danli and 24 in Olancho. The CRSP research team has established firm collaborative work with (1) CIAT to evaluate bean nurseries and (2) Ministry of Natural Resource personnel to establish on-farm trials in various bean production areas of the country. An equally impressive research program is underway at UPR.

One of the basic objectives of the project is to develop multiple disease resistant bean germplasm because diseases are considered one of the major constraints to bean production in Honduras. The extent of damage by diseases depends upon factors such as variety grown, season of production and environmental conditions of the area of production. Hence, the approach adopted by the project to evaluate bean varieties in different environments is appropriate to identify sources of disease resistance and genotypic adaptation. In addition, experiments have been designed to determine the extent of yield reduction under various levels of disease infection and the realized yield potential under complete disease protection. The information gained from these experiments will be basic for designing breeding strategies which will lead to the development of disease resistant (disease tolerant) varieties for production in the country.

Progress has also been made in the area of training and the involvement of women in the project. A modest training program, focusing on short course, B.S. and M.S. level training, is underway. More than six women have been actively involved in the program in 1984.

Although trials are being conducted jointly with small farmers in two departments from which production and utilization data are being obtained, a systematic baseline study has not yet been undertaken. This is a major limitation of the project. Remedying it would provide not only a basis for judging future progress but also insights into the farmers' most important problems concerning production and utilization.

SUMMARY:

1. Administration of Project
Host Country-S
United States-S
AID-S
Interaction-S
2. Technical Personnel
Host Country-HS
United States-HS
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-S
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-S
Publications/Information Dissemination-S
Food and Nutritional Component-PoI
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-S
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-HS
AID Projects-S
International-S
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-S

PROJECT EVALUATION PROFILE

INCAP • WASHINGTON STATE UNIVERSITY (Initiated November 1981)
Swanson

Improved Biological Utilization and Availability of Dry Beans

RECOMMENDATION RATING: 1

REVIEW:

The overall objective of the research is to improve availability, utilization and nutritional quality of dry beans for human consumption in developing countries. To increase availability, activities among the following on bean quality must be coordinated: (1) production factors, (2) changes during handling and storage, (3) effects of processing and development of food products and (4) nutritional characteristics of improved varieties. Standardized methods to evaluate quality of beans have been developed by the five cooperating US universities and the division of agriculture and food sciences at INCAP. The principal contribution of the cooperating institutions are:

- | | |
|-----------------------------|--|
| INCAP | Examination of a broad range of factors influencing bean quality and evaluation of bean quality for human consumption, handling and storage changes, feeding studies, cooking time, trypsin inhibition, protein efficiency ratios, digestibility and food processing. Baseline survey data in Guatemala have been gathered by INCAP personnel. |
| Washington State University | Study of the role of lipid, carbohydrates and protein components of beans and the genetic basis for their distribution. The "hard-to-cook" phenomenon is also being examined in relationship to the chemical composition and physical microstructure of beans. |
| Colorado State University | Impact of genetic/environmental interactions on bean quality. |
| Kansas State University | Identification of chemical changes, usually developed during storage, related to the "hard-to-cook" phenomenon in beans. |

Michigan State University Evaluation of the genetic relationship to constituents in the seed coat of beans, especially polyphenols and lectins.

University of Puerto Rico Development of an assay for procyanidins in beans.

Coordination of research in many different sites has been difficult and requires a considerable amount of the WSU Principal Investigator's time. In some cases the collaborating institutions appear to be sub-contractors rather than active participants in the CRSP, however. More frequent team meetings are desirable.

The collection and documentation of standard methods for evaluating bean quality for human consumption has been a major accomplishment of the project. Linkages to other projects in the Bean/Cowpea CRSP have been established so that improved cultivars developed by breeders can be evaluated for bean quality.

The EEP judged that this project is highly satisfactory and should be continued without major changes/adjustments.

SUMMARY:

1. Administration of Project
Host Country-S
United States-S
AID-S
Interaction-S
2. Technical Personnel
Host Country-E
United States-HS
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-S
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-HS
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-PoI
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-HS
AID Projects-S
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

KENYA • UNIVERSITY OF CALIFORNIA-DAVIS (Initiated August 1981)
Webster

Improvement of Drought and Heat Tolerance of Disease Resistant Beans in Semiarid Regions of Kenya

RECOMMENDATION RATING: 2

REVIEW:

The objective of this project is to improve drought and heat tolerance in disease resistant bean cultivars for cultivation in semiarid areas of Kenya. The major problem for bean production in these areas is the lack of appropriate bean cultivars that produce good yields within the short and unpredictable period of rainfall in the growing season (250 to 350 mm). The CRSP project is helping to lessen this constraint by establishing physiological and agronomic experiments to determine the adaptability of Kenyan bean cultivars of different degrees of drought stress. Information obtained could be used for direct recommendation to farmers and to develop a breeding program on drought adaptation.

The plant physiology experiments are being conducted at the University of Nairobi Research Station in Kabete and at the National Dryland Research Station in Katumani, using a line source sprinkler system to provide gradients of water supply and consequently of drought stress. These experiments are concerned with the measurement of characteristics such as dry matter production, leaf area, seed growth and flower abscission and with physiological traits affecting plant growth such as leaf temperature, leaf water potential and stomatal resistance.

The agronomic experiments are being conducted at Katumani and Machanga under rain-fed conditions. Variations in moisture stress are imposed through planting densities, dates of planting within a given growing season and intercropping.

The limited number of varieties so far studied are not disease resistant but they do show a range of responses in plant growth and yield under different moisture stress conditions. These varieties were chosen from the ones recommended to farmers by the National Agricultural Station at Thika. The experimental results indicate that early maturing varieties are better able to survive under dry conditions than the later maturing ones.

Several experiments have failed at Katumani because of extreme effects of drought on seed germination and establishment and early growth. This problem, however, has been recently solved with the completion of a line source sprinkler system, which is being used by the plant physiologist and the agronomist.

The EEP is pleased with the actions taken in Kenya to correct weaknesses in administration and financial accountability. It feels, with hindsight, that UCD could have provided stronger management support. It also notes that the environment at Davis would have to be handled in a more sophisticated manner than has been the case hitherto if the results of drought screening there are to be directly useful to the program in Kenya. Alternatively, the drought screening might better be conducted at UC-Riverside or in some other more appropriate environment in the US.

The EEP recommends the reorganization of this project in conjunction with the Senegal project within the University of California to better coordinate drought research and project management.

SUMMARY:

- | | |
|---|---|
| <p>1. <u>Administration of Project</u>
 Host Country-S
 United States-LS
 AID-S
 Interaction-LS</p> | <p>2. <u>Technical Personnel</u>
 Host Country-HS
 United States-S
 Collaboration-S</p> |
|---|---|
3. Project Progress
 Log Frame/Consistency of Objectives with Activities-S
 Achievement of Natural Science Objectives-S
 Achievement of Social Science Objectives-LS
 Achievement of Training Objectives-S
 Publications/Information Dissemination-S
 Food and Nutritional Component-NA
 Consideration of WID Issues-LS
 Application to Systems Used by Small Farmers-S
 Contribution to Development in the Host Country-PU
4. Linkages
 Host Country-S
 AID Projects-S
 International-S
5. Overall Major Project Strengths/Deficiencies
 See text above
6. Response to Prior EEP Project Recommendations-S

PROJECT EVALUATION PROFILE

MALAWI • MICHIGAN STATE UNIVERSITY (Initiated February 1982)
Adams

Genetic, Agronomic and Socio-Cultural Analysis of Diversity Among Bean Landraces in Malawi

RECOMMENDATION RATING: 1

REVIEW:

This project is well established in the Department of Crop Production at Bunda College, which in turn is regarded by the Agricultural Research Council of Malawi as the lead agency for the national research program on beans. In the United States it is firmly based in the Department of Crop and Soil Sciences at Michigan State University. It is well-regarded by the USAID Mission in Malawi. The program is in touch with bean research in East Africa, including two bean CRSP projects.

The diversity of bean landraces in different parts of Malawi is being collected, described and conserved. The breeding biology and patterns of inheritance of seed coat colors and markings has been investigated by the small team in Malawi, including a US graduate student working for an M.S. degree at MSU. Associated agronomic improvement work continues in Malawi. Studies of the production and use of beans in Malawian rural families, with particular reference to the activities of women, have assembled useful new descriptive information, but these studies have not yet determined whether (as seems likely), and if so how and for what reasons, deliberate selection (by women, who are responsible for the seed stock) is significant in maintaining the observed patterns of diversity. It is by answering questions of this sort that the synergistic value of the partnership of natural scientists and social scientists in this project will be measured.

The project continues to be well run, the more so because some administrative misunderstandings were solved during the year. As Malawians currently in training at MSU on agronomic and genetic subjects return to Malawi, the contribution of Malawians will become more visible. The complementary relations between the groups in the US and Malawi are markedly collegial and productive.

The work at MSU includes analysis of data collected in Malawi and isozyme studies of the genetic constitution of the bean populations from Malawi. Notwithstanding the comparative weakness of the professional interaction between the natural science and human science components, the project is making good progress toward both its scientific and training objectives and is satisfactory for continuation without significant changes.

SUMMARY:

1. Administration of Project
Host Country-S
United States-S
AID-S
Interaction-S
2. Technical Personnel
Host Country-HS
United States-S
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-S
Achievement of Social Science Objectives-HS
Achievement of Training Objectives-HS
Publications/Information Dissemination-S
Food and Nutritional Component-S
Consideration of WID Issues-HS
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-LTP
4. Linkages
Host Country-HS
AID Projects-S
International-S
5. Overall Major Project Strengths/Deficiencies
Slow development of synergistic interaction between social and natural science parts.
6. Response to Prior EEP Project Recommendations-NA

PROJECT EVALUATION PROFILE

MEXICO • MICHIGAN STATE UNIVERSITY (Initiated March 1983)
Adams

Improving Resistance to Environmental Stress in Beans Through Genetic Selection for Carbohydrate Partitioning and Efficiency of Biological Nitrogen Fixation

RECOMMENDATION RATING: 1

REVIEW:

The project has completed two growing seasons only. It made a good start in 1983 and has continued it in 1984. Research workers of the Mexican national agency INIA, cooperating with the investigators in Michigan, have achieved a useful degree of consistency in identifying lines or populations of beans which are adapted to the types of dry conditions experienced at their testing sites, as well as to nitrogen-poor soils. In the United States, valuable work has been done on the capability of different lines of the host to become successfully infected by Rhizobium and to fix satisfactory quantities of nitrogen, but the results have yet to be transferred to the field for testing in Mexico. Conceptually, the work on adaptation to dry conditions at Michigan has made important progress in 1984 in understanding the diverse phenomenon represented by the term "drought," and the physiological work on partition of carbohydrate has been started.

The training objectives at MSU are being satisfactorily pursued. A Colombian female student has completed an M.S. degree in association with the project. One male Mexican is in training; he may be expected in due course to return to the Mexican part of the project, which lacks fully qualified research staff at present. The project seems to be well anchored in Mexico and to be in touch with those CRSP and other projects which are working on growth and nitrogen metabolism of beans in dry conditions. Materials which have been improved physiologically by the project must also be attractive to consumers. In Mexico, the seed industry should be able to deliver materials to producers. The project is satisfactory for continuation without significant change.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-HS
Interaction-HS
2. Technical Personnel
Host Country-HS
United States-HS
Collaboration-HS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-HS
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-NA
Achievement of Training Objectives-S
Publications/Information Dissemination-S
Food and Nutritional Component-NA
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-PoI
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-S
AID Projects-NA
International-S
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-NA

PROJECT EVALUATION PROFILE

NIGERIA • MICHIGAN STATE UNIVERSITY (Initiated November 1981)
Markakis

Medical Aspects of Feeding Cowpeas to Children

RECOMMENDATION RATING: Phase Out

REVIEW:

Events during 1984 have not been favorable for this project. One of the two PIs in Nigeria has left the country and the other has made little progress with the essential task of demonstrating by feeding trials the adverse reaction which is said to occur when cowpeas are fed to some weanling infants. Nor has the association between fermentable carbohydrate, breath hydrogen and the claimed adverse reaction been rigorously demonstrated.

The work at MSU made little progress in 1984 and no direct contact between the MSU PI and the remaining PI in Nigeria occurred until November 1984.

The EEP does not recommend this project for extension. Appropriate provision should be made for the discharge of remaining obligations to project staff and students in line with CRSP Board-approved policy.

SUMMARY:

1. Administration of Project
Host Country-LS
United States-S
AID-S
Interaction-LS
2. Technical Personnel
Host Country-S
United States-S
Collaboration-LS
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-LS
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-S
Publications/Information Dissemination-LS
Food and Nutritional Component-LS
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-S
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-LS
AID Projects-NA
International-LS

5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-LS

PROJECT EVALUATION PROFILE

NIGERIA • UNIVERSITY OF GEORGIA (Initiated April 1981)
McWatters

Appropriate Technology for Cowpea Preservation and Processing
and a Study of Its Socio-Economic Impact on Rural Populations in Nigeria

RECOMMENDATION RATING: 2

REVIEW:

Two good teams of research workers, one in Nigeria and one in Georgia, are collaborating in studies to preserve and process different cultivars of cowpeas and to assess nutritional, functional and sensory qualities of selected cultivars. The project has made good progress in developing appropriate technologies for processing cowpeas and preparing the traditionally accepted food, akara, from the meal. Present milling procedures in Nigeria result in a cowpea meal that is too fine for preparing a satisfactory product.

Improved methods for storage of cowpeas and meals which prevent infestation by insects and inhibit growth of microflora have been established, and the "hard-to-cook" phenomenon in stored seeds has been investigated. An appropriate village-scale technology for mechanically decorticating cowpeas and for reducing cotyledons to meal suitable for traditional food preparations has been developed. The nutritional, functional and sensory properties of cowpea meal and of the traditional food, akara, made from it have been characterized. The feasibility of extrusion cooking of cowpeas to produce nutritious, novel foods has been demonstrated.

The PIs of the two teams have provided leadership that has led to significant progress in the stated objectives. Team membership in each location has been stable throughout the three-and-a-half years in which the project has been active. Although the data from an initial socio-cultural survey related to usage of cowpeas has not been interpreted, the nutritional status of pre-school children in 250 households has been assessed by anthropometry (13 percent were mildly malnourished, 41 percent were stunted) and methods for home preparation and home storage of cowpeas were obtained. Reasons for infrequent use of cowpea paste by some women included "hard work," "too time consuming" and "too expensive."

Publications and papers at national and international conferences have been recorded; more are in progress.

Efforts must be continued to establish a closer working relationship between the US and HC teams. Because Nsukka has a well-established graduate program in food science, it may not be necessary to include higher degree training in the US in this project. However, specific in-service training on methods and instrumentation for short periods to the US for graduate students and junior faculty members may be valuable.

Both research teams consist of well-qualified individuals and include both men and women. They are to be commended for progress made in three-and-a-half years of a new project requiring collaboration between institutions where their communications and travel are so difficult.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-S
Interaction-S
2. Technical Personnel
Host Country-HS
United States-HS
Collaboration-S
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-LS
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-HS
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-NA
Contribution to Development in the Host Country-PoI
4. Linkages
Host Country-S
AID Projects-NA
International-S
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-S

PROJECT EVALUATION PROFILE

SENEGAL • UNIVERSITY OF CALIFORNIA-RIVERSIDE (Initiated August 1981)
Hall

A Program to Develop Improved Cowpea Cultivars
for Production and Utilization in Semiarid Zones

RECOMMENDATION RATING: 1

REVIEW:

The long-term objective of this project is to develop cowpea production systems leading to increased production and stable yields in hot semiarid zones. The project is fully integrated into the University of California-Riverside, where it receives institutional back-up support for training and research. Highly satisfactory progress has been achieved in the areas addressed by the project with results applicable to both the California cowpea growers and the Senegalese farmers.

Training of Senegalese counterparts on methodologies to conduct field research in crop management and germplasm improvement has resulted in the formation of a local research team highly productive at ISRA. Research results in crop management in Senegal indicate that using intercropping systems that combine early erect varieties, developed at UCR and UCD, with local more prostrate ones, could improve yield stability in semiarid zones.

The research work on heat tolerance, especially adaptation to warm nights, has been successful in developing methodologies to differentiate between heat-tolerant and heat-susceptible cultivars. The mode of inheritance of heat adaptation has also been established. Breeding and selection work has produced cowpea lines with heat tolerance which are moderately early, erect and day-neutral and have adequate seed quality. These lines have been sent to Senegal for agronomic evaluation and selection under local conditions.

Techniques to screen for drought adaptation have centered on studies of root penetration. Cowpea strains obtained from cooperators have been screened by this method, and results indicate that some cultivars show more extensive root growth than others. Issues of diseases and insects related to cowpea production in Senegal are not being directly addressed by the project at UCR. These

problems are being handled through collaborative linkages with other CRSP projects and IITA. This project is recommended for continuation without major changes.

The associated sub-project in Arizona made little progress in 1984, and the Co-PI has taken up an overseas assignment expected to continue for three years. The EEP recommends that the sub-project not be continued but that the future use of a very satisfactory sprinkler line site at Yuma, Arizona, be discussed with the University of Arizona.

SUMMARY:

1. Administration of Project
Host Country-HS
United States-HS
AID-HS
Interaction-HS
2. Technical Personnel
Host Country-HS
United States-HS
Collaboration-E
3. Project Progress
Log Frame/Consistency of Objectives with Activities-S
Achievement of Natural Science Objectives-HS
Achievement of Social Science Objectives-S
Achievement of Training Objectives-HS
Publications/Information Dissemination-HS
Food and Nutritional Component-NA
Consideration of WID Issues-S
Application to Systems Used by Small Farmers-HS
Contribution to Development in the Host Country-AI
4. Linkages
Host Country-HS
AID Projects-HS
International-HS
5. Overall Major Project Strengths/Deficiencies
See text above
6. Response to Prior EEP Project Recommendations-HS

PROJECT EVALUATION PROFILE

TANZANIA • WASHINGTON STATE UNIVERSITY (Initiated June 1981)
Silbernagel

Breeding Beans for Disease and Insect Resistance and Determination of Economic Impact on Smallholder Farm Families

RECOMMENDATION RATING: ;

REVIEW:

This project has been institutionalized as an integral part of the bean program of the Sokoine University of Agriculture in Tanzania. Its research and training components are very active and productive in both its US and Tanzanian sites.

Significant progress has been achieved in crop improvement for disease resistance, and some lines with resistance to insects have been identified. Heat-tolerant lines have been screened in the US; and low-cost production practices, such as the use of neem oil to control field insects or bean mixtures to reduce the incidence of diseases, have been evaluated. Socio-economic studies on bean production and utilization systems, a research area of great importance to the global contribution of the CRSP, have not, however, advanced greatly. Insufficient time of key Tanzanian project staff and limited experience of both the US and Tanzanian teams in farming systems research has somewhat delayed on-farm testing of technology developed through the project.

Training at the graduate (M.S. and Ph.D.), undergraduate and non-degree levels has been provided to participants from the US, Tanzania and other countries. Collaboration between the US and Tanzanian teams is remarkable, and effective linkages have been established with other CRSP and international bean projects.

This project should be extended without major changes, except for adjustments needed to strengthen socio-economic and on-farm research.

SUMMARY:

1. Administration of Project
Host Country-S
United States-HS
AID-S
Interaction-S

2. Technical Personnel
Host Country-S
United States-HS
Collaboration-HS

3. Project Progress
 - Log Frame/Consistency of Objectives with Activities-S
 - Achievement of Natural Science Objectives-HS
 - Achievement of Social Science Objectives-S
 - Achievement of Training Objectives-HS
 - Publications/Information Dissemination-S
 - Food and Nutritional Component-LS
 - Consideration of WID Issues-S
 - Application to Systems Used by Small Farmers-PoI
 - Contribution to Development in the Host Country-PoI
4. Linkages
 - Host Country-HS
 - AID Projects-S
 - International-HS
5. Overall Major Project Strengths/Deficiencies
 - See text above
6. Response to Prior EEP Project Recommendations-S

SUMMARY 1984 EXTERNAL EVALUATION PANEL PROFILES

	ADMINISTRATIVE				TECHNICAL			PROGRESS									LINKAGES			RESPONSE TO ERP	RATING*
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.1	4.2	4.3	6	7
BOTSWANA	HS	HS	S	S	LS	HS	HS	S	E	S	HS	HS	LS	S	HS	PoI	E	S	HS	HS	1
BRAZIL/ROBERTS	HS	HS	HS	HS	S	E	S	HS	E	NA	HS	S	NA	S	HS	PU	S	NA	HS	HS	1
BRAZIL/BLISS	HS	HS	HS	HS	S	E	HS	HS	E	NA	S	S	NA	S	HS	PoI	E	NA	HS	HS	1
BRAZIL/MAXWELL	HS	HS	HS	S	S	HS	S	S	S	NA	LS	S	NA	S	PU	PoI	S	NA	S	E	2
CAMEROON	S	S	S	S	S	HS	S	HS	HS	LS	LS	S	NA	LS	S	PoI	HS	HS	HS	HS	2
DR/COYNE	HS	HS	S	HS	S	HS	E	HS	HS	LS	HS	HS	NA	HS	PoI	PoI	S	NA	HS	HS	1
DR/BEAVER	HS	HS	S	E	S	HS	E	HS	HS	LS	HS	HS	S	HS	HS	AI	S	NA	HS	HS	1
ECUADOR	UN R A T E D																				
GUATEMALA	UN R A T E D																		Restructure		
HONDURAS	S	S	S	S	HS	HS	HS	S	S	LS	S	S	PoI	S	S	PoI	HS	S	S	S	2
INCAP	S	S	S	S	E	HS	HS	HS	HS	HS	S	HS	HS	S	PoI	PoI	HS	S	HS	HS	1
KENYA	S	LS	S	LS	HS	S	S	S	S	LS	S	S	NA	LS	S	PU	S	S	S	S	2
MALAWI	S	S	S	S	HS	S	HS	S	S	HS	HS	S	S	HS	HS	LTP	HS	S	S	NA	1
MEXICO	HS	HS	HS	HS	HS	HS	HS	HS	HS	NA	S	S	NA	S	PoI	PoI	S	NA	S	NA	1
NIGERIA/MARKAKIS	LS	S	S	LS	S	S	LS	S	LS	LS	S	LS	LS	S	S	PoI	LS	NA	LS	LS	Phase Out
NIGERIA/MC WATTERS	HS	HS	S	S	HS	HS	S	S	HS	LS	HS	HS	HS	S	NA	PoI	S	NA	S	S	2
SENEGAL	HS	HS	HS	HS	HS	HS	E	S	HS	S	HS	HS	NA	S	HS	AI	HS	HS	HS	HS	1
TANZANIA	S	HS	S	S	S	HS	HS	S	HS	S	HS	S	LS	S	PoI	PoI	HS	S	HS	S	1

KEY:

E - Exceptional
 HS - Highly Satisfactory
 S - Satisfactory

LS - Less Than Satisfactory
 NA - Not Applicable
 PU - Potentially Useful

PoI - Potentially Important
 AI - Already Important
 LTP - Long-Term Potential

*See text of individual project profiles for clarification of additional issues considered in this evaluation.

EEP PROJECT REVIEW AGENDA
1984 US Project Review

1. Involvement and Support from US Institution
 - a. Institutional integration: range of departments, number of persons, services utilized
 - b. Institutional back-up support provided
 - c. Institutional interest in continued involvement
 - d. Actions needed
- 2. Project Administration
 - a. Fiscal management
 - b. Program management and logistics
 - c. Actions needed
3. Personnel
 - a. Paid/unpaid
 - b. Adequate number and type
 - c. Involvement of women
 - d. Effectiveness
 - e. Staff concerns
 - f. Actions needed
4. Equipment and Facilities
 - a. Availability
 - b. Adequacy
 - c. Actions needed
5. Project Progress
 - a. Frequency and usefulness of US/HC team travel
 - b. Level of US/HC team communication and communication with HC AID Mission
 - c. Appropriateness of activities to goals
 - d. Progress toward research objectives
 - e. Progress toward training objectives
 - f. Attention to issues of related disciplines including WID
 - g. Contribution of work to small farmer systems
 - h. Contribution of work to US agriculture
 - i. Actions needed
6. Active Linkages Established
 - a. HC organizations
 - b. US organizations
 - c. Other CRSP projects
 - d. Actions needed
7. Summary of Status
 - a. Specific strengths
 - b. Specific weaknesses
 - c. Change from previous review
 - d. Expected schedule of future outputs
8. Summary of Recommendations

CRSP MANAGEMENT OFFICE EVALUATION

RECOMMENDATION RATING: 1

REVIEW:

The Management Office is responsible for a very wide range of executive functions essential for the funding, accounting, operation, reporting and forward planning of the CRSP. It acts under the authority of the Management Entity (Michigan State University) and the Board of Directors. It services the Board, the EEP and the Technical Committee. It is organized as part of the Institute of International Agriculture of Michigan State University, which falls under the Vice Provost and Dean of the College of Agriculture and Natural Resources and is partially supported by the Dean of International Studies and Programs. It is, as a result, firmly based in and served by the management structure of the University.

The office staff includes three-and-a-half professional positions (Director, half-time Deputy Director, Finance Officer, WID Officer), two support positions and some part-time help. The half-time post of Deputy Director was in effect vacant through most of the year so that the staff has been heavily overworked. The EEP is much impressed with the devotion, industry and competence of the staff of the MO and with the remarkably wide range of tasks which they perform effectively.

For the more effective working of the CRSP, the EEP advises that the post of Deputy Director be made full-time and filled and that an additional typist post be created in order to provide the extra support which will be needed in consequence.

The working of the MO, and of the projects within the CRSP, has been hampered since the establishment of the CRSP by delays in obtaining approvals from AID Washington, particularly for purchases of equipment. Recently, as a result of the personal intervention of the Finance Officer in Washington, most of the outstanding requests have been filled. However, we can have no assurance that future delays will not occur. Moreover, they should never have occurred in the first place in a responsible civil service department. It is a necessary part of our responsibility to bring this long-standing difficulty to the attention of the Board of Directors and of BIFAD, with a strong recommendation for urgent action.

We have reviewed the record of past expenditures by the CRSP. We find this has been managed by the MO in a rational and orderly fashion. Of funds provided through 9/31/84 and projected for 1985, of \$14.7m, only \$0.7m is unallocated. We have to report, however, that no external audit has been conducted, either in the US or abroad, in spite of requests from the MO. We understand that internal auditing within MSU is satisfactory and acceptable to USAID.

PROGRAM EVALUATION

Summary Statements

During the Annual Meeting in Atlanta and without advance notice, several EEP members were asked to make summary comments on several CRSP topics. These comments were explorations into the status and potential of CRSP activities. These are presented below. Because it is now timely to begin measuring the global impact of the Bean/Cowpea CRSP, more comprehensive, in-depth evaluations will be attempted in 1985 and subsequent years.

● Status/Progress and Prospects for CRSP Bean Research (Dr. Antonio Pinchinat)

Bean production research is addressed by eleven of the eighteen CRSP bean projects. They cover biological N₂ fixation, methodology to facilitate pathology and breeding work in multiple disease resistance, genetics of reaction to diseases, breeding for single and multiple disease resistance, production, physiology and agronomy, heat resistance, genetic variability, adaptation to drought and insect resistance. Except for some limited work on specialized local constraints, this research at cooperating Host Country and US sites addresses global problems of bean production in the world.

Several of the CRSP bean projects are applying unique strategies to improve biological nitrogen production both from an efficacy and efficiency standpoint. This BNF work looks simultaneously at the bean plant and the Rhizobium organism. As a result, bean genotypes and Rhizobium strains are demonstrating enhanced BNF and improved production efficiency. Similarly, the practical advantage of dry disease inoculum over its liquid form has been demonstrated. More efficient techniques to apply disease inoculum on the bean plant is facilitating breeding work. Differential reaction of different parts of the plant to pathogens has been observed. The biological reaction of several pathogens on the same plant has been studied and advances in inheritance of disease resistance have been registered. More reliable and repeatable methods to screen for disease resistance have been developed. The effects of ecological factors such as photoperiod and temperature on plant development have been evaluated, and the results of this work may be useful for breeding for ecological adaptation and stability in bean production. Techniques to study the physiology and genetics of adaptation to drought and reaction to heat are being refined. Improved varieties of beans have been identified or developed. Progress has been made in trying to increase crop production stability through physical mixtures of

different landraces. Cropping systems to enhance BNF, reduce losses to diseases and increase total biological and economic returns are being identified. But efforts to increase resistance to insects so far have not produced any spectacular results. This seems to be an area on which more research should focus.

There are areas of collaboration that the CRSP needs to develop among the researchers of the different projects. A major interaction among researchers working in common problems such as drought adaptation or disease and insect resistance could lead to increased exchange of germplasm to enhance research results. Some specific examples of collaboration can be suggested here:

- (a) Among bean diseases, bacterial blights are of general occurrence in most environments, consequently, any CRSP project dealing with disease resistance could benefit from other findings in this research field.
- (b) Certain diseases appear to be more prevalent in certain regions of the world; golden bean mosaic and web blight for example are common problems in bean production in Central America.
- (c) Bean fly is important in East Africa where CRSP researchers could interact with other bean programs being established in the area.

Summarizing then, the CRSP bean research has generated new basic knowledge, advanced methodology and techniques and improved physical and biological technology. In such a short time of work, this is a commendable performance.

● Status/Progress and Prospects for Individual Bean CRSP Projects (Dr. Luis Camacho)

1. BRAZIL/BLISS

Progress

- a. Bean lines with genetic potential to fix high levels of N_2 have been identified.
- b. Strains of Rh. phaseoli which have high level of N_2 -fixing ability have been selected.

Prospects

- a. New bean lines acceptable for the market in Brazil and having genetic potential to fix high N_2 levels will be developed.
- b. Features of cropping that either enhance or decrease N_2 fixation in beans will be determined.
- c. More effective bean Rhizobia strains will be identified or developed.

Training

Training has been accomplished in breeding beans for enhanced biological N_2 fixation and rhizobium technology.

2. BRAZIL/MAXWELL

Progress

Dry inoculum techniques have been developed and successfully tested to assess the reaction of beans to the major fungal diseases (*Isariopsis griseola* and *Colletotrichum lindemuthianum*).

Prospects

The same methodology will be expanded to include two more pathogens (*Xanthomonas campestris* pv. *phaseoli* and *Uromyces appendiculatus*).

Training

Post-doctoral and short-term training active in plant pathology.

3. DOMINICAN REPUBLIC/UNIVERSITY OF NEBRASKA

Progress

- a. It appears that there may be strains of common bacterial blight in the tropics that have not been found in the United States.
- b. One tropical landrace of beans shows a wide range of resistance to rust.
- c. Knowledge of inheritance of disease resistance in rust and common blight has been advanced and used in breeding programs.

Prospects

Information on heterogeneity of rust and common blight pathogens, on epiphytic bacterial population characteristics and on genetic control of rust and common blight will be available for use in bean breeding programs.

Training

Plant breeding and plant pathology training are active in relation to disease resistance.

4. DOMINICAN REPUBLIC/UNIVERSITY OF PUERTO RICO (Beaver)

Progress

- a. A technique for enhancing manual bean crossing in the field through drip irrigation has been developed.
- b. Germplasm resistant to two races of root knot nematode has been identified.
- c. High yielding black and white bean lines showing stable performance over a wide range of environments have been developed and released.

Prospects

- a. New bean germplasm with resistance to different diseases will be developed.

- b. Inoculation techniques for screening bean resistance of *Macrophomina phaseolina* will be developed.

Training

Training in breeding for disease resistance and agronomy undertaken.

5. ECUADOR/CORNELL UNIVERSITY

Progress

On-farm trials of improved cultural practices and germplasm resources have been tested in tropical highlands.

Prospects

Project will determine response of bean varieties to different temperatures in production zones.

Training

None.

6. GUATEMALA/CORNELL UNIVERSITY

Progress

Photoperiod x temperature x genotype interaction has been demonstrated and is being used in bean breeding programs.

Prospects

Increasingly useful information for bean breeding programs will be developed.

Training

Plant breeding training was supported.

7. HONDURAS/UNIVERSITY OF PUERTO RICO

Progress

Same as DR/UPR.

Prospects

Same as DR/UPR.

Training

Same as DR/UPR.

8. KENYA/UNIVERSITY OF CALIFORNIA, DAVIS

Progress

- a. Large-scale field methods are available for identifying drought tolerance in beans.

- b. Cultivars with identifiable morphological markers related to drought and heat tolerance were identified.
- c. Physiological data on dry matter partitioning, water use efficiency, sink source relationship and N fixation under drought conditions have been gathered.
- d. Techniques have been developed for rapid estimation of pollen production and viability on an individual flower, whole plant or plant population basis.

Prospects

- a. More sophisticated drought tolerance studies in beans to be initiated.
- b. Improved embryo culture techniques will facilitate the crosses of bean x tepary for testing under drought conditions.
- c. Improved bean tepary hybrids will be developed.

Training

Plant breeding, agronomy, nematology, physiology and genetics training undertaken.

9. MALAWI/MICHIGAN STATE UNIVERSITY

Progress

- a. Genetic diversity has been described in bean landraces and used in the multivariate distance analysis (PCDA) to assess variability between bean farms within areas and among lines within farms.
- b. Performance of pure lines and mixtures have been assessed.

Prospects

More performance and stability trials will be carried out.

Training

Crop physiology, plant pathology, rhizobiology genetics training underway.

10. MEXICO/MICHIGAN STATE UNIVERSITY

Progress

Advances in improving resistance to environmental stress in beans through selection for carbohydrate partitioning and for efficiency of biological N₂ fixation are being accumulated.

Prospects

Both more efficient and N fixing rhizobium and bean strains will be identified together with increased tolerance to drought.

Training

Crops and soil science training initiated.

11. TANZANIA/WASHINGTON STATE UNIVERSITY

Progress

- a. Better yielding varieties of beans under dry conditions have been developed.
- b. High yielding disease and insect resistant lines have been selected.
- c. The oil method to reduce bruchid damage in seed storage has been tested.
- d. Mixtures of cultivars to reduce losses due to disease in the field have been evaluated.
- e. Greenhouse for actual screening of bean common mosaic virus (BCMV) and HB is ready for general use by bean breeding program.

Prospects

- a. The use of monoclonal antibodies (MCAB) to assay for seed-borne BCMV will be refined.
- b. The ELISA serology kit for rapid BCMV identification will be available for general use.
- c. The home-grown neem oil method to control insect pests will be further developed.
- d. Several breeding lines with multiple disease resistance will be available for on-farm testing.
- e. Germplasm methodology for high temperature tolerance during bloom will be available to other bean breeders.

Training

Breeding, entomology, plant pathology training is active.

● Studies of the Rationale of Farming Systems (Dr. A. H. Bunting)

Most current work in existing systems of rural production seeks to identify possible constraints which restrict the output of particular commodities or output from particular regions. This information is needed to design relevant research and development proposals, and it is usually needed soon or now. The methods used to obtain it are rapid and consequently somewhat superficial, but they are nonetheless useful.

These rapid methods usually describe the existing system, but they abbreviate or by-pass, for lack of time, those parts of the following analytical phase which can determine the rationale underlying the system. The rationale is scientifically interesting in its own right, for both natural and human sciences, but it is also potentially useful because it can indicate the extent to which structural change in the system would be feasible if it were to become desirable for other reasons. Put another way, it can determine which determining factors are potentially modifiable and which are inherent in the general environment and cannot therefore be changed.

These factors fall into at least three categories. The first covers the natural environment and its variations over time. The principal components are rainfall, radiation, temperature, water content of the air, wind, evaporation, and the consequences for the soil/water cycle through the year (using daily data); soil profile characteristics including structure at different seasons, texture, depth, chemical characteristics including pH, drainage; land characteristics (slope, aspects, drainage pattern), areas of land of different classes per producing family; water, irrigation and future prospects.

The second category covers the human condition. Among the principal components are the numbers of people and the rates of growth of numbers, family and social structure, age structure of populations, settlement patterns in relation to land, soil and water residues, structure and activity in the system, social organization and management and allocation of resources between parts of the society and between competing activities, economic circumstances of different families, nutritional and other needs; income and other family and community resources from outside the rural life system; property rights in products.

The third category covers the economic and political environment which surrounds the rural production and life system. The main categories are volume of effective demand for surplus products, the output delivery system (transport, communication), the availability and cost of inputs (and possible changes in the future), policy and practice of government affecting the interest of the producers in raising a surplus for sale outside the family.

Work associating some of these environmental factors with the nature of farming systems in developing countries is not new. Trapnell described the farming systems of what is now Zambia 50 years ago and explained them in terms of soil and climate. William Allan (who was associated with Trapnell in Zambia) extended the description to much of tropical Africa in "The African Husbandman."

This work reflected the profound influence of Max Gluckman, a social anthropologist who directed the Rhodes-Livingstone Institute in the late forties and early fifties. Since then, environmental science has become more sophisticated, and understanding of the social and economic determinants has also advanced. The first view is to develop new methods of description and analysis as rapidly as is consistent with reasonable accuracy. This can probably only be done by attempting some analyses of contrasted selected systems for which parts of the necessary data already exist.

● Status/Progress and Prospects of CRSP Research
Re Small Farmers and Farming Systems
(Dr. Mel Blase)

Small farmers and farming systems in developing countries have two common characteristics. First, presumptions to the contrary, there is a great deal that is not known about them. Second, in many respects both are supposed to be targets of the CRSP. Hence, there is a need for CRSP researchers to become highly knowledgeable about both in the Host Country. Where this does not happen, irrelevant technology may be produced. Unfortunately, in some cases this may be the case.

How can such an inefficiency be avoided? By requiring a baseline study, the probabilities will increase that research relevant to the problems of small farmers will be undertaken. Further, such baseline data will provide a benchmark against which to measure progress due to the CRSP and other factors. Suffice it to say, baseline studies should be viewed as a necessary but not sufficient condition for successful CRSP performance. No project should be approved for extension until a satisfactory baseline study has been done in the Host Country and there is evidence that the data are being used in planning and implementing the project.

Three Dimensions

Both small farmers and farming systems should be viewed from three dimensions. They are physical possibilities, economic feasibilities and institutional permissibilities. Each deserves elaboration.

Physical Possibilities--

Many scientists in the physical sciences think that this is what research is all about. They struggle with questions such as "Is it possible to produce a variety with multiple disease resistance?" "Is it possible to produce twice as much grain per acre?" "Is it possible to increase cropping intensity?" All

of these questions and many more are relevant to both small farmers and farming systems. But if the CRSP stops with a concern only for increasing physical possibilities, it may have relatively little impact on the welfare of small farm families.

Economic Feasibilities--

When farmers are presented new technology, they usually seek to determine if it is profitable. Even if the production is for home consumption, they will endeavor to learn whether they can use fewer resources to produce a given quantity needed by the family. Certainly in the case of market-oriented production will the question of economic feasibility be raised. Much agricultural technology, in the sense of knowing what is physically possible, exists in the world today but is unused. Economics is one important although not the only reason that technology may not be used.

Institutional Permissibilities--

Technology that is both physically possible and economically profitable may still go unused. The reason is concerned with institutional permissibilities. It has two dimensions, legal and sociological. Legal aspects are illustrated by the fact that some crops--for example, from which drugs can be manufactured--are against the law to produce. Sociological constraints are illustrated by peer pressure. In most parts of the world farmers are quite concerned about what their neighbors think of them and may make farm management decisions accordingly.

Small Farmers and Farming Systems in 3D

The basic argument of this paper is that in order for a CRSP to be relevant to small farmers and farming systems, it must take a three-dimensional approach. Hence, a multi-disciplinary orientation is needed. Only when the research results have dealt with physical, economic and institutional obstacles will the CRSP impact on the welfare of the target audience in such a way as to have been a good investment. Presently, the CRSP essentially is addressing only the physical obstacles in a substantive way. Hence, papers need to be commissioned in FY 85 on a global dimension to be added to the CRSP on institutional and economics considerations.

● Status/Progress and Prospects of CRSP Food and Nutrition Research (Dr. Charlotte Roderuck)

All projects have been rated in "food and nutritional components" as part of the evaluation profile. Ten were judged not to have food and nutritional

components and eight were rated from LS to HS. Although Cameroon/UGA received an NA in this and previous reviews, the research activities include preliminary studies of traditional and modern methods to prevent post-harvest losses of cowpeas during storage. This component is related to increasing the availability of cowpeas for utilization and perhaps should be considered as a contribution to food science or food technology.

Three projects address food science and nutrition issues directly. They are INCAP/WSU, whose focus is on dry beans; Nigeria/MSU and Nigeria/UGA, both addressing aspects related to cowpeas. Five (plus Cameroon/UGA) have a farming systems and/or social science component that has collected some information on the use of beans or cowpeas for food, what varieties are preferred, how they are prepared, etc. It is not clear how this information has or will be used nor whether the three projects with direct studies of nutritional issues have been given access to data on use of these legumes in different areas.

Provision of more beans and cowpeas is a major goal of this CRSP; however, wider availability and utilization, especially by the urban and rural poor, is a stated purpose also, i.e., improvement of the nutritional state of the poor, especially young children. No measures to evaluate changes in the nutritional state of populations have been implemented in countries or regions where projects are located overseas.

In order to assess availability and utilization, marketing information, costs and changes in the purchase price of the legumes, evidence for increased use in the diet with a resultant improvement in the quality of the diet should be obtained in order to demonstrate a positive effect of this CRSP in populations in many areas of Africa and Latin America. For instance, post-harvest losses are reported to be large; if these losses are prevented, what would be the impact on need or demand?

Breeding research should include evaluation of the quality of beans and cowpeas to assure maintenance or improvement of protein quantity and quality instead of focusing only on yield as a measure of success. In addition, the demand for leaves and pods as green vegetables for human food should be assessed.

The Role of the CRSP in International Agricultural Research and Development

Similar to the movement of several decades ago which began the establishment of a network of International Agricultural Research Centers (IARCs), CRSPs

were introduced into an evolving international agricultural research and development system as a new and needed component. Their unique characteristics present a cost-effective model, a model that can perform a critical international role beyond the mandates (and capabilities) of the IARCs and other similar research organizations. Critical among the model's characteristics, as demonstrated by the Bean/Cowpea CRSP, are:

1. The tremendous size of the resource base including the professional expertise, the research facilities and the administrative support structure represented by the US Land-Grant system;
2. The diversity of professional disciplines available to be called upon as appropriate to contribute to the problem-solving efforts;
3. The working partnerships of committed colleagues rewarded for collaborating across national boundaries with other participating nations; and
4. The management structure whose sole function is the integration and coordination of all of the above components while maintaining a focus on overall program goals.

Thus, as a member of the new CRSPs' initiative, the Bean/Cowpea CRSP complements and supplements IARCs and other public and private research organizations by broadening and deepening the overall research support base. It is showing itself to be a highly acceptable, interactive mode for technical assistance which can bring the diverse, largely untapped resources of US centers of excellence into collaborative international research and training activities. Through these efforts, the CRSP is extending the worldwide network of institutions and individuals cooperating in important bean and cowpea related research. More broadly over time, it will help fashion and strengthen enduring linkages throughout the international agricultural research and development system.

Specific Contributions of the Bean/Cowpea CRSP to Development

There is good evidence that:

1. The CRSP is a mechanism which supports better equity within research teams engaged in development activity. The model develops a pattern of interaction which is not hierarchical but collegial in nature, providing an important avenue for the active participation of HC professionals in the development process.
2. The CRSP provides one vehicle for the contribution to development of science and technology as a necessary but insufficient partner along with

such factors as government pricing policy and extension. As such, the CRSP is an important component of the US bilateral assistance program contributing to the total AID effort to alleviate world hunger.

3. The CRSP has shown itself to be a rapid method of generating technology fitting the specific needs of Host Countries. It is an effective way to transfer and build greater capacity to generate new knowledge.
4. The CRSP is a catalyst for specific CRSP-related scientific work without which, in many countries, the work could not be done.
5. The CRSP is a catalyst for scientific activity beyond the purview of the CRSP itself as both the research and the professional relationships stimulate energy and initiatives that ripple farther than the original mandate.
6. The actual research, involving the collaboration of scientists cross-nationally, and the training of new professionals effectively supports the institution-building components of this CRSP. Both within the African and Latin American regions and across regional lines, professional networks are evolving which strengthen the institutional capacities of participating organizations.
7. The CRSP training resources effectively utilize a variety of training modes (degree/non-degree, formal/informal, domestic/international) directly geared and linked to the needs of the countries. Further, HC students have the opportunity to study in the US with US professors who are working on behalf of the students' own countries and frequently are working intermittently in these countries.
8. The CRSP has attracted a remarkable number of US and HC scientists. In the US it has strengthened interest and capability of US institutions to understand and participate in development.
9. The CRSP supports attention to the role of women in agriculture and the involvement of women in its projects. It has improved the attitude of male professionals toward working with professional women. Attention is being paid to efforts to advance women through the system.
10. The CRSP, in evolving a problem-solving network, has developed a community of US and HC scientists for scientific and technological development which should prove itself productive over the long term.

Specific Contributions of the Bean/Cowpea CRSP to US Agriculture

1. Bean/Cowpea CRSP projects/activities are concentrated largely on producing superior bean and cowpea cultivars and supporting production technologies

- (e.g., enhanced N-fixation). Predictably, these cultivars and technologies will contribute directly and indirectly to the development of superior cultivars and production technologies for the United States.
2. An important related activity of most CRSP projects is the collecting, describing, cataloguing and conserving of bean and cowpea germ plasm. These irreplaceable genetic resources will become available over time to the United States and to other bean and cowpea growing nations and, therefore, will increase the range and diversity of genetic stocks available for improvement programs.
 3. New resources and procedures for the control of pests and diseases in bean and cowpea production are emerging, i.e., insect pathogens, antiserum procedures to assess virus strains in transported plant material. These new technologies will not only support legume improvement programs in the US and other legume-producing countries, but they will also expedite the ability of nations to utilize one another's plant material in adaptation trials and improvement programs across national boundaries.
 4. The Bean/Cowpea CRSP has a limited, but highly important, focus on improving the human nutritional characteristics of beans and cowpeas through breeding, processing and food science programs. This focus can be expected to have a salutary impact on bean/cowpea production research, as well as home and commercial processing which ultimately will contribute to United States industrial interests.
 5. The Bean/Cowpea CRSP helps to build and support effectively functioning international agricultural research networks. These networks are made up of individual professionals, many of whom will have studied together under CRSP sponsorship, as well as an array of research institutions which will have been strengthened through their CRSP involvement. Such global networks serve US agricultural interests and can frequently pay handsome dividends in unexpected ways over the long term.

Program Weaknesses

1. The CRSP collegial and financial activity may alter the balance of priorities within Host Countries, not in their own best interest.
2. Collaboration with other overseas development programs and agricultural research efforts is still inadequate. Especially important is cooperation with other US bilateral efforts within the same Host Countries.

3. Economic analyses of production systems and the acquisition of baseline data continue to lag behind biological research.
4. Linkages with other development agencies and institutions in the Host Countries such as extension remain weak. Dissemination and use of research findings therefore is likely to be poor. The international linkages, valuable as they are, could be further strengthened.
5. Some HC PIs are administrators rather than working researchers. While administrative support is critical to project success, having a PI who is an administrator inhibits the progress of the actual research, the building of professional collegial relationships among peers and the institutionalization of the project research at the operational level.

Overall Evaluation

Individual CRSP projects are established and operating smoothly and effectively through the joint efforts of collaborating Principal Investigators in the US and counterpart institutions in Africa, Central and South America. The organizational framework within which the projects are administered--the Management Entity and its Management Office, the Board of Directors and the Technical Committee--is well-suited to promoting and supporting collaborative research on beans and cowpeas. As presently constituted and operated, the CRSP is composed of eighteen discrete projects operating independently with minimal interactions between and among projects. Opportunities for regional as well as global networks and interactions appear to be excellent and could be key to the Bean/Cowpea CRSP's realizing its potential as an important element of an evolving international research system for beans and cowpeas. It may be timely and appropriate for the Board of Directors to consider convening informal meetings of representatives (agricultural officers) of the principal funding agencies for beans and cowpeas (held separately) and selected research leaders/administrators to examine global research issues and procedures to promote international cooperation in bean and cowpea research.