

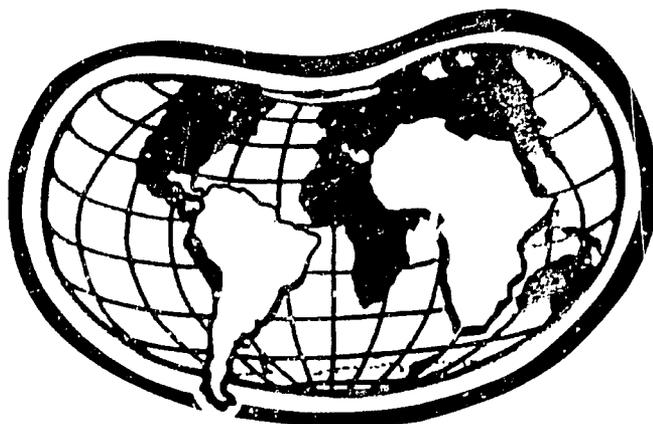
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COLLABORATIVE RESEARCH IN THE
INTERNATIONAL AGRICULTURAL RESEARCH
AND DEVELOPMENT NETWORK:
A CASE STUDY

PROGRESS REPORT OF
THE BEAN/COWPEA COLLABORATIVE
RESEARCH SUPPORT PROGRAM (CRSP)

MICHIGAN STATE UNIVERSITY

MAY 1984



An international community of persons, institutions,
agencies and governments committed to collectively
strengthening health and nutrition in developing
countries by improving the availability
and utilization of beans and cowpeas

PROLOGUE

In thoughtful discussions among the outstanding US and non-US professionals associated with this CRSP, various points of view have been shared in attempts to identify research strategies which will contribute to human well-being throughout the world. From the array of national, cultural, ethnic, gender, class and disciplinary perspectives, their interactions with one another have opened new horizons to the development and application of evolving science and technology. The researchers, most of whom had been wrestling with global issues independently long before coming together in the CRSP, have been stimulated by one another and have found excitement and power in the expanded peer relationships. The professional traffic of scholars among CRSP countries highlights the mutual benefits of such relationships and emphasizes a growing appreciation of the mutual dependency. As Professor Paul Streeten has pointed out "knowledge is a common good and its pursuit unites scholars across the world."¹ This intellectual dependency is a mirror image of the economic and environmental interdependence that exists among all countries including the US and the developing countries which are the Host Countries (HCs) of this CRSP. World hunger and malnutrition are undeniable and poignant examples which are experienced at some level in all countries.

According to the Washington, DC Environmental Fund, the US population is approximately 235,000,000 people. However, US land available to produce food for this growing mass is being lost at an average of over a million acres a year, mostly to urban sprawl. Presently, US agriculture, the most prolific in the world, produces an abundance of food for US consumption. The US also produces, each year, millions of dollars worth of food for export.²

Some of this surplus food is sold on the international market and helps address the US balance of payments deficit. That deficit is recently reported to be over \$40 billion this year and expected to surpass \$80 billion by the end of 1985--a foreign debt level that dwarfs that of most developing countries.³ Other surplus food from the US enters the international arena as foreign assistance to poverty- and famine-ridden areas of the world. Such areas are often plagued by instability and political strife which threaten the existence of all nations. Basic commodity shortages frequently fan those flames, jeopardizing international efforts to address such global concerns as pollution, population growth, nuclear weapons and security. An additional complication is that developing countries represent the largest growth markets for the sale of US exports compared to US exports to developed countries. These same developing countries are also the countries from whom the US imports raw materials critical to commercial industries and defense.⁴

The importance of US food production to the US and the rest of the world presents a serious and complex dilemma. The Environmental Fund projects that if the population of the US continues to increase at the present rate and the land available for agriculture continues to decrease, by the year 2000 all the food produced by the US will need to be consumed within the US. A vanishing US export market capacity and depleted food assistance program could have dire implications. Further, no country can avoid being affected by such recent occurrences as the expanded use of chemical warfare, changing weather patterns worldwide and the large numbers of severely stressed national economies. All of these issues demonstrate that the US lacks immunity to the painful unemployment, mass poverty, hunger, drought, infestation and disease problems suffered by many countries of the world. In reality, the US too is a developing country. It, too, will benefit from a sharing of resources and the strengthening of national institutions with whom it can collaborate.

Thus, for world humanitarian needs as well as for US survival requirements, the US agricultural network, especially its Land-Grant community, must play an even more prominent role in the international arena than it has in the past. HC and US students entering this arena, for which most contemporary professionals were never prepared, require from their educational institutions greater international participation. HC and US faculty, who must face those young men and women in classrooms and supervise their research in laboratories and in the field, require increased international professional experience and continuing education. For US and HC participants, CRSPs can provide an example of human resource development based on shared scientific, technical and socio-cultural understanding.

The promise of US Title XII and HC institutions is heightened by their joining together the best of HC and US scientific and traditional agriculture and the related disciplines. Through their heterogeneous resources, their composite experience and their vast research capacity, such collaboration is a natural extension of the Land-Grant tradition. The new findings emerging from the array of Bean/Cowpea CRSP projects only hint at the long-term potential: US and HC cowpea germ plasm crosses in Africa outperformed other exotic and traditional lines during the recent severe drought there: basic research contributes to scientific understanding of genetic, agronomic and socio-cultural factors important in the maintenance of rich natural germplasm pools--a constantly changing trust especially important for those who rely on beans and cowpeas as food: monoclonal antibody procedures developed for quick, simple and inexpensive detection of seed borne viruses in beans; native fungal isolates showing promise in biological insect control which can minimize use of expensive and often toxic synthetic insecticides; village level technology for increasing, among rural and urban populations, the availability of inexpensive cowpea meal acceptable in the preparation of traditional foods.

Through such research efforts new mutually rewarding relationships are being fashioned with sensitivity and care. Over the long term they will provide the foundation for strengthening communication, respect and trust among future agricultural leaders. To the extent that the CRSPs function well and are truly collaborative research and training programs, they will leave behind a major human and scientific legacy. If we are lucky, they will also make a noticeable impact on world poverty, malnutrition and hunger.

Pat Barnes-McConnell
Program Director
Michigan State University

- 1 Paul P. Streeten. Social Science Research on Development: Some Problems in the Use and Transfer of an Intellectual Technology. The Agricultural Development Council, Inc., July, 1975.
- 2 Bradford Morse. "Where 80% of UN Resources Go." Christian Science Monitor, April 19, 1983.
- 3 Alan Murray. "Payments Gap Rose in Fourth Period to \$15.29 Billion." Wall Street Journal, March 20, 1984.
- 4 Edmund S. Muskie. "The West's Stake in Third-World Aid." Christian Science Monitor, August 6, 1980.

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V

INTRODUCTION

The Bean/Cowpea Collaborative Research Support Program (CRSP) is a program of coordinated projects in Africa and Latin America addressing hunger and malnutrition through research on the production and utilization of beans (Phaseolus vulgaris) and cowpeas (Vigna unguiculata). The CRSP reflects the Title XII "Famine Prevention and Freedom from Hunger" mission of the US Foreign Assistance Act under which the program is funded. Contributing to the alleviation of hunger and malnutrition in developing countries by improving the availability and utilization of beans and cowpeas, the CRSP also makes a significant contribution to agriculture in the US. The research findings and identified biological resources hold potential for solving or reducing important agricultural constraints to the availability of beans and cowpeas in all legume-producing nations.

The problems being addressed by the Bean/Cowpea CRSP, by their nature, are systemic, rooted deep in a complex of interacting variables and will require long-term research and training to adequately address. As stated in the grant which established the Bean/Cowpea CRSP,

"This program is a long-term effort designed to bring together the research capabilities of participating universities, collaborating Title XII institutions including USDA and other federal research agencies, appropriate LDC institutions and international centers into a comprehensive and coordinated effort in research and training to generate and apply knowledge that can assist in alleviating principal constraints to improved production, marketing and utilization of beans and cowpeas in LDCs. It is based on the assumption that there are large areas of overlap between U.S. and developing country needs for research, marketing and utilization of these two crops. Substantial mutual advantages are expected to result from joint research program efforts which cut across national boundaries and different levels of agricultural development."

The Bean/Cowpea CRSP is one of seven CRSPs which through interactions among the partners (AID-US Institutions-Host Country [HC] Institutions) has evolved a research and training effort to address issues of food availability in designated areas throughout the world. Although the seven have many basic characteristics in common, each CRSP has a configuration which is somewhat unique. These differences emerged from the resources and needs of the respective partners, the research requirements of the commodity and the stage of Title XII development at the time the particular program was begun.

As the third such program to be developed, following the Small Ruminant CRSP and the Sorghum/Millet CRSP, the Bean/Cowpea CRSP was the beneficiary of two especially critical lessons. First, it was determined that the Host Countries to participate should be identified early in the planning process. This facilitated HC involvement in planning the specific research, their acceptance of a role in that research and their readiness to begin work once the program was implemented. Secondly, to avoid a great deal of unproductive transition time, it was determined that the Planning Entity should be allowed to be a serious candidate for Management Entity when the CRSP was implemented. These two changes from the original guidelines for CRSP development have been major factors in the important achievements of the Bean/Cowpea CRSP despite its short time in existence.

Even though at program initiation all prospective participants were identified, the first year was taken up with acquiring the final approvals which could not precede actual funding. Official government and institutional signatures on the required documents in the US and thirteen participating HCs had to be acquired. The task for the second year was getting the projects off the ground--funds could begin to flow, identified professionals could request released time, students could apply for training and, if admitted right away, could be sent off to begin that training, approvals for equipment purchases could be requested from AID and the lucky few receiving the approvals promptly could order the first equipment before the end of the year. Thus, for the most part, it was not until late in the third year that preliminary research was enough under way to suggest tentative initial findings. There are striking exceptions where important and significant results have already been obtained. These are frequently the consequences of the program's being able to capitalize on previous long-term thinking, associations and background research which fitted the precise needs of the CRSP and required only its guided human and financial resources to push the work over the top. An excellent example of this is the work reported in the first issue of the CRSP Vanguard series by a senior US researcher, his former student who is presently a research leader in the participating HC, and a current graduate student working with the team (Vanguard Vol. 1, No. 1, "Temperature X Photoperiod, Adaptation and Yield in Phaseolus vulgaris" by Donald H. Wallace, Porfirio N. Masaya and Paul A. Gniffke, available from the CRSP Management Office).

PROGRAM GOAL

By making available to the international agricultural research and development system a new avenue to the US agricultural research network, the Bean/Cowpea CRSP is organized to make important contributions to the resolution of difficult and persistent problems associated with bean and cowpea production and utilization.

The grant document puts forward the following goal of the Bean/Cowpea CRSP:

"The goal to which this program is to make a significant contribution is improvement in living conditions of small farm producers in LDCs and increased availability of low cost nutritious foodstuffs in the marketplace for the rural and urban poor in LDCs."

PROGRAM PURPOSE

The grant document further identifies the following purpose of the CRSP:

"The purpose of this program is to organize and mobilize financial and human resources necessary for mounting a major multi-institutional U.S.-LDC collaborative effort in research and training. This effort is expected to provide the knowledge base necessary to achieve significant advances in alleviating the principal constraints to improved production, marketing and utilization of beans and cowpeas in LDCs. A sub-purpose is to improve the capabilities of appropriate LDC institutions to generate, adopt and apply improved knowledge to local conditions."

PLANNING PROCESS

During planning, a thorough identification was made of HC and US problem areas, interests and capabilities. The planning group met with HC nationals engaged in legume research individually and in groups at national and international meetings and conferences. International groups were invited to the US to further refine the effort. Extensively researched and honed to the needs of the HC and the international agricultural community, the CRSP research projects evolved from this comprehensive process. Below is a chronology of the Bean/Cowpea CRSP planning process as presented in the Final Planning Report.

Chronology of the Bean/Cowpea CRSP Planning Process

July, 1978	BIFAD authorized planning for Bean/Cowpea CRSP.
August, 1978	Experiment Station representatives met in Chicago authorizing MSU to submit the planning grant proposal.
October, 1978	Planning grant awarded to MSU, effective as of this date.
October, 1978- June, 1979	Dr. Donald Wallace, on leave from Cornell, joined with Dr. Wayne Adams of MSU to carry out the planning effort.
October, 1978	Letter to Title XII institutions requesting indications of manifest interest--forty-three responded.
October, 1978	Wallace and Adams made orientation trips to University of Missouri and USAID-Washington. LDC questionnaires subsequently developed and disseminated.
December, 1978	Wallace attended Western Regional Project #150 Participants Meeting in Berkeley, California to present a report on the objectives and expected planning procedures of this CRSP.
January- February, 1979	Wallace and Adams visited CIAT, Guatemala, Panama, Costa Rica, Colombia and Chile. Collected information on constraints. Met potential collaborators.
February, 1979	Adams visited Dominican Republic, FAO meeting. Wallace visited IITA. Collected information on constraints. Met potential collaborators.
February, 1979	Wallace attended Southern Region Meeting of American Society of Horticultural Science in New Orleans to acquaint cowpea workers of the south and southeastern US with the goals and procedures of the Bean/Cowpea CRSP.
March, 1979	Adams attended PCCMCA meeting, Honduras. Collected information on constraints. Met potential collaborators.
April-May, 1979	Fact-finding team visits to South America, Caribbean and Mexico, West Africa and East Africa--team members from various Title XII institutions. Collected information on constraints. Met potential collaborators.

May, 1979 Bean/Cowpea proposals received from interested institutions responding to RFP. Proposals received from seventy-seven persons representing twenty-five institutions.

May, 1979 Dr. Pat Barnes-McConnell joined Planning Office.

June, 1979 Planning team presented Interim Report to JRC, Iowa.

June, 1979 Barnes-McConnell attended Grain Legume Workshop, University of the West Indies, Trinidad. Collected information on constraints. Met potential collaborators.

June, 1979 International Peer Review Panel Meeting to evaluate proposals received. Sixteen panel experts represented CIAT, IITA, IICA and US senior legume scientists.

July, 1979 Progress report to JRC, Virginia.

August, 1979 Adams and Barnes-McConnell attended Grain Legume Workshop at University of Nairobi. Collected information on constraints. Met potential collaborators.

September, 1979 Barnes-McConnell visited Tanzania, University of Dar es Salaam, College of Agriculture. Collected information on constraints. Met potential collaborators.

October, 1979 Host Country Advisory Group Meeting, MSU. Prioritized constraints relative to country needs. Subsequently matched country needs with US evaluated proposal topics.

November, 1979 Meeting with JRC for approvals of Title XII institutions and collaborating research scientists abroad.

December, 1979 Meeting of the representatives of US institutions approved for involvement in further planning. Constraints by geographic areas reviewed. Potential US research teams designed. Country research response sheets sent to potential developing country collaborators.

January, 1980 JRC meeting--approval of overseas trips by US representatives of potential research teams.

March, 1980 Attendance at East African Bean Conference, Malawi--Adams and Barnes-McConnell. Confirmation of constraints chosen for research in Africa. Attendance at PCCMCA meeting, Guatemala--Adams. Confirmation of constraints chosen for research in Latin America.

March-April, 1980 Meetings on-site of potential US and HC collaborators--
a) familiarizing US collaborators with the specific resources, problems and culture of the country in which work to be conducted; and

- b) providing an opportunity for scientists of the US and the HCs to get to know each others' interests, capabilities and approaches to problem solving, in preparation for:
- c) developing specific research designs and budgets to address the problems identified.

April, 1980 JRC meeting--approval of ten institutions to participate in the CRSP.

April, 1980 CRSP Development Meeting, Chicago O'Hare, with the ten institutions approved for CRSP involvement. Brief report of the collaborators' meetings, the Global Plan, decisions on the CRSP Management Entity and the initial five institutions to be members of the first Board of Directors.

May, 1980 Review and comment on the Global Plan received from participating US institutions.

June, 1980 Presentation of Bean/Cowpea Global Plan and proposal to implement the CRSP to JRC and AID (one institution subsequently omitted).

PROGRAM CONSTRAINTS

The constraints to the availability of beans and cowpeas, as identified during the planning process, became the basis for the development of the global or master plan. These constraints as presented in that plan defined the major issues which the project research was designed to address. The constraints are as follows:

1. Limitations due to pests and diseases,
2. Plant response limitations,
3. Limitations of the physical environment,
4. Farming practices limitations,
5. Storage problems,
6. Production-consumption economics,
7. Nutrition, food preparation and health,
8. Socio-cultural factors and
9. Education, training and research capability.

The first four constraints represent prioritized agricultural production problems and the remaining represent other related areas in bean/cowpea availability, utilization or consumption. Both sections are important in CRSP development and the various components of these sections are being addressed.

Specific problems are addressed within constraint areas. In recognition of the impracticality of mounting and supporting large, comprehensive research thrusts in each of these constraint areas, the problems were narrowed to the following proposed activities.

1. Lack of generalized disease and pest resistance and/or effective biological control methods in field and in storage.
2. Low yields and low yield stability.
3. Plant sensitivity to environmental stress and lack of wide adaptation.
4. Inefficiency of nitrogen fixation in the field.
5. Hard seediness necessitating prolonged cooking time.
6. Lack of understanding of traditional farming systems, including pertinent socio-cultural issues and the role of women.
7. Difficulties in the digestibility of legume protein, for adults and especially for small children.
8. Lack of improved practical processing and preserving methods to insure high quality foods from beans/cowpeas.
9. Lack of information on the comparative economic values of introduced technology versus traditional practices (financial, health, labor costs, including sex roles, etc.).
10. Limited indigenous professional competencies to address critical constraints.

Clearly, these are not independent problems. They are both interdependent and universal. Based on LDC priorities and other information received, they are problems which are geographically widely dispersed.

In the development of the research projects, the planning officers considered it of fundamental significance that the US planners did not impose their wishes unilaterally upon national programs. However, the reverse was also true in that planning office responsibility demanded concern for comprehensive coverage of constraint areas which minimizes expensive duplication of effort. In the spirit of true collaboration, it was determined that the actual functioning research plans would have to be prepared jointly by US researchers and Host Country program personnel.

It should be pointed out, however, that the reality of matching professional Host Country needs and expectations with US scientists' needs and goals, within the framework of a global CRSP, has dictated some compromise of the ideal. The global CRSP plan had to focus on universal problems that can be addressed through a local and specific Host Country linkage, with enough specificity to serve a Host Country need, and sufficient generality to permit extension of research findings to the region or to the world.

EVOLUTION OF THE GLOBAL PLAN

The Global Plan for the Bean/Cowpea CRSP was developed by the Planning Entity based on the identified constraints. Implemented during the first year of this program, the plan presented a configuration of nine US lead institutions providing leadership in eighteen projects all of which are presently in existence. Early on, just before the presentation and approval of the initial Global Plan, a tenth lead institution (Mississippi) withdrew from involvement. After plan approval, there were two other revisions made in the plan--Mexico was substituted for CIAT (although CIAT remains involved) and Botswana was substituted for Guyana. Nonetheless, the worldwide research needs for beans and cowpeas which were identified as needing to be included in the initial efforts of the CRSP are all being addressed.

At the time that the initial plan was evolving, much about the CRSP mode was new and uncharted. Guidelines for program implementation had to be developed which would reinforce the mission and keep the program on track. It was determined that the Bean/Cowpea CRSP projects were:

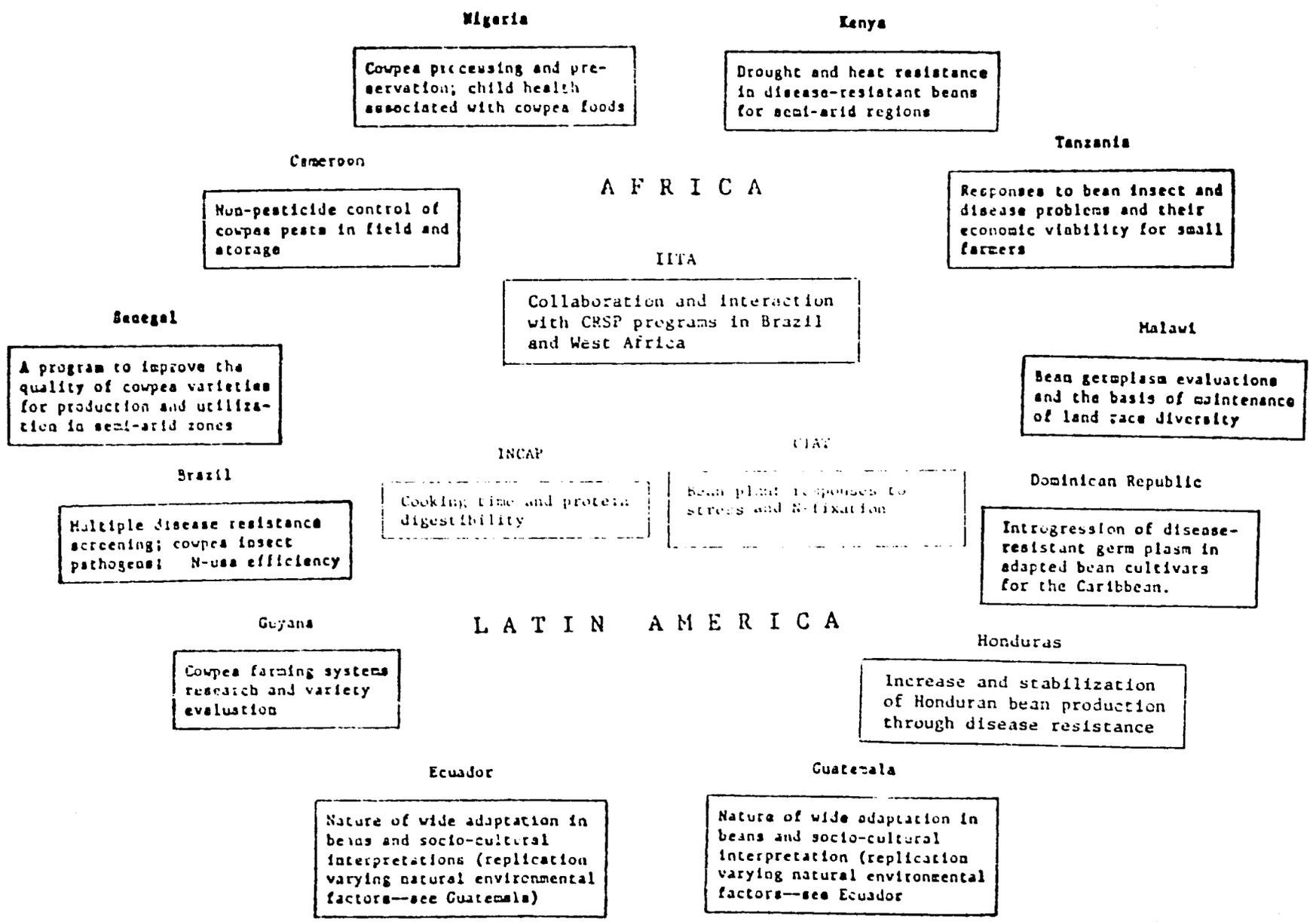
1. To be individual but structurally integrated in order to make the maximum contribution to the availability of beans and cowpeas in areas where they are important to human diet;
2. To emphasize multidisciplinary research integrating production and non-production issues;
3. To focus on research in traditional settings;
4. To build strong and collegial professional relationships among the HC and US researchers in each project;
5. To make financial resources available for both HC and US research activity;
6. To contribute to the strengthening of HC institutions through the enhancement of facilities and equipment needed to support that research;
7. To contribute to the strengthening of HC institutions through a significant level of graduate and undergraduate study, short-term courses, conferences and workshops;
8. To pay specific attention to the roles and participation of women;
9. To be alert to mechanisms for information dissemination; and
10. To provide an opportunity for private sector participation in research activity and in the dissemination of products.

GLOBAL RESEARCH PLAN

BEAN/COWPEA CRSP

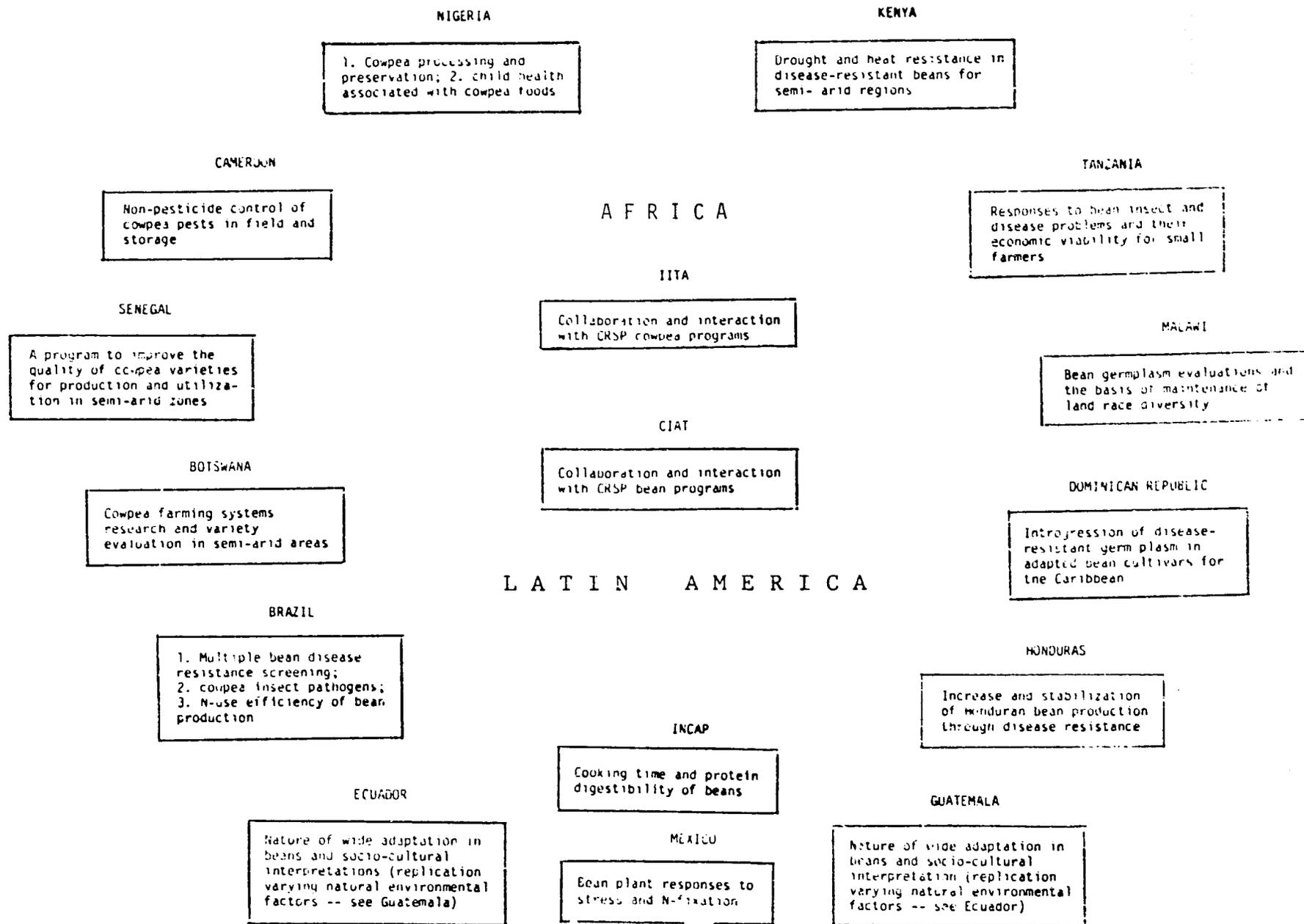
SEMI-ARID ZONE

TEMPERATE ZONE



GLOBAL RESEARCH PLAN (Revised)
BEAN/COWPEA CRSP

SEMI-ARID ZONE



GLOBAL RESEARCH PLAN

HOST COUNTRY/US ADMINISTRATIVE LINKAGES--AFRICA

Projects were developed in the identified African countries through agreements and collaboration with the Host Country administrative units indicated.

BOTSWANA

Ministry of Agriculture

Colorado State University

CAMEROON

Délégation Générale à la
Recherche Scientifique
et Technique (DGRST)
Institut de Recherche
Agronomique (IRA)

KENYA

Ministry of Agriculture
College of Agriculture of
University of Nairobi
at Kabete

University of California
at Davis and Riverside

MALAWI

Ministry of Agriculture
Bunda College of Agriculture of
University of Malawi

Michigan State University with
Virginia State University

NIGERIA

Ministry of Economic Planning
Department of Food and Science of
University of Nigeria at Nsukka
Department of Medicine of
University of Nigeria at Jos
Department of Human Nutrition of
University of Ibadan

University of Georgia and
Michigan State University

SENEGAL

Government of Senegal
Institut Sénégalais de
Recherches Agricoles (ISRA)
Fambey Station

University of California-
Riverside with
University of Arizona

TANZANIA

Government of Tanzania
College of Agriculture of
University of Dar es Salaam
at Morogoro

Washington State University with
University of Illinois

HOST COUNTRY/US ADMINISTRATIVE LINKAGES--LATIN AMERICA

Projects were developed in the identified Latin American countries through agreements and collaboration with the Host Country administrative units indicated.

BRAZIL

Ministry of Agriculture
Empresa Brasileira de Pesquisa
Agropecuaria (EMBRAPA)

Boyce Thompson Institute and
University of Wisconsin

DOMINICAN REPUBLIC

Ministry of Agriculture

University of Nebraska and
University of Puerto Rico with
Mayagüez Institute of
Tropical Agriculture (MITA)

ECUADOR

Ministry of Foreign Affairs
Instituto Nacional de
Investigaciones
Agropecuarias (INIAP)

Cornell University

GUATEMALA

Ministry of Agriculture
Instituto de Ciencia y
Tecnologia Agricolas
(ICTA)

Cornell University

HONDURAS

Ministry of Agriculture
Escuela Agricola Panamericana
(EAP) at Zamorano

University of Puerto Rico
with MITA

INCAP

Institute of Nutrition of
Central America and Panama
(INCAP)

Washington State University with
Colorado State University
Kansas State University
Michigan State University
University of Puerto Rico

MEXICO

National Institute for
Agricultural Research (INIA)
of Department of Agriculture and
Water Resources of the
United States of Mexico

Michigan State University

BEAN/COWPEA CRSP LOG FRAME

<u>Program Goal</u>	<u>Objectively Verifiable Indicators</u>	<u>Verifiers</u>	<u>Assumptions</u>
<p>Make a significant contribution to the improvement of living conditions of small farm producers in developing countries and increase the availability of low cost, nutritious food in the marketplace for the rural and urban poor.</p>	<p>Development of important research results addressing identified constraints.</p> <p>Stronger national research program addressing identified constraints.</p> <p>CRSP products accepted by farmers, extension agents, HC private initiatives in ways which will advance goal.</p> <p>Increased participation of women.</p>	<p>Annual reports and positive TC/ERP reviews of progress.</p> <p>Increased overall size of national program research team with greater multidisciplinary competence and HC investment in the project.</p> <p>Adaptation of findings by external agents: farmers, IARCs, extension agents, commercial interests.</p> <p>Increased male and especially female CRSP graduates in the professional pipeline.</p>	<p>Food and nutrition problems in the developing nations can be solved in part through research.</p> <p>Collaboration between US and HC can be of mutual benefit.</p> <p>Achievement from this program can reach the rural and urban poor.</p> <p>Achievements of this Program can contribute to development in ways which do not increase the marginalization of women and their families.</p>

<u>Purpose</u>	<u>Objectively Verifiable Indicators</u>	<u>Verifiers</u>	<u>Assumptions</u>
<p>Organize and mobilize financial and human resources necessary for mounting a major multi-institutional US/HC collaborative effort in research and training.</p> <p>Provide the knowledge base necessary to achieve significant advances in alleviating the principal constraints to improved production, marketing and utilization of beans and cowpeas in HCs.</p> <p>Improve the capabilities of HC institutions to generate, adopt and apply improved knowledge to local conditions.</p>	<p>US/HC administrations' support of projects.</p> <p>HC and US teams functioning with good working relationships established.</p> <p>Research teams operating with effective level of equipment, supplies and technical support.</p> <p>Effective communications among all participants especially among those working on the same constraints across projects.</p> <p>Mechanism established for the identification and support of US and HC male and female CRSP students.</p> <p>Useful secondary data identified.</p> <p>Improved research infrastructure with laboratory and field research in process.</p>	<p>Smooth management with good communication with MO.</p> <p>US/HC quarterly and annual reports.</p> <p>Formal commitment of participants.</p> <p>Consistent pattern of student training established.</p> <p>Documentation of secondary data.</p> <p>Primary data analyses available in reports and publications.</p> <p>HC contributions to CRSP documented in each year's budget analysis.</p>	<p>HC will maintain interest in the commodity and in CRSP participation.</p> <p>Coups and other forms of political or social disturbances will not be of a magnitude at project sites as to severely and insurmountably affect progress.</p> <p>Necessary basic equipment, facilities and supplies will be available or acquirable within reasonable time frame.</p> <p>There is a sufficiently large pool of students from which to draw for advanced training at least at the secondary school graduate level.</p>

<u>Outputs</u>	<u>Objectively Verifiable Indicators</u>	<u>Verifiers</u>	<u>Assumptions</u>
Strong, better quality yields produced under stressful conditions.	Yield increase under an array of stressful conditions to which produced varieties are resistant.	Yield data from local and national census.	There exists in the HC at least a skeletal infrastructure for information dissemination.
Greater understanding by US and HC collaborators of the socio-cultural and the agri-cultural environment.	Multidisciplinary research generated.	Reports of projects incorporate and integrate socio-cultural with agri-cultural information.	There are HC and US women sufficiently interested in advanced education and professional employment to work their way through the system when it is opened to them.
Products of research packaged appropriately for consumer use.	Informational materials available.	Materials acknowledged as received by many groups and increased consumer demand.	
Information dissemination for a variety of audiences.	Interest of wider international and national research and development community in products.	Requests from professional community for information and products increased.	
Production and utilization research findings useful for the wider research community.	Better health among those making use of project outputs.	Site visits.	
Many male and female graduates of training programs.	Male and especially female graduates returning to HC research institutions.	CRSP graduates identified in HC research positions.	
		Increased numbers of male and female students continually in short-term and long-term training.	

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<u>Inputs</u>	<u>Objectively Verifiable Indicators</u>	<u>Verifiers</u>	<u>Assumptions</u>
Necessary long-term/short-term personnel from HC/US institutions who can communicate with each other.	Annual allocation from AID.	Increase in communications initiated by participants with one another.	AID will generate necessary approvals in timely fashion.
Financial contributions from AID and US and HC institutions.	CRSP funds flowing on regular bases to US and HC research teams.	Review of annual documents by TC and BOD.	AID will have funds available for use by the CRSP.
Equipment such as vehicles, lab, field and office equipment.	Annual plan of work and budget document with US/HC contributions.	AID letter of credit authorizing funds.	All parties making input will continue to feel the mutual benefits worth the investments.
Facilities and supplies for HC/US teams.	Frequent and regular communication among AID, MU, US and HC.	Regular reimbursement requests with quarterly reports.	
Management support from MU, US and HC institution administrations.	Participation in CRSP research and training activity by external groups (i.e., AID-sponsored FSR teams, IARCs, USAID missions).	AID approvals to purchase indicated equipment received.	
Information and support from external groups.		Site visits.	
		Meetings and other forms of communication with external agents.	

PROGRAM REPORT

REFERENCE LISTING

Throughout this section, reference will be made to other CRSP publications which provide additional information. These publications, available on request from the Management Office are as follows:

- Bean/Cowpea CRSP Brochure
- 1983 Annual Report: Executive Summary
- Bean/Cowpea CRSP Women-in-Development Pamphlet
- Beans-Cowpeas Production Constraints and National Programs
- 1983 Annual Report: Technical Summary
- Vanguard Vol. 1, No. 1
- Pulse Beat, Spring 1984 with Bean/Cowpea CRSP Bibliography insert
- Research Highlights Vol. 1, Nos. 1-5
- Women-in-Agriculture Guide--Cameroon
- Monographs Vol. 1, No. 1
- 1983 Annual Report: External Review Panel

MANAGEMENT ORGANIZATION

Management Entity (ME)--Michigan State University

Total program and fiscal responsibility for the performance of the CRSP rests with the Management Entity. The administrative work of the CRSP, organized and funded through the Management Entity, is achieved through the participation of groups as follows:

Management Office (MO)

This is the operational office of the Management Entity for the Bean/Cowpea CRSP. It is located on the Michigan State University campus but maintains constant communications with the project personnel in the US and HCs as well as the management support groups listed below. The MO is organized with the following staff positions.

Director	100%
Deputy Director	50%
WID/Program Specialist (50%/50%)	100%
Administrative Officer	100%
Executive Secretary	100%
Secretary-Receptionist	100%

Despite almost one hundred percent turnover in staff within the last one-and-a-half years, the Management Office has continued (1) to monitor project activity in US and HCs as needed, (2) to provide support and guidance to all projects, (3) to reinforce attention to the WID perspective, (4) to reinforce communication among the various participants of the CRSP, (5) to encourage better project integration in the lead and HC institutions, (6) to provide staff support to the BOD, TC and ERP, (7) to carry out the policies and recommendations of these groups, (8) to maintain communication flow between the CRSP and AID/BIFAD, (9) to increase the published output and (10) to represent the CRSP in wider national and international settings.

The MO is responsible for compiling, editing and publishing the following documents:

CRSP Brochure

Annual Report: Executive Summary

Annual Report: Technical Summary

Detailed Annual Report

External Review Panel Report

Pulse Beat

Vanguard

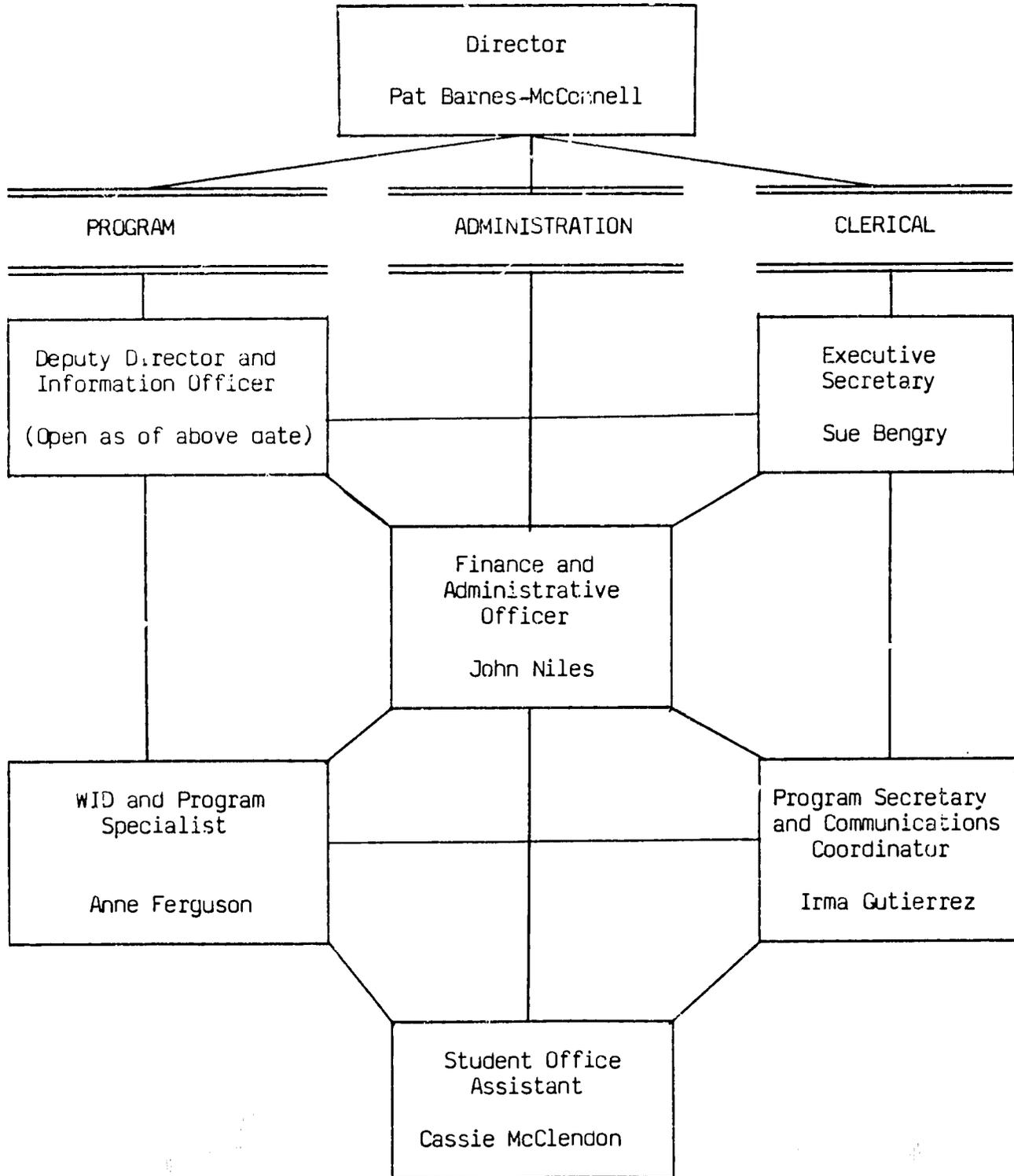
Research Highlights

Women-in-Agriculture Resource Guides

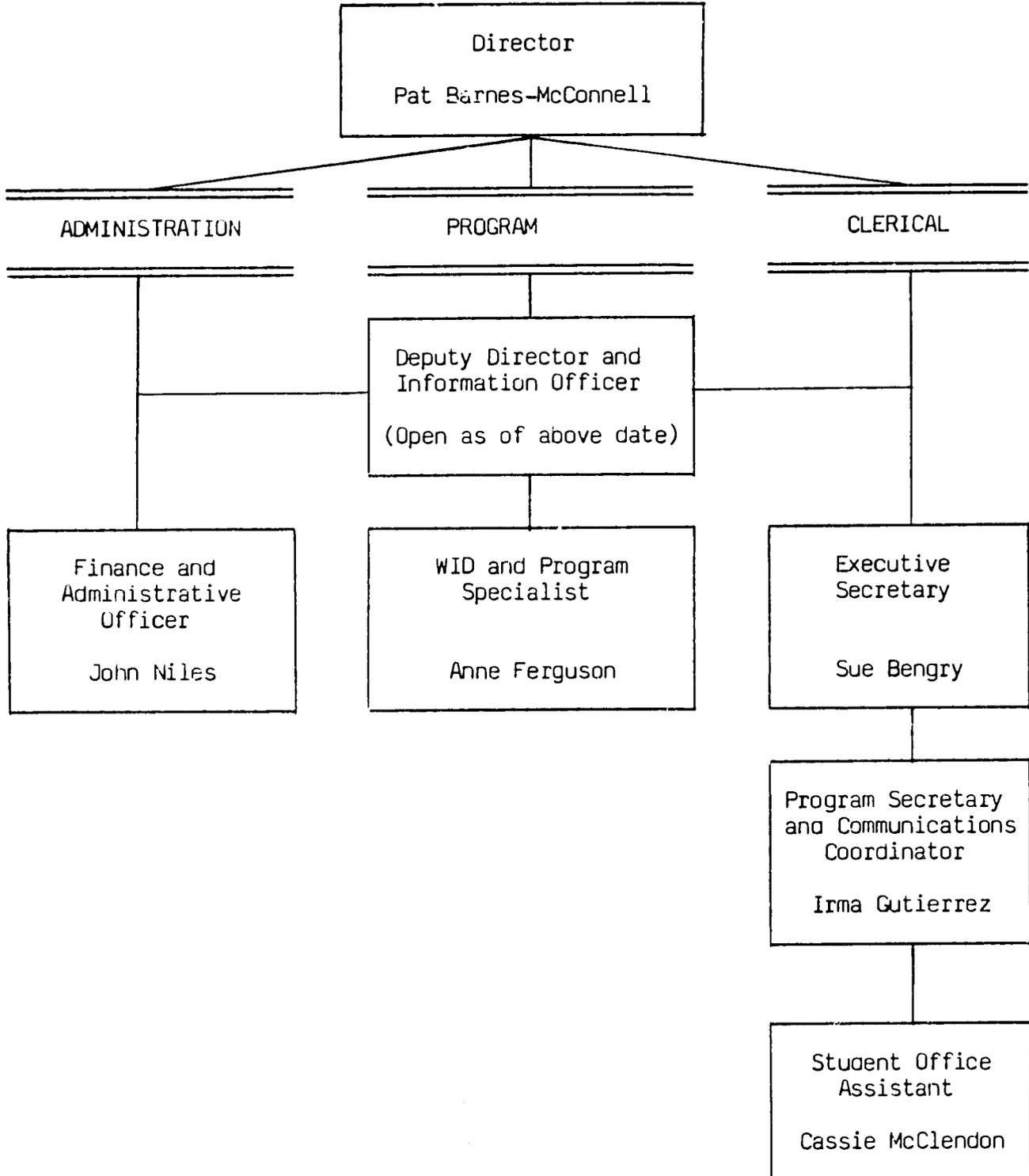
WID Pamphlet

The Management Office further supports the projects through communication with outside organizations, workshops and conferences. The active level of CRSP-wide communication is demonstrated by the MO-documented average daily output of twenty-five phone communications (local and long distance), one telex/cable (incoming or outgoing), twenty-five incoming pieces of mail handled, fifty pieces of mail outgoing and two visitors (local or from out of town). There are multiple phone and mail communications between the MO and the AID and BIFAD program officers weekly.

BEAN/COWPEA CRSP MANAGEMENT OFFICE
INTERACTION CHART
January 1, 1984



BEAN/COWPEA CRSP MANAGEMENT OFFICE
ORGANIZATION CHART
January 1, 1984



External Review Panel (ERP)

7 members

Eminent scientists from an array of disciplines with no previous connection to the CRSP are appointed by BIFAD to annually review and evaluate the individual CRSP projects and the program as a whole. The ERP has completed two reviews of the CRSP. A report of their findings each year presents the results of US and HC site visits and project progress reviews. These ERP reports are used by all of the other management groups in monitoring individual projects and in conducting general CRSP affairs. The comprehensive 1983 Annual Report: External Review Panel is available from the Management Office.

After its third review to be held in 1984-85, the members of the ERP will be rotating off in a 2-2-2-1 pattern, establishing four-year staggered terms.

Institutional Representatives (IRs)

10 members

There is one IR from each of the nine lead institutions plus an additional one from the University of California-Riverside/Davis system. There are no regularly scheduled meetings but frequent mailings from the MO keep them informed of overall CRSP activity. They are the senior link between the CRSP project personnel at their institution and the administration there. Excerpts from IRs' letters indicating the role and contributions of the projects in their institutions are included in this document. These letters reinforce the extent of US institutional support of CRSP activity.

Board of Directors

5 members

The Board is the policy-making group of the CRSP; members are elected from among the nine lead institutions' Institutional Representatives. One member is a standing member representing the Management Entity. In addition to these five members, the Board invites consulting members to its meetings from among the HC administrators. An average of three meetings are held per year staffed by the Management Office. Policies passed by the Board are presented below.

1. Bean/Cowpea CRSP Policy on US/HC Distribution of Funds:

- A. The existing policy previously adopted by the CRSP Board indicates that not less than 50 percent of USAID funds for support of projects be spent in or directly on behalf of Host Countries. In order:
 - (1) To insure CRSP focus on the solution of Host Country problems rather than on the maintenance of existing research programs of US institutions and
 - (2) To nourish a climate of collaboration and partnership between the US and Host Country PIs,this policy is upheld and is to be based on each total grant period.
- B. However, experience has demonstrated that the US PI is uniquely restricted when institutional indirect costs for project support are taken solely from the US 50 percent of the total funds. Therefore, the 50/50 split is to be applied to the total project budget exclusive of all indirect costs.

C. Some projects have not settled into a spending pattern in the Host Country comparable to that in the US. Thus, in order to maintain a 50/50 split, more of each year's funds must be allotted to the half of the team spending less. Assuming that authorized project spending suggests the progress of approved research activity, it is appropriate to encourage Host Country utilization of project funds. Therefore, where Host Country spending patterns are seriously below the expected level, the Host Country and US PIs will be requested to submit to the MO for TC discussion the reasons for the spending patterns and their suggestions for addressing the issue, including possible recognition of an unrealistic Host Country budget level.

2. Bean/Cowpea CRSP Policy on Institutional Involvement:

The Bean/Cowpea CRSP Board of Directors is concerned about the degree to which institutional participation occurs in CRSP projects beyond activities associated with the individual PIs. Of special concern is the extent to which PIs interact with their Institutional Representatives and the extent to which the administration of the lead institution is aware of the project's progress. It is strongly recommended therefore that at each institution significant steps be taken to strengthen institutional ownership through (a) internal project reviews with attention to greater institutional integration, (b) identification of project strengths and weaknesses with appropriate institutional response and (c) when relevant, institutional participation in on-site project analyses.

3. Bean/Cowpea CRSP Policy on Project Allocations:

If there is an effective and consistent quarterly spending pattern of 80 percent (actual costs reimbursement not including encumbrances) projects may be considered for allocations up to 100 percent of project need as requested and demonstrated by the Principal Investigator. Maintenance of spending patterns less than 80 percent receive allocations commensurate with the prior spending pattern at a level which will discourage the accumulation of excess carry-forward funds.

4. Bean/Cowpea CRSP Policy on Training:

The Bean/Cowpea CRSP has as a major goal the strengthening of HC institutions through the training of HC nationals, a critical resource necessary for successful long-term research. To achieve this goal, CRSP projects are to give emphasis to the training of Host Country persons over the training of US persons. This policy adopts a Host Country priority rather than US exclusion and refers to both short-term training and graduate education.

5. Bean/Cowpea CRSP Policy on Participation of Non-CRSP Developing Countries:

Whereas the Bean/Cowpea CRSP has institution building and strengthening as a major goal, the BOD endorses the concept of CRSP Host Countries inviting scientists, representing limited-resource nations in CRSP regions of the world, to participate in Host Country collaborative research and training efforts which may provide mutual benefits.

INSTITUTIONAL PARTICIPATION ON THE BEAN/COWPEA CRSP BOARD OF DIRECTORS

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
Colorado State University		X	X					
Cornell University	X	X						
Michigan State University	X	X	X	X	X	X	X	X
University of California		X	X				X	X
University of Georgia	X			X	X	X		
University of Nebraska	X			X	X	X		
University of Puerto Rico			X	X	X			
University of Wisconsin	X	X				X	X	X
Washington State University			X	X	X			

Technical Committee (TC) 7 members

Composed of researchers associated with the CRSP, this group is responsible for internal project review and research coordination. Members and their alternates are appointed by the Board. It is made up of:

Researchers from CRSP US institutions	5
Researchers from CRSP HC institutions	1
Representatives from IARCs (CIAT or IITA)	1

An average of five meetings are held per year staffed by the Management Office. Some of the major activities of this group have been (1) monitoring progress of projects, (2) reviewing requested changes in projects, (3) responding to ERP recommendations, (4) identifying new areas for collaboration and cooperation, (5) determining most efficient and effective methods for disseminating CRSP information and (6) making recommendations to the Board regarding policies needed for the successful operation of the projects.

INSTITUTIONAL PARTICIPATION ON THE BEAN/COWPEA CRSP TECHNICAL COMMITTEE

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
Botswana								
Brazil/Boyce Thompson				BTI	BTI			
Brazil/Wisconsin/Bliss		UW	UW					
Brazil/Wisconsin/Hagedorn								
Cameroon								
Dominican Republic/Coyne		UNE	UNE					
Ecuador	CORNELL							
Guatemala								
Dominican Republic/UPR		UPR	UPR					
Honduras								
INCAP			HC	HC&MSU	MSU			
Kenya	UCD	UCD						
Malawi	MSU							
Mexico								
Nigeria/U of GA	GA&HC	GA&HC		GA	GA			
Nigeria/MSU								
Senegal			UCR	UCR				
Tanzania	U-IL		WSU	WSU				
CIAT	X	X			X*	X	X	X
IITA			X	X	X*	X	X	X

*Starting from 1985, CIAT and IITA representatives will alternate attendance at Technical Committee meetings.

INTERNATIONAL TRAVEL OF MANAGEMENT GROUPS

To carry out the responsibilities assigned by the grant, most of the groups described above were required to travel internationally. Information on that travel is presented below.

BEAN/COWPEA CRSP INTERNATIONAL TRAVEL THROUGH 9-30-83
(Person Trips)

<u>Project</u>	<u>To Collaborating Country</u>	<u>Prof. Mtg. in Another Country</u>	<u>To IARCs</u>
Board of Directors	0	0	0
External Review Panel	10	0	0
Technical Committee	<u>0</u>	<u>0</u>	<u>7</u>
Total	10	0	7
Management Office	28	0	2

COUNTRY RESEARCH PROJECT ORGANIZATION

The research of the CRSP is organized in sets of HC and US teams collaborating in addressing one or more constraints to bean or cowpea production and utilization. No projects are free standing in the US without HC alliances. All evolved from the two-year planning effort.

Total projects		18
Africa	8	
Latin America	10	
Host Countries		13
Africa	7	
Latin America	6	
Bean projects		12
Africa	3	
Latin America	9	
Cowpea projects		6
Africa	5	
Latin America	1	
US lead institutions		9
US institutions contributing resource scientists		14
Cooperating International Research Centers		2

COUNTRY RESEARCH PROJECT PERSONNEL

Notwithstanding coups or serious coup attempts in five of the CRSP HCs, food riots and other forms of political unrest, the projects continue their steady forward progress. This noteworthy achievement is undoubtedly the product of convivial professional relationships formed among the heterogeneous group of competent people whose human natures seem to demand that, in the midst of confusion and havoc, they seek the path of greatest dedication to the application of science in solving social problems.

PROFESSIONAL RESEARCHERS PARTICIPATING IN CRSP

	<u>Males</u>	<u>Females</u>	<u>Total</u>
HC	90	11	101
US	<u>53</u>	<u>16</u>	<u>69</u>
Total	143	27	170

US RESEARCHERS IN RESIDENCE IN HCS FOR 6 MONTHS OR LONGER

6 males 2 females 8 total

The organization of project research teams has developed based on the needs and existing resources of the projects and the professional relationships established between the HC and US PIs. Three successful models have emerged:

1. No US scientists are stationed in the HCs but active communication, professional cooperation and collegial relationships are maintained. This model is especially appropriate where the HC, similar to the US, maintains a critical mass of scientists including effective senior scientists.
Example: Senegal.
2. Junior scientists (including post-doctorates or advanced Ph.D. students) are stationed in HCs, under close and frequent supervision of senior US PIs, to work with national programs. This model is especially successful where there is an effective HC team but less than a critical mass in the identified research area. Example: Brazil.
3. Senior US scientists are stationed in HCs to work with national programs. This model is especially effective where the HC has very limited research personnel and the US PI acts as a stimulus to building a critical mass.
Example: Botswana.

These models of collaboration are only three among many possibilities, but they evolved from surveys of existing needs and resources and candid negotiations among the principals during the planning and early implementation phases. Because the structure of model #1 is the most equitable and mutually rewarding for the long term, those projects for whom models #2 or #3 are currently the most appropriate are motivated to focus attention on a comprehensive plan to achieve that level of operation.

To reinforce and maintain professional relationships within and among the US/HC teams, project personnel consult with one another frequently, visiting one another's programs and assessing the progress of laboratory and field research strategies jointly developed. The international travel sustained by the projects through the first three years of the CRSP is presented below.

BEAN/COWPEA CRSP INTERNATIONAL PROJECT TRAVEL THROUGH 9-30-83
(Person Trips)

<u>Project</u>	<u>To Collaborating Country</u>	<u>Prof. Mtg. in Another Country</u>	<u>Training--IARCs</u>
Botswana/CSU	2	0	1
Brazil/BTI	12	2	0
Brazil/Bliss	7	1	0
Brazil/Hagedorn	2	0	0
Cameroon/UGA	6	3	1
Dom. Republic/UNE	14	0	2
Dom. Republic/UPR	5	3	3
Ecuador/COR	20	1	2
Guatemala/COR	15	2	1
Honduras/UPR	8	3	0
INCAP/WSU	8	1	0
Kenya/UCD	7	0	0
Malawi/MSU	14	0	1
Mexico/MSU	4	0	0
Nigeria/UGA	4	14	2
Nigeria/MSU	3	4	0
Senegal/UCR	9	1	0
Tanzania/WSU	9	5	2
<u>Total Project Trips</u>	<u>149</u>	<u>40.0</u>	<u>15.0</u>
Average US/HC Trips Per Project Per Year	3	.7	.3

WOMEN-IN-DEVELOPMENT STRATEGY

Recognizing the significant role played by women in many developing countries in bean and cowpea production, this CRSP has incorporated a strong Women-in-Development focus and has included a WID Specialist on its Management Office staff. This was originally a quarter-time appointment but effective September, 1983 it became a full-time position with half of the work effort given to WID and the remainder to more general program-related tasks such as editing the CRSP newsletter and annual reports. A CRSP Women-in-Development pamphlet that provides an overview of women's roles in bean and cowpea production in the HCs and outlines Bean/Cowpea CRSP strategies to incorporate women as agricultural producers, researchers and students has been prepared. A work plan has also been developed and is being implemented. Briefly, three areas of concentration are identified: those with a project focus, those related to the program as a whole and those that address broader policy issues of concern to the WID field.

Project-Centered Areas of Concentration

The major purpose is to increase awareness of how the role played by HC women and children in agriculture may affect, and be affected by, project activities. This input is tailored to the individual projects and takes various forms:

- A. For those projects identified by the External Review Panel as needing greater concentration on WID issues the following plan has been adopted:
1. The Project Paper, Annual Reports, Trip Reports, ERP Reports and other relevant materials are reviewed in order to document the extent to which goals and accomplishments have addressed WID issues.
 2. Planning discussions are held with the PI so as to better identify where WID inputs may be most appropriate.
 3. A Women-in-Agriculture Resource Guide is prepared. This includes:
 - a. A description of women's roles in the farming systems of the HC drawn largely from secondary source materials.
 - b. An examination of the implications of this literature for project activities.
 - c. Information on women's organizations in the HC and, where possible, identification of US and HC researchers who could serve as consultants to the project.
 - d. An annotated bibliography on farming systems and women's roles in agricultural production in the HC. This guide is made available to US and HC project researchers.
 4. Once a specific strategy is agreed upon, efforts are made to assist in implementation.
- B. A slightly different approach is used with regard to those projects the ERP judged as demonstrating adequate attention to WID:
1. By reading the Project Paper, Annual Reports, Trip Reports and other relevant information, the WID Specialist identifies WID concerns that have been successfully addressed and documents the methodologies used.
 2. This information is disseminated to the other projects. For example, copies of articles where WID concerns are well addressed are circulated and PIs are familiarized with successful data collection techniques used in their geographic/cultural areas.
 3. Project researchers are encouraged to make mention of WID issues in their publications and to further expand their efforts to incorporate women through:
 - a. Hiring competent female researchers and technicians, both in the US and in the HCs. Where possible, the WID Specialist assists in this process by providing lists of relevant organizations and individuals for consideration.
 - b. Training of HC and US females in both degree and non-degree programs.

Program-Centered Areas of Concentration:

In addition to project-centered activities, a number of program-wide activities are carried out by the WID Specialist:

- A. Workshops and Training: Training of HC nationals is an important component of the Bean/Cowpea CRSP. Many projects include opportunities for individuals to pursue graduate degree studies and/or participate in non-degree programs. CRSP efforts to recruit women have been successful and will be continued in the future. Attention will also be paid to familiarizing researchers and students with women's roles in agricultural production in developing countries. The feasibility of locating existing WID curricula, or designing short seminars which could be held either separately or in conjunction with other Bean/Cowpea CRSP programs or workshops, is being investigated. Where possible, those individuals in degree programs may also be encouraged to take a course or participate in some formal offering related to Women-in-Development. In a related vein, students who have conducted research addressing women's roles in agricultural production and/or processing may be encouraged to present their findings at appropriate professional association meetings (AWID and others). Training is of particular importance because many of the HC students will command top research and administrative positions when they return home. In these policy-making roles they may significantly influence training and research opportunities for women and build WID concerns into development efforts.
- B. While the Bean/Cowpea CRSP newsletter, Pulse Beat, is already an important means of disseminating information, it can be used to address WID concerns in a more systematic fashion. For example, brief reviews of relevant books and articles can be included, female researchers and students highlighted and WID-related findings from the various projects reported.
- C. Being well acquainted with the eighteen projects, the WID Specialist identifies areas of concern to women that are not currently receiving attention in the program. Recommendations are made as to how these can be incorporated in future planning efforts.

Documenting the Effectiveness of WID

As the program evolves, an increasingly important responsibility will be to demonstrate the effects of having incorporated females as researchers, students and agriculturalists in the projects. This will be done through writing articles, participating in conferences and seminars and other appropriate means.

This plan of work was presented to the Technical Committee on April 26, 1984 and to the Board of Directors on May 10, 1984 where it received positive endorsements. One Women-in-Agriculture Resource Guide (on Cameroon) has been prepared to date and is available from the Management Office.

PROGRAM RESEARCH ACHIEVEMENTS

In the less than three years of actual operations, CRSP researchers are already reporting significant contributions to CRSP goals. For example,

1. Research illuminating the interaction of altitude (temperature) and latitude (daylength) now suggests it is possible to identify each cultivar's optimal environment (see Vanguard Vol. 1, No. 1).
2. Large collections of bean and cowpea germplasm have been made throughout Africa and Latin America.
3. Large numbers of local and exotic bean and cowpea lines have been screened for
 - Pest resistance
 - Disease resistance
 - Heat resistance
 - Drought resistance
4. Breeding programs were initiated incorporating these materials with those of the US collections and the IARCs--these materials also shared with national and international programs. Testing has begun at many sites offering an array of altitude/latitude variations.
5. One national germplasm guide, growing out of the extensive germplasm survey and research, has been prepared for publication.
6. Extremely early cowpeas were developed producing acceptable yield under the recent severe African drought and heat conditions (see Research Highlights Vol. 1, No. 1).
7. Bean-tepary crosses have progressed to field trials which have identified drought resistance (see Research Highlights Vol. 1, No. 6 [in process]).
8. Quick, inexpensive and technically feasible methodology was developed for assessment of viral contamination of lines to be transported across national boundaries (see Research Highlights Vol. 1, No. 5).
9. Five new multiple disease resistant bean genotypes were released and made available to breeding programs (see Research Highlights Vol. 1, No. 2).
10. Basic research on the genetics of inheritance of resistance is proceeding.
11. Research on variations among strains of plant pathogens is generating information critical to disease control.
12. Interactions were identified among bacterial isolates, their concentrations and host plant genotypes as important components in disease control.
13. Over one hundred isolates of insect pathogens were collected for research on biological insect control (see Research Highlights Vol. 1, No. 3).

14. Insect control research on identified cowpea pests' life-cycles and reproductive habits is generating important preliminary findings.
15. Experimental results with superior bean selections and superior isolates of *Rhizobium phaseoli* is suggesting greater than usual levels of nitrogen-fixing potential adequate for commercial level bean production on small farms using traditional cropping systems.
16. Secondary research is generating important information on the role of women in food production (see Women-in-Agriculture Guide--Cameroon).
17. Socio-cultural and socio-economic studies are generating important information which will contribute to decision making in breeding programs.
18. Methodology is being developed for village-level production of cowpea meal acceptable for preparation of traditional foods (see Research Highlights Vol. 1, No. 4).
19. An extensive canvassing of the variety of methods used for evaluation of bean quality has been done, and a report of these methods is being organized for use by the scientific community (see Monographs Vol. 1, No. 2 [in process]).
20. Extensive secondary research completed on the eating of legume leaves and their role in traditional diets (see Monographs Vol. 1, No. 1).
21. Appropriate farming implements were developed (jointly with other groups) suitable for an identified Host Country farming system and environment.
22. Collaboration achieved with other international agricultural programs funded by AID and other bilateral donors.
23. CRSP-sponsored, -organized and -run workshops and short courses (i.e., BNF, biological insect control, MSTAT) have been contributing to the professional programs of CRSP students and the continuing education of CRSP professionals.

Details of research achievements--1983 Annual Report: Technical Summary.

ACHIEVEMENTS IN ADDRESSING CONSTRAINTS BY PROJECT

DOMINANT CONSTRAINT	BTSWA	BRZL/R	BRZL/B	BRZL/H	OMACON	IR/C	IR-L/R	EQUAD/W	GUMALA	INDAS	INDP	KENYA	MALAWI	MEXICO	NERIA/M	NERIA/MC	SENEGAL	TANZANIA
#1a-LIMITATIONS DUE TO PESTS																		
Achievement #3a *					39-44													130-138
Achievement #4					**													
Achievement #13		18-24																
Achievement #14					39-44													
Achievement #16					39-44													
Achievement #22		18-24			39-44													
Achievement #23		18-24																
#1b-LIMITATIONS DUE TO DISEASES																		
Achievement #3b				33-38		45-51	52-56											130-138
Achievement #4						45-51	52-56			72-76								130-138
Achievement #8																		130-138
Achievement #9							52-56			72-76								
Achievement #10						45-51												
Achievement #11						45-51												130-138
Achievement #12						45-51												
Achievement #22				33-38		45-51	52-56											
#2-PLANT RESPONSE LIMITATIONS																		
Achievement #2													91-99					
Achievement #3a													91-99					
Achievement #3b													91-99					
Achievement #3d													91-99	100-108				
Achievement #15			25-32															
Achievement #22			25-32															
Achievement #23			25-32											91-99	100-108			
#3-LIMITATIONS OF THE PHYSICAL ENVIRONMENT																		
Achievement #1									65-71									
Achievement #2																		120-129
Achievement #3c												86-90						120-129
Achievement #3d												86-90						120-129
Achievement #4									65-71			86-90						120-129
Achievement #6												86-90						120-129
Achievement #7												86-90						120-129
Achievement #22																		120-129
#4-FARMING PRACTICES LIMITATIONS																		
Achievement #2	11-17																	
Achievement #3d	11-17																	
Achievement #4	11-17																	
Achievement #5	11-17																	
Achievement #21	11-17																	
Achievement #22	11-17																	
#5-STORAGE PROBLEMS																		
Achievement #3					39-44													
Achievement #19										77-85								
#6-PRODUCTION-CONSUMPTION ECONOMICS																		
Achievement #17																		130-138
#7-NUTRITION, FOOD PREPARATION AND HEALTH																		
Achievement #17															109-111			
Achievement #18																112-119		
Achievement #19											77-85							
#8-SOCIOCULTURAL FACTORS																		
Achievement #17								57-64					91-99					130-138
#9-EDUCATION, TRAINING AND RESEARCH CAPABILITY																		

ALL PROJECTS

*See pages 27-28 for details.

**Refers to pages in 1983 Technical Summary.

PROGRAM TRAINING ACHIEVEMENTS

From the beginning the CRSP has made an on-going effort to emphasize the training of US and HC scientists prepared to work together in the international agriculture context. This effort is the result of a CRSP philosophy that research capacity must be strengthened to build a long-term attack on constraints to food availability throughout the world. While not emphasized to the same extent as the training of HC nationals, US students are also supported under the CRSP. These students, often in exchange arrangements to HCs, provide good counterparts to HC students studying in the US. Frequently important potentially long-term professional relationships evolve (some of the US and HC PIs were students together years ago at a Title XII institution). In addition, US students are provided invaluable learning experiences that will render them more knowledgeable future professors of US and HC students studying in the US in subsequent years. Thus, all is done with an eye toward what will exist after a CRSP project comes to an end.

Strengthening HC institutions through short-term and long-term training in informal and formal settings is encouraged by each of the CRSP's projects. Especially encouraged is graduate-level education to help build a critical mass of professional researchers in the Host Countries participating in this CRSP.

As a part of that effort, projects maintain a strong concern for the educational advancement of women and, through the support of their Host Country colleagues, are gradually being successful. The potential for human resource development is especially significant in this program because of continuing efforts to reinforce gender as well as national/ethnic diversity. The following charts and diagrams show CRSP training activity over the first three years.

1983 BEAN/COWPEA CRSP TRAINING COMPONENT

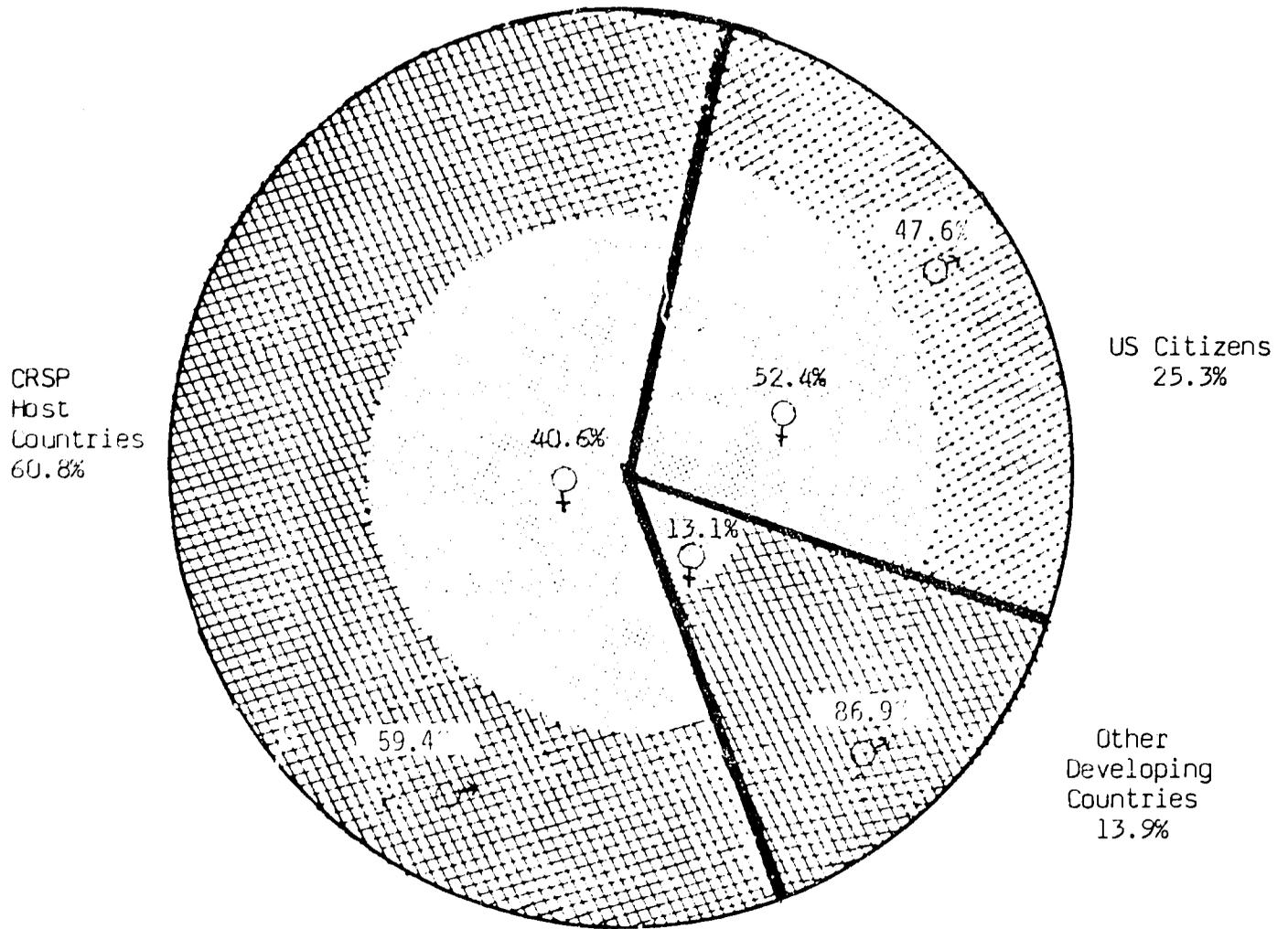
	HOST COUNTRY				UNITED STATES				OTHER DEVELOPING COUNTRIES				TOTAL
	Degree*		Non-Degree**		Degree		Non-Degree		Degree		Non-Degree		
	M	F	M	F	M	F	M	F	M	F	M	F	
BOTSWANA	0	1	2	0	0	2	0	1	0	0	0	0	6
BRAZIL/ROBERTS	0	0	14	24	0	1	1	2	0	0	0	0	42
BRAZIL/BLISS	1	0	1	0	0	0	0	0	0	0	0	0	2
BRAZIL/HAGEDORN	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMEROON	0	0	0	0	0	0	0	0	0	0	1	0	1
DR/COYNE	2	0	2	0	1	1	0	0	2	0	0	0	8
DR/LÓPEZ-ROSA	3	0	2	1	1	0	4	2	0	0	0	0	13
ECUADOR	0	0	0	1	0	0	0	1	0	0	0	0	2
GUATEMALA	3	0	1	0	2	0	1	0	1	0	2	0	10
HONDURAS	1	0	2	0	0	0	0	0	0	0	0	0	3
INCAP	5	6	6	2	5	5	0	0	2	0	1	0	32
KENYA	1	1	1	0	1	0	0	2	0	0	0	0	6
MALAWI	2	0	0	0	1	1	0	0	0	0	0	0	4
MEXICO	1	0	1	0	0	0	0	0	0	1	0	1	4
NIG./MARKAKIS	0	1	0	0	0	0	0	0	0	0	0	0	1
NIG./MCWATTERS	0	0	0	0	2	1	0	0	0	1	0	0	4
SENEGAL	2	0	1	0	1	2	0	0	6	0	4	0	16
TANZANIA	2	1	4	3	0	1	0	0	1	0	0	0	12
Total	23	10	37	31	14	14	6	8	12	2	8	1	***166

* The majority of these students are enrolled in Masters or Ph.D. programs in US institutions. In a few cases individuals are completing Bachelors degrees prior to enrollment in graduate programs.

** Included here are programs of from a few days to nearly a year's duration attended by students and technicians associated with the CRSP.

*** It should be noted that some degree students have also participated in non-degree training and in these cases have been counted in each category. While the total number of traineeships is 166, the actual number of individuals is 149.

BEAN/COWPEA CRSP TRAINEES BY COUNTRY OF ORIGIN AND GENDER*

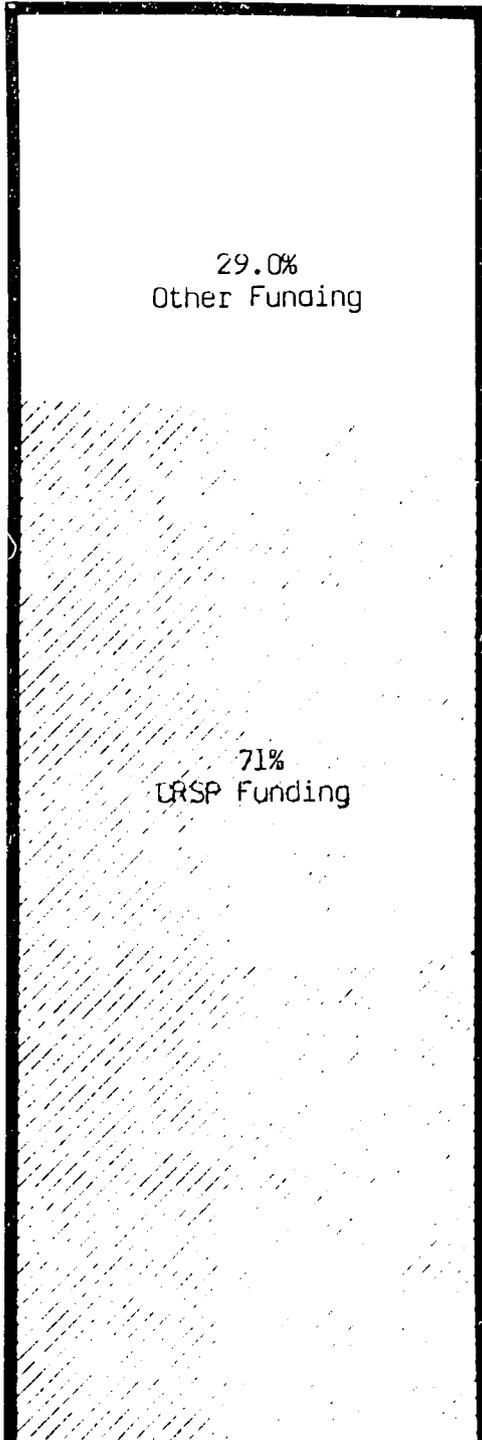


	Male		Total	Female		Total	Total
	Funding CRSP	Other		Funding CRSP	Other		
<u>Degree Programs</u>							
US Citizen	6	8	14	8	6	14	28
Host Country	15	8	23	4	6	10	33
Other Developing Countries	9	3	12	2	0	2	14
Subtotal	30	19	49	14	12	26	75
<u>Non-Degree Programs</u>							
US Citizen	5	1	6	8	0	8	14
Host Country	31	6	37	28	3	31	68
Other Developing Countries	5	3	8	1	0	1	9
Subtotal	41	10	51	37	3	40	91
Total	71	29	100	51	15	66	166

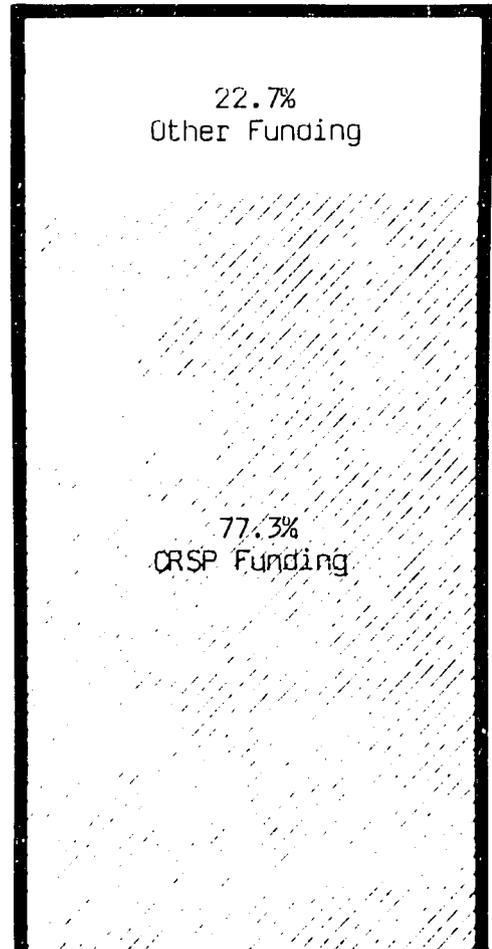
*Some trainees participated in degree and non-degree programs and, in these cases, have been counted in both categories. The actual number of individuals trained is 149 (86 males and 63 females).

BEAN/COWPEA CRSP STUDENT TRAINEES BY FUNDING SOURCE AND GENDER

Male
Degree and Non-Degree
100 Total



Female
Degree and Non-Degree
66 Total



LINKAGES WITH INTERNATIONAL AGRICULTURAL RESEARCH CENTERS (IARCs)

From the beginning, when the heads of the respective legume programs at CIAT and IITA were invited to participate in CRSP planning (i.e., Peter Graham and subsequently Aart van Schoonhoven from CIAT; Peter Goldsworthy and subsequently Shiv Singh from IITA), CRSP and IARC scientists have maintained collegial professional relationships which in many cases predated the birth of the CRSP. These relationships have, in most cases, grown to the mutual advantage of both groups. Examples of the relationships are as follows:

1. The heads of the legume programs of the cooperating IARCs alternate on the Technical Committee (Shiv Singh of IITA and Aart van Schoonhoven of CIAT).
2. IARC scientists have taken sabbatical leaves to study with senior CRSP scientists and CRSP scientists have spent their sabbaticals at the IARCs (i.e., CIAT's Steve Temple to Wisconsin; IITA's Earl Watt to Michigan State University; CRSP's Matt Silhernagel to CIAT).
3. CRSP graduate students (i.e., Paul Gniffke from Cornell) and trainees (i.e., Betty Gondwe from Tanzania) trained and conducted research at IARCs. The CRSP has sponsored several such trainees. IARC-trained graduates (i.e., Moffi Ta'Ama) have found positions in CRSP projects.
4. IARC plant material is included among lines in CRSP trials (i.e., Dominican Republic) and among the material evaluated in the CRSP food science research (i.e., INCAP).
5. Conversely, CRSP material has been used by CIAT and additional lines have been requested and are being furnished to IARCs by CRSP teams (i.e., Kenya/University of California tepary crosses).
6. CRSP and CIAT cooperate in agronomic and varietal on-farm research such as presently being planned in Honduras.
7. The CRSP and CIAT have worked together sponsoring important joint professional meetings such as the Rust Workshop held in 1983 in the Dominican Republic. At this meeting, international leaders in rust research reached agreement on new evaluation criteria and labels to be used worldwide as the standard in rust evaluation trials.
8. The CRSP and IITA are co-sponsoring a Worldwide Cowpea Conference in November of 1984 in Ibadan, Nigeria.

These cooperative efforts evolved as mutual advantage was perceived by the respective units. The MOUs between the CRSP and the IARCs demonstrate the extent to which both groups are concerned that duplication is held to a minimum, complementarity is enhanced and our respective resources are used as efficiently and appropriately as possible to increase the availability of beans and cowpeas in the food deficient areas of the world.

PROJECT EVALUATIONS AND REVIEW PROFILES

EXTERNAL REVIEW PANEL EVALUATIONS AND FOLLOW-UP

At the Annual Meeting of the ERP, the progress reports of the projects and site reviews were discussed at length and evaluated. A summary is presented here.

Project Evaluation Scales

Each project was assessed in seven categories related to the review issues agreed upon at the beginning of the process. The categories are:

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
(See complete 1983 ERP Report)
6. Response to Prior ERP Project Recommendations
7. Overall Recommendation Rating

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

Overall Rating: General performance was considered with projects receiving one of three recommendations: #1 continuation with no major changes, #2 continuation with some changes recommended and #3 continuation only with identified changes.

Five-Point Evaluation Scale (for items 1-3.8, 4 and 6): Within a project each category was judged to be Exceptional (E), Highly Satisfactory (HS), Satisfactory (S), Less than Satisfactory (LS) and 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 are presented in the complete 1983 ERP Report.

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SUMMARY 1983 EXTERNAL REVIEW PANEL EVALUATION 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	S	S	E	LS	HS	S	NA	S	HS	PoI	E	LS	HS	S	1	
BRAZIL/ROBERTS	S	HS	S	S	LS	HS	LS	HS	E	NA	S	S	NA	S	HS	PU	S	NA	HS	S	2	
BRAZIL/BLISS	HS	HS	S	S	LS	E	HS	HS	E	NA	HS	HS	NA	LS	S	PoI	E	NA	HS	NA	1	
BRAZIL/HAGEDORN	S	LS	S	UA	LS	HS	UA	S	LS	NA	LS	NA	NA	LS	NA	L	S	NA	LS	UA	3	
CAMEROON	LS	LS	S	LS	UA	HS	LS	HS	HS	NA	LS	S	NA	LS	S	PoI	S	S	S	UA	3	
DR/COYNE	S	HS	HS	HS	HS	HS	E	S	HS	S	HS	HS	NA	HS	S	PoI	S	NA	S	HS	1	
DR/LÓPEZ-ROSA	S	HS	HS	E	HS	HS	E	S	HS	S	HS	HS	NA	HS	HS	AI	S	NA	S	HS	1	
ECUADOR	S	S	HS	HS	S	S	HS	LS	S	HS	LS	S	S	HS	HS	HP	HS	S	S	HS	2	
GUATEMALA	HS	S	S	S	HS	HS/UA	HS	LS	E	UA	S	S	LS	LS	HS	WW	S	S	HS	S	2	
HONDURAS	LS	S	S	LS	LS	S	LS	S	S	LS	S	S	NA	UA	S	PoI	S	S	S	S	3	
INCAP	S	S	S	S	E	HS	S	S	HS	S	S	S	HS	LS	S	PoI	S	S	HS	HS	1	
KENYA	UA	LS	S	LS	S	HS	LS	S	S	NA	S	S	NA	S	S	PU	S	S	S	LS	3	
MALAWI	S	S	S	S	HS	HS	HS	HS	HS	HS	HS	S	S	HS	HS	LTP	HS	S	S	NA	1	
MEXICO	HS	HS	NA	HS	HS	HS	HS	S	HS	NA	S	S	NA	S	HS	PoI	S	NA	S	NA	1	
NIGERIA/MARKAKIS	S	S	S	S	S	S	LS	S	S	S	S	LS	S	S	S	PoI	UA	NA	S	S	2	
NIGERIA/MC WATTERS	HS	S	S	S	HS	HS	LS	S	HS	LS	S	HS	HS	S	S	PoI	LS	NA	S	S	2	
SENEGAL	HS	HS	HS	HS	HS	HS	E	S	HS	NA	HS	HS	NA	S	HS	AI	HS	HS	HS	NA	1	
TANZANIA	S	HS	S	S	S	HS	HS	S	S	HS	HS	S	S	HS	HS	PoI	HS	S	S	NA	1	

KEY:

E - Exceptional	UA - Unacceptable	PU - Potentially Useful	LTP - Long-Term Potential
HS - Highly Satisfactory	NA - Not Applicable	PoI - Potentially Important	WW - Worldwide
S - Satisfactory	L - Limited	AI - Already Important	
LS - Less Than Satisfactory	PL - Potentially Limited	HP - Highly Promising	

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

SUMMARY OF ERP RECOMMENDATIONS AND FOLLOWUP

PROJECT	RECOMMENDATION BY ERP--1983	ACTIONS TAKEN
BOTSWANA/CSU	Coordination with USAID-supported Agricultural Technology Improvement Program needs to be improved. Training initiatives need to be intensified. Development of social science component has been slow.	Issues have been communicated to US PI. Further discussions will be held while US team is on home leave in US in summer of 1984.
BRAZIL/BTI	Lack of a HC PI who is a working researcher inhibits the full institutionalization of the project.	A HC PI who is a working researcher has been identified (Mr. Bonifacio Magalhaes).
BRAZIL/BLISS	Post-graduate training needs to be increased. Women should be more directly involved in the project research and training.	Studies are in process to address these problems.
BRAZIL/ HAGEDORN	Brazil needs to designate a HC PI prepared to contribute directly to research objective of project. A technical assessment is required of the relationship of the project to the overall program of CNPAF with attention to existing work on varietal development. An assessment needs to be made of the methodology, its appropriateness and likely effectiveness in Brazil. A small group of disciplinary peers should be identified to assess present research strategy.	New peer panel identified. Wisconsin administrator and MO director joined Pathologist's Review Panel (PRP) for on-site visit to assess the project from disciplinary perspective. With PRP report TC reviewed project again. New US PI (Dr. Douglas Maxwell) has been named. Broader institutionalization of project at Wisconsin. Dr. Almiro Blumenschein (CNPAF Director) visited US and new work plan was developed focusing on simultaneous inoculation, general resistance, etc. Dr. Blumenschein reaffirmed project commitment and new direction at BOD presentation.
CAMEROON/UGA	HC PI needs to be provided by the Government of Cameroon within an arrangement that will provide training for personnel and move toward the institutionalization of the research. In the US some public relations work may be in order.	HC PI has been named (Mr. Zachee Boli Baboule). New HC PI and AID Mission Director invited to US institutions for discussion of work plan and budget. Broader institutionalization of project at Georgia with participation of additional researchers and administrative support.

PROJECT	RECOMMENDATION BY ERP--1983	ACTIONS TAKEN
DOM. REP./ UNE	A comprehensive graduate training plan should be constructed which lays out (1) a broader array of disciplines which can contribute to the national bean research program and (2) opportunities for the professional advancement of DR women.	Studies are in process to address these problems.
DOM. REP./ UPR	There is a serious need for more training in plant breeding.	Activities in process to address this problem.
ECUADOR/COR	Weaknesses must be corrected in (1) the project's Logical Framework (2) the training component and (3) failure to have yet identified the technical personnel it had planned to place in Ecuador.	The project Log Frame is being updated. An agronomist (Wesley Kline) and sociologist (Dr. Kris Merschrod) have been named and will begin work in HC immediately. Training component weaknesses are being studied.
GUATEMALA/ COR	Progress with respect to sociological objectives is unacceptable. Requires implementation or attention to procedures for adjusting project objectives.	Broader institutionalization of project at Cornell. New sociologist (Dr. Harold Capener) named to address ERP issues.
HONDURAS/UPR	High turnover of HC PIs and inadequate HC institutionalization are weaknesses which have compromised the value of the project. Greater US collaboration with HC needed.	New HC PI has been named (Mr. Rafael Diaz). Director of HC institution (EAP) attended May '84 BOD meeting and reaffirmed commitment to project. Previous HC contributions now recognized. New US PI named (Dr. James Beaver).
INCAP/WSU	Contributions and coordination among the five US institutions, particularly the cost effectiveness of the current arrangement, needs to be assessed.	US PI has increased level of communication with participants. Special attention being paid to coordinating research objectives and procedures.
KENYA/UCD	The approaches being used to assess drought tolerance should be reviewed by TC. Level of project activities and accomplishments by HC in relation to level of financial support used should also be reviewed by TC. HC financial reporting to UCD is unsatisfactory.	US PI and MO finance officer joined project team for on-site review and meeting. Univ. of Nairobi controller has supplied all financial reports. New fiscal procedures in place with UN controller in charge of all finances. New HC PI named (Dr. David Ngugi). Dr. Ngugi visited UCD and developed new plan of work, which reorganizes

PROJECT	RECOMMENDATION BY ERP--1983	ACTIONS TAKEN
KENYA/UCD (continued)		HC team and responsibilities. Dr. Ngugi attended BOD meeting to discuss new arrangements. TC reviewed new project draft plan of work.
MALAWI/MSU	Needs better Agronomic/Social Science integration.	First report now available. More work in process to address this issue.
MEXICO/MSU	Lack of trained personnel at the Ph.D. level for the breeding and physiology research at Durango. Lack of adequate laboratory and greenhouse facilities to supplement field plot research at Durango. Limited involvement of HC women researchers.	Activities are in process to address these problems. Help of AID representative sought.
NIGERIA/MSU	Training component needs strengthening. Domestic and international linkages, including those with other CRSP projects, need to be improved. Communication between US and HC needs improvement.	Activities to address these problems are in process. Closer links with other projects are being developed. Structural problems within Nigeria inhibit communication. Greater resources may be required to maintain required level of communication.
NIGERIA/UGA	Sociological component needs improvement. Special attention should be given to building stronger links between the two Nigeria projects.	Socio-economic surveys will be expanded. Closer links between the two Nigerian projects are being developed. Joint meeting for November 1984.
SENEGAL/UCR	Graduate degree training, especially for women, is limited and should be intensified to include training in the US. Cooperation from Univ. of Arizona is weak.	Activities are in process to address these problems. TC requested ERP evaluation of Arizona project.
TANZANIA/WSU	Absence on HC side of any person who devotes more than 20% to the CRSP leading the day-to-day work of the group is a weakness. Poor linkages in HC between the agricultural and social sciences. Physical facilities and organization for managing and conserving the genetic resource material need to be developed.	Activities are in process to address these problems. US researcher to go to Tanzania being sought.

PROJECT	RECOMMENDATION BY ERP--1983	ACTIONS TAKEN
MANAGEMENT OFFICE	<p>(1) An early warning system, appropriate to the model, needs to be set up so that MO identification of potential problems and better communication between US and HC PIs are facilitated.</p> <p>(2) An open line of communication among all CRSP components should be maintained.</p> <p>(3) Attention should be directed to building a stronger sense of community across projects within the CRSP. This includes: research-sharing workshops; sharing publications; increasing the dissemination of CRSP information through publications which are made available to US and HC participants; adding publications listings to <u>Pulse Beat</u>, the CRSP newsletter; involving HC graduate students in more cross-project activities which will encourage them to continue working with the CRSP projects when they return home.</p> <p>(4) More open communication with the CGIAR system should be established. Existing cooperation with IARCs should be strengthened.</p>	<p>These recommendations are in the process of being implemented.</p>
PROGRAM EVALUATION	<p>(1) The CRSP collegial and financial activity may alter the balance of priorities within HCs, not in their own best interest. (2) Collaboration with other overseas development programs and agricultural research efforts is inadequate. Especially important is cooperation with other US bilateral efforts within the same HCs. (3) Economic analyses of production systems and the acquisition of baseline data are lagging behind biological research. (4) Linkages with other development agencies and institutions in the HCs such as extension are weak. Dissemination of research findings therefore is likely to be poor. (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.</p>	<p>These recommendations are in the process of being addressed.</p>

BOARD OF DIRECTORS EXTENSION EVALUATIONS

On May 10, 1984 the BOD reviewed the eighteen CRSP projects, considering the appropriateness of each for a three-year extension beyond the initial five-year period. Utilizing all documentation, the BOD members engaged in lengthy discussions of the information available as follows:

1. Progress reports by individual projects.
2. ERP evaluations and recommendations.
3. TC review and recommendations.
4. Reports from MO, lead institutions' and HC institutions' actions taken in response to those recommendations
5. Current and projected status of each project based on the resolutions accomplished.

General performance, importance of the research to the CRSP Global Plan and current potential for making the promised contribution as a result of the recent changes were issues receiving particular attention in those projects previously judged as less than satisfactory by the ERP.

BOD Rating Scale:

- 1 The project is making important contributions to the CRSP goals and is therefore appropriate for extension.
- 2 The project has potential importance for the CRSP goal but is appropriate for extension only if, after one year, the major changes made result in significant progress.
- 3 The project is inappropriate for extension beyond the original commitment.

SUMMARY 1983 BOARD OF DIRECTORS EXTENSION RATING

	Comments	Rating
BOTSWANA	Interest expressed in monitoring project strengthening as identified by ERP.	1
BRAZIL/ROBERTS	Planned change important and will be monitored for effectiveness.	1
BRAZIL/BLISS	Service role in CRSP significant.	1
BRAZIL/HAGEDORN	Significant changes, indicated by ERP, PRP and TC and made as a result of commitment and great effort on parts of US and HC administrators, are impressive.	2
CAMEROON	Identification of HC PI plus greater institutionalization of this project within UGA may have addressed concerns identified by ERP.	2
DOM. REP./COYNE	This project will provide important foundation for disease research in several projects.	1
DR/LOPEZ-ROSA	Existing level of coordination should magnify the contributions from this group.	1
ECUADOR	Sociologist and agronomist on site are expected to move project forward rapidly.	2
GUATEMALA	Initiation of socio-agronomic research planned FY 84 is expected to bring this component more closely in line with successful agronomic component.	2
HONDURAS	Identification of HC PI and clarification of significant HC contributions give promise of rapid movement in objectives. Reports of farmers already growing the new lines impressive.	2
INCAP	Improved coordination/communications among project researchers, service role in CRSP significant.	1
KENYA	All ERP-identified problems vigorously addressed by changes in HC PI, financial reporting, improvements in research design and new plan of work. US and HC administrative efforts suggest project turn-around.	2
MALAWI	Important contribution to CRSP anticipated.	1
MEXICO	Important contribution to CRSP anticipated.	1
NIGERIA/MARKAKIS	New HC PI anticipated will move research more quickly. Promised closer cooperation and improved communications among researchers will be monitored for effectiveness.	2
NIGERIA/MCWATTERS	Important contribution to CRSP goal evolving.	1
SENEGAL	Important contribution to CRSP goal evolving.	1
TANZANIA	Important contribution to CRSP goal evolving.	1

COUNTRY RESEARCH PROJECT REVIEW PROFILES

The following pages present for each of the eighteen projects, a one-sheet profile which gives a brief overview of the important information on goals, achievements, evaluations and problem resolutions. These Project Review Profiles are useful as a quick summary of project flow.

The Profiles presented here present both the success stories as well as the CRSP projects that have received a less-than-satisfactory evaluation. Brief statements of what major changes have been made demonstrate (1) the level of response to the evaluations and (2) the extent of efforts made to maintain the viability and integrity of the original research objectives still judged by the TC, BOD and ERP to be important for the achievement of CRSP goals. The Board Rating for project extension based on the prior resolution activity concludes each sheet.

Thus for each project, information is given as follows:

Goal

Description

Role in Global Plan

Achievements

Contributions

To HC

To US

Major Problems as Identified by ERP

ERP Rating

Actions Taken

Resolution

Subsequent BOD Extension Rating

Following each Project Review Profile is the project's Logical Framework.

PROJECT REVIEW PROFILE

BOTSWANA • COLORADO STATE UNIVERSITY (Initiated July 1982) • COWPEAS
deMooy

DEVELOPMENT OF INTEGRATED COWPEA PRODUCTION SYSTEMS IN SEMIARID BOTSWANA

GOAL: Provide small farmers with an acceptable package of integrated practices for cowpea growing and harvesting including improved varieties and implementation as required to realize increased yields.

DESCRIPTION: This project adopts a comprehensive cropping systems approach to improving yields. Attention is given to tillage practices, planting practices and moisture conservation as well as variety testing, cultural practices and harvesting techniques. A senior and a junior expatriate researcher have been in place in Botswana although the latter will return to the US for graduate work in the fifth year of the CRSP.

ROLE IN GLOBAL PLAN: This is the major comprehensive cropping systems project. Dominant constraint #4 (farming practices limitations).

ACHIEVEMENTS:

1. A newly introduced variety, surpassing the nationally recognized variety in yields, has been accepted for release by the Botswana Ministry of Agriculture (MAG).
2. A cowpea germplasm collection was established, seeds available upon request. A Botswana Cowpea Germplasm Catalog, with a description of 180 local varieties, is being published by the MAG and a second volume is in preparation.
3. A once-over cultivating/planting procedure for minimum tillage implements and reduction in draft animal power is being designed. Demonstration plots on farmers' fields were arranged.

CONTRIBUTIONS:

To HC--Making a unique contribution to production practices, intercropping systems and harvesting techniques, the project will contribute practical solutions to the problems of low yield characteristic of small farms.

To US--Some of the problems characteristic of cowpea production in Botswana, such as soil crust formation, are characteristic of semiarid zones in the US and elsewhere in the world, hence an investigation of these issues has potential widespread ramifications. In addition, the cowpea germplasm collection is a valuable resource to US agriculture.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 1): None. However, US PI in Botswana needs to coordinate better with AID Farming Systems Project there.

ACTIONS TAKEN: This issue communicated to US PI. Further discussions to be held while team is on home leave in US summer 1984.

RESOLUTION:

1. Better in-country coordination in process.
2. Expanded plant screening activities being initiated, with breeding assistance identified.
3. HC PI will be in place after completion of graduate program.

SUBSEQUENT BOD EXTENSION RATING 1.

LOG FRAME - COLORADO STATE UNIVERSITY - BOTSWANA

June 1, 1983

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Assumptions
<p><u>Program or Sector Goals:</u> Increase in yield per ha and yield stability of cowpeas under specific semi-arid conditions</p> <p>Increased returns in cowpea production per unit of labor and/ or financial input on sample farms.</p>	<p><u>Measures of Achievement:</u> Yields consistently in excess of base line survey records.</p> <p>Greater production per farm family unit compared with previous statistical records.</p>	<p>Means of field trials for certain regions under various seasonal conditions compared with standard varieties and traditional production methods.</p> <p>Socio-economic data recorded for cooperating farmers in field trials.</p>	<p><u>Assumptions for Goal Achievement:</u> Minimum of 3 years of project operation. Continuing field support from DAR and USAID. Sufficient level of interest from SOB Agricultural Field Services personnel in various regions of the country. Base line survey data exist or will be made available. Small farmers willing to follow up on agricultural extension recommendations and interested in progressing beyond minimum subsistence production.</p>
<p><u>Project Purpose:</u></p> <ol style="list-style-type: none"> 1. Identification of constraints in cowpea production process stemming from a combination of: tillage/ cultivation, planting, spacing, and intercropping practices, choice of variety, draft power supply, insect and disease infestation, harvesting, threshing, storage, labor or other resource input factors. 2. Finding solutions for constraints. 3. Testing of solutions for acceptability in farmers' fields. 4. Institutionalization of research techniques and capacity. 	<p><u>Conditions Indicating Project Achievement:</u> Packages of improved cultural practices adapted to specific sets of environmental or socio-economic conditions.</p> <p>Acceptance of project recommendations by more than one-half of the farmers in sample having identified constraints.</p>	<p>Results of experiments. Published reports.</p> <p>Survey of rate of acceptance of recommended practices by cooperating farmers and their neighbors.</p>	<p><u>Assumptions for Project Achievement:</u> Continuation of H.C. administrative and technical support</p> <p>Continued interest of farmers to cooperate with project. Participation of Agricultural Field Services regional staff and Farming Systems groups.</p>
<p><u>Project Outputs:</u></p> <ol style="list-style-type: none"> 1. Selection of HYV from local and international germplasm collection and trials; better adapted varieties than those presently grown. 	<p><u>Magnitude of Outputs:</u> Number of varieties identified, quantities of seed produced.</p>	<p>Consistent superior performance of introduced varieties in regional field trials. Amount of seed produced by Seed Multiplication Unit.</p>	<p><u>Output Assumptions:</u> Continued cooperation with IITA and SAFGRAD Research Centers.</p>

LOG FRAME (cont.)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Assumptions
<p>2. Packages of cultural practices for higher production/ha and yield stability through better stands, insect and weed control and other cultural practices for specific environments, socio-economic resource levels, and type of draft power availability.</p> <p>3. Faster methods of harvesting, threshing, and winnowing with greater returns per unit labor.</p> <p>4. Training of H.C. research personnel at MS degree level at U.S. university for cowpea research career.</p>	<p>Variety of situations covered by improved practices adequate to make substantial progress over current status.</p> <p>Economic returns.</p> <p>Number of H.C. personnel trained and remaining involved in cowpea research.</p>	<p>Measured and recorded observations in field trials on Agricultural Research Station, Outlying Research Farms, and privately owned farms.</p> <p>Recorded comparisons of harvesting, threshing, and winnowing labor and time, using hand labor or machine.</p> <p>Same</p>	<p>Cooperation with EFSAIP in development of appropriate tillage/planting implements.</p> <p>Appointment of active cowpea researcher as H.C. professional counterpart.</p> <p>Presence of suitable cowpea lines in germplasm collection</p> <p>H.C. students capable of fulfilling academic requirements at U.S. university.</p>
<p>Project Inputs:</p> <p>1. CSU research personnel in H.C.: U.S. Project Leader, 2 graduate students on continuing basis, 1 P.C. volunteer agronomist.</p> <p>2. CSU personnel on campus: Program administrator and part-time technical backstop.</p> <p>3. H.C. research personnel: H.C. Project Leader, 2 graduate students on continuing basis, 1 Technical Assistant, 1/4 time R.O. in entomology and two 1/4 time assistants, 1/4 time R.O. in phytopathology and two 1/4 time assistants, clerical support and supplies.</p> <p>4. H.C. administrative support: Program administrator.</p> <p>5. DAR office/ laboratory facilities, suitable land & research facilities, equipment and materials, vehicle for official transportation.</p>	<p>Current project roster for personnel involvement.</p> <p>Availability of input resources recorded in progress reports.</p>	<p>Project files containing progress reports, annual reports, official correspondence and memos, project expense accounting.</p>	<p>The negotiated project input resources to be sustained throughout life of project.</p> <p>All positions on the project filled within reasonable time.</p>

PROJECT REVIEW PROFILE

BRAZIL • BOYCE THOMPSON INSTITUTE (Initiated October 1981) • COWPEAS
Roberts

INSECT PATHOGENS IN COWPEA PEST MANAGEMENT SYSTEMS FOR DEVELOPING NATIONS

GOAL: Develop insect pathogens as pest management tools compatible with other insect control practices for small farms.

DESCRIPTION: This project is advancing technology for biological insect control in small farmer cowpea production. Short-term training courses in insect pathology have generated considerable interest. An expatriate scientist is in place in Brazil (Dr. Richard Daoust).

ROLE IN GLOBAL PLAN: This is the only CRSP project directed totally to biological control of insects. Dominant constraint #1 (limitations due to pests).

ACHIEVEMENTS:

1. More than one hundred fungal isolates have been identified in Brazil and many have been evaluated in the laboratory.
2. Methods for fungal mass production and bioassay have been developed and refinements of insect-rearing methods have made some cowpea insect species available for pathology and non-pathology studies.
3. Short courses in insect pathology have been held in Goiania, Brazil to provide an overview of the current status of microbial control and to demonstrate simple techniques in laboratory sessions.

CONTRIBUTIONS:

- To HC--This project will directly benefit Brazil through the development of cowpea pest microbial control agents that can be produced in-country and can be used by small farmers.
- To US--Fungal isolates from Brazil have been distributed to interested scientists in the US for possible use as insect control agents. Methods for fungal mass production and bioassay are directly applicable to other studies of entomopathogenic fungi worldwide.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 2): None. However, the ERP was concerned about the absence of a HC PI in Brazil who is a working researcher.

ACTIONS TAKEN: Regular trips to Brazil by the senior US PI support effective communication and provide necessary research materials.

RESOLUTION:

1. HC PI, who is a working researcher, was established (Mr. Bonifacio Magalhaes).
2. The possibility of extending the work to include insect pathogens of beans will be explored.

SUBSEQUENT BOD EXTENSION RATING 1 (with planned changes).

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Log Frame Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Outputs:</p> <p>(1) Isolation, taxonomic determination, and screening of candidate microbial control agents.</p> <p>(2) Identification and small scale production of efficacious pathogens.</p> <p>(3) Development of cost effective, low technology, mass production and formulation methodologies.</p> <p>(4) Development of operational field application and/or introduction strategies (including rates, timing, and integration with other control methods).</p> <p>(5) IPRC and working data base established, maintained, and operated by trained insect pathologists.</p>	<p>Magnitude of Outputs:</p> <p>(1) A number of promising microbial control candidates are found which show potential for control of important cowpea pests.</p> <p>(2) Small and large scale test plot applications are carried out and result in significant reductions in target insect pest populations.</p> <p>(3) Sufficient quality is produced to meet demands of operational control programs.</p> <p>(4) Field applications or introduction result in significant reductions in insect pest numbers thereby reducing crop damage and producing significant yield and quality increases.</p> <p>(5) High quality program of ongoing research in the fields of insect pathology and microbial control established and maintained by Brazilian scientists.</p>	<p>(1) Data will be obtained from laboratory screening of microbes obtained from pathogen surveys in Brazil and elsewhere. Tests will utilize colonies of important cowpea pest insects established at IPRC (Brazil and Boyce Thompson Institute).</p> <p>(2) Data will be obtained from replicated insect control trials.</p> <p>(3) Control programs are carried out.</p> <p>(4) Data will be obtained from replicated yield and insect control trials and from surveys of small farms where microbial control methods are applied.</p> <p>(5) Published papers and reports.</p>	<p>(1) Promising pathogens will be found and isolated.</p> <p>(2) Efficacious pathogens will be discovered.</p> <p>(3) Efficacious pathogens are economically mass reproducible by subsistence farmers or grower associations.</p> <p>(4)</p> <p>a) Effective insect pest control can be achieved under the conditions of large scale, operational control programs.</p> <p>b) Small farmers are able and interested in working with technical extension personnel.</p> <p>c) Continued enthusiastic and effective technical and administrative leadership in Brazil.</p> <p>(5) Training of students and technical staff is continued and excellence in scholarship is encouraged.</p>

Log Frame Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Inputs:</p> <p>(1) <u>Insect Pathology Resource Center, Boyce Thompson Institute, USA.</u> Project leader/principal investigator, co-principal investigator, research associate (residing in Brazil), postdoctoral fellow, technical personnel, office, laboratory, greenhouse, and insect rearing facilities, field test plots, project vehicle (assigned to Brazil), and equipment and supplies.</p> <p>(2) <u>CNPq/EMBRAPA, Brazil.</u> Corresponding principal investigator, three co-investigators, technical personnel, student and scientist trainees, office, laboratory, greenhouse, and insect rearing facilities, and field plots, equipment, and labor.</p>	<p>Inspection of current project roster to verify continued personnel involvement, and examination of annual reports to determine if facilities and other listed resources have been available to the project.</p>	<p>Annual project, budget, and trip reports.</p>	<p>(a) The present AID/USA and host country institution financial contributions are sustained at the planned level.</p> <p>(b) The positions listed under inputs in USA and host country will be sustained.</p> <p>(c) Administrative support will be sustained.</p> <p>(d) Student and scientist trainees will be available/involved in the project.</p> <p>(e) Facilities, resources, services and equipment listed under inputs will remain available and in working condition.</p>

PROJECT REVIEW PROFILE

BRAZIL • UNIVERSITY OF WISCONSIN (Initiated February 1982) • BEANS
Bliss

IDENTIFICATION OF SUPERIOR BEAN-RHIZOBIA COMBINATIONS FOR UTILIZATION
IN CROPPING SYSTEMS SUITABLE TO SMALL FARMS IN BRAZIL

GOAL: To develop superior N₂ fixing cultivars that in association with superior strains of R. phaseoli produce high yields under bean-only and bean-maize cropping systems without supplemental nitrogen fertilizers.

DESCRIPTION: The focus has been on identifying and field testing black bean breeding lines with high biological nitrogen fixation (BNF) and on developing methods to transfer characters favoring enhanced BNF into standard cultivars. An expatriate scientist is in place in Brazil (Dr. Robert Henson).

ROLE IN GLOBAL PLAN: This is one of only two bean projects which have BNF enhancement as a major focus. The HC provides some unique ecology for this work. Dominant constraint #2 (plant response limitations).

ACHIEVEMENTS:

1. Black bean breeding lines with potential for enhanced BNF (UW 22-34) ready to be entered into regional trials.
2. Breeding methods facilitating transfer of enhanced BNF characters are available for immediate use and improved methods of inoculation are being developed.
3. Information on the effects of mixed cropping on bean plant BNF is being gathered and isolates of Rhizobium phaseoli selected for superior competitive ability and BNF potential have been obtained.
4. A BNF Student Trainee Workshop was held at the University of Wisconsin, July 18-20, 1983 with fourteen students from developing countries in attendance.

CONTRIBUTIONS:

To HC--Given the often prohibitive cost of nitrogen fertilizer for small farmers, the development of improved cultivars that incorporate high N₂ fixation represents an efficient means of increasing yields.
To US--Success of this project will allow US bean breeders to obtain breeding lines with enhanced BNF potential, thus considerably reducing fertilizer N₂ requirements.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 1): None.

ACTIONS TAKEN: None required.

RESOLUTION:

1. The HC PI will return to CNPAF after completion of an M.S. program.
2. Sponsorship of workshops will continue stressing methodology in breeding and improving field performance of beans inoculated with rhizobia.

SUBSEQUENT BOD EXTENSION RATING 1.

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Log framework Matrix - University of Wisconsin/Brazil - N₂-Fixation/Bliss
July, 1982

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Program or Sector Goal:</u></p> <p>Increase production of dry beans available to small/subsistence farmers.</p>	<p><u>Measure of Goal Achievements</u></p> <p>Yields of dry beans on small farms with low nitrogen soils will increase without use of N fertilizer. Improved breeding lines will be released by 1988.</p>	<p>(1) Comparisons of yields of new cultivars with old cultivars on small farm, with low soil N.</p> <p>(2) Improvement of other bean lines in National program, Bean/cowpea CRSP projects, CIAT etc. for BNF.</p> <p>(3) Improved availability of food beans to small farmers</p>	<p><u>Assumptions for achieving goal targets:</u></p> <p>(1) Needs for dry beans produced on small farms with increase or remain the same.</p> <p>(2) Beans will continue to be produced on poor soils.</p> <p>(3) Cost of N fertilizer will increase or remain high.</p> <p>(4) Incentives for bean production are positive.</p> <p>(5) Continuing market at attractive prices remains.</p>
<p><u>Project Purpose:</u></p> <p>(1) Increase dry bean production on nitrogen-poor soils without reliance on chemical fertilizer</p> <p>(2) Develop methods that allow plant breeders to incorporate selection for N₂-fixation into improvement programs.</p> <p>(3) To educate/train Brazilian scientists in plant breeding and rhizobiology.</p> <p>(4) To elucidate the plant/rhizobia and ecological factors that limit and/or enhance N₂-fixation.</p>	<p><u>Conditions that will indicate purpose has been achieved:</u></p> <p>(1) Incorporation of enhanced BNF traits into Brazilian regional cultivars, e.g. blacks, carioca, whites, canario will lead to increased yields on low N fields.</p> <p>(2) Other bean breeders in Bean/cowpea CRSP and National programs select for enhanced BNF.</p> <p>(3) Brazilian students begin advanced training.</p>	<p>(1) Demonstration of value of enhanced BNF in improved cultivars in trials at experiment stations and demonstration plots and on small farms.</p> <p>(2) Use of cultural practices/new cultivars to enhance BNF.</p> <p>(3) Brazilian students complete training.</p>	<p><u>Assumptions for achieving purpose:</u></p> <p>(1) Low soil N fertility continues to be a major problem.</p> <p>(2) Other limiting factors e.g. pest resistance are minimized by other research.</p> <p>(3) Effective interaction between CRSP components continues.</p> <p>(4) Budget becomes more predictable.</p>

<p><u>Outputs:</u></p> <ol style="list-style-type: none"> (1) Identification of new plants with enhanced BNF potential. (2) Production of new breeding lines and cultivars with enhanced BNF potential and adapted to Brazil. (3) New methodology to allow bean breeders to select routinely for enhanced BNF. (4) Improved knowledge of agronomic/ecological factors that reduce/increase ENF under small farm conditions. (5) Brazilian breeders/microbiologists trained in N₂-fixation research. 	<p><u>Magnitude of outputs:</u></p> <ol style="list-style-type: none"> (1) Yields of new cultivars without added N fertilizer are 90% of old cultivars with added N fertilizer. (2) Reduced amounts of N fertilizer required for bean production. (3) Cultural practices for intercropping are developed that enhance BNF and yields of beans grown with corn. (4) Complete training of Brazilian students. 	<ol style="list-style-type: none"> (1) Yield and production data obtained from trials demonstration plots, farmers fields to show superiority of new lines over standard cultivars. (2) Comparison to baseline data. 	<p><u>Output Assumptions:</u></p> <ol style="list-style-type: none"> (1) Continued enthusiastic and effective cooperation between U.S. and Host country personnel. (2) Interest in cooperation by/with small farmers. (3) Interchange with breeders/agronomists at CNPAF and within CRSP continue.
<p><u>Inputs:</u></p> <ol style="list-style-type: none"> (1) Univ. of Wisconsin. Project leader/Principal Investigator. Lab, greenhouse, fields. Research Associate in residence in Brazil (2) Michigan State Univ. Project sub-principal investigator, labs. (3) CNPAF, Brazil. H.C. Principal Investigator. National program personnel. Support for student trainee (1983-1986). Office, lab, research facilities, transportation in Brazil. Cooperation with other BNF researchers and extension personnel. 	<p>Use of project reports, budgets, etc. to determine ongoing input.</p>	<p>Annual Project Budget and trip reports.</p>	<p><u>Input Assumptions:</u></p> <ol style="list-style-type: none"> (1) AID/U.S. and H.C. financial and technical contributions remain at planned levels. (2) Administrative support remains consistent. (3) U.S. Research Associate will work in Brazil 1983-1985. (4) Brazilian student training completed as planned. (5) Interaction between CRSP and National Programmes is effective.

PROJECT REVIEW PROFILE

BRAZIL • UNIVERSITY OF WISCONSIN (Initiated June 1982) • BEANS
Hagedorn

IMPROVED TECHNIQUES FOR DEVELOPMENT OF MULTIPLE DISEASE RESISTANCE IN BEANS

GOAL: Improved strategies and methods for attaining multiple disease resistance.

DESCRIPTION: Research focused on sequential inoculation especially the production and use of dry inoculum. Predominant research to date conducted at WI.

ROLE IN GLOBAL PLAN: This is the only CRSP project concentrating on improved low technology disease resistance screening methods for breeders. Dominant constraint #1 (limitations due to diseases).

ACHIEVEMENTS:

Preliminary progress on long-term research on disease resistance techniques.

CONTRIBUTIONS:

To HC--Long-term potential good as bean production in Brazil severely constrained by severe multiple disease pressures. Short-term work to date unclear as dry inoculum technique questioned by some professionals.

To US--More efficient multiple disease resistance screening methods will allow all bean improvement centers to make faster progress in developing and releasing new varieties. Such techniques will provide for increased stability of germplasm across environments in the US.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 3):

1. Administrative and scientific communication between US and HC unacceptable.
2. Project research strategy and management questioned by two review teams.
3. HC and US PI designation questioned.

ACTIONS TAKEN:

1. Personnel adjustment requested in Brazil and Wisconsin.
2. Per ERP and Board recommendation, Wisconsin administrator and MO director joined with second review team for on-site visit to assess the project's:
 - a. Relationship to HC's existing program.
 - b. Current methodology, its appropriateness and effectiveness in Brazil.

RESOLUTION:

1. New HC PI named (Dr. Josias Faria).
2. New US PI named (Dr. Douglas Maxwell). Michael Havey, at completion of joint pathology/breeding Ph.D. degree in summer of 1984, will become the project's resident expatriate at CNPAF.
3. Wisconsin and Brazil made administrative commitment to solving problems above.
4. US Post-doc requested by Brazil identified and approved by HC.
5. New plan of work written incorporating other parameters of original research goal--simultaneous inoculation including research on resistance maintenance.

SUBSEQUENT BOD EXTENSION RATING 2.

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Log Frame Matrix-Univ. of Wis. Hagedorn/Brazil
August 1982

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Program or Sector Goal:</u> Increase quality and productivity of dry bean lines available to small farmers in developing countries.</p>	<p><u>Measures of Goal Achievements</u> Yield and quality of bean lines, available to small farm families through national programs, will increase.</p>	<p>Comparison of yields, under farm conditions, of new beans with baseline data.</p>	<p><u>Assumptions for Achieving Goal Targets:</u> Small farmers will continue to be interested in growing beans for consumption and sale.</p>
<p><u>Project Purpose:</u> Develop reliable and efficient field and greenhouse methods to identify resistance to 6 major pathogens.</p>	<p><u>Conditions that will Indicate Purpose has been Achieved:</u> Efficient multiple disease resistance screening methods are adopted and used by bean improvement researchers at international and national centers for bean improvement in developing countries.</p>	<p>Communication with and visits to bean improvement centers in developing countries.</p>	<p>More efficient multiple disease resistance screening methods will allow bean improvement centers to make faster gains in developing and releasing new beans which will yield better under pervasive severe disease pressure.</p>
<p><u>Outputs:</u></p> <ol style="list-style-type: none"> 1) Organize a collection of bean lines and pathogen isolates to use in developing screening methods. 2) Develop inoculation methods, and determine environmental influences, necessary to observe reactions of beans to several pathogens in field and greenhouse. 3) Locate effective disease-testing sites in Brazil. 4) Study variability of bean pathogens. 5) Provide PhD training to Brazilian student in plant pathology. 	<p><u>Magnitude of Outputs:</u> Researchers at UW and CNPAF, using a diversity of bean lines and pathogen isolates at selected field sites and in greenhouses, have procedures in hand for identifying multiple resistance to major bean pathogens.</p>	<p>A nursery of bean lines, whose reaction to 6 pathogens are known, will be tested at various field and greenhouse sites by the methods developed, and their performance there compared with their known reactions.</p>	<p><u>Output Assumptions</u></p> <ol style="list-style-type: none"> 1) Studying disease reaction of a diversity of bean lines to various isolates of the pathogens under controlled conditions will result in an efficient method for multiple disease resistance screening. 2) Disease testing sites at Goiania and elsewhere in Brazil will be available.

Narrative Summary	Objectively Verifiable Indications	Means of Verification	Important Assumptions
			<p>for use in this research. 3) PhD training of a Brazilian student will increase expertise for multiple disease resistance research at EMBRAPA/CNPAF.</p>
<p><u>Inputs:</u></p> <p>1) University of Wisconsin Project leader/PI Breeding Collaborator Research Associate Technical personnel Lab, greenhouse, growth chamber and field facilities.</p> <p>2) CNPAF Co-investigators Lab, screenhouse, greenhouse and field facilities Technical personnel PhD student.</p> <p>3) Collaborators at CIAT, MITA, University of Nebraska</p>	<p>Continued involvement of project leader and co-investigators in the research, and good support including technical personnel, equipment, supplies, travel, etc.</p>	<p>Annual project, budget and trip reports.</p>	<p>1) Funding for investigators, students, facilities, travel, and technical personnel will continue as planned. 2) PhD student will be available and pursue studies at University of Wisconsin. 3) Co-operation and frequent communication between University of Wisconsin and CNPAF will continue.</p>

PROJECT REVIEW PROFILE

CAMEROON • UNIVERSITY OF GEORGIA (Initiated September 1981) • COWPEAS
Chalfant

PEST MANAGEMENT STRATEGIES FOR OPTIMIZING COWPEA YIELDS IN CAMEROON

GOAL: Develop methods for optimizing yield and quality of cowpeas through pest management research.

DESCRIPTION: Project has concentrated on varietal screening for pest resistance, insecticide use research and research on life-cycle and breeding habits of cowpea insects. An expatriate scientist is in place in Cameroon.

ROLE IN GLOBAL PLAN: This is the only comprehensive cowpea pest management project in the CRSP. Dominant constraint #1 (limitations due to pests).

ACHIEVEMENTS:

Important preliminary progress on long-term integrated pest management research. Project works closely with IITA and builds on prior integrated pest management work funded by AID.

CONTRIBUTIONS:

To HC--Devastating cowpea losses from insects both pre- and post-harvest underscore the importance of this project to Cameroon.

To US--Findings will contribute to integrated pest management resources in US cowpea industry.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 3):

1. Lack of HC PI who is working researcher.
2. Lack of adequate US/HC communication and US/AID Mission communication.
3. Project management weak.

ACTIONS TAKEN:

1. Personnel adjustment requested in Cameroon.
2. Georgia administration encouraged to participate.
3. Georgia administrator and MO director joined project team meeting in the HC.
4. Georgia administrators met in Georgia to discuss and resolve the problems.

RESOLUTION:

1. New HC PI named (Mr. Zachee Boli Baboule).
2. New HC PI and the AID Mission Director invited to Georgia and Boyce Thompson.
3. Georgia administrator assuming greater role in management of project.
4. New plan of work to be developed when HC PI comes to US in summer 1984.
5. Georgia work on encapsulated pyrethrum and bacillus thuringiensis to be integrated with project and increased work on control of storage insects.
6. BTI work to concentrate on chemistry of aphid and bruchid resistance.

SUBSEQUENT BOD EXTENSION RATING 2.

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CAMEROON--Chalfant

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Program or Sector Goal:</u> increase production and quality of proteinaceous food (cowpeas) available to small/subsistence farmers.</p>	<p><u>Measures of Goals Achievement:</u> Yield and quality of cowpeas available to small/subsistence farm families will increase significantly by 1986.</p>	<p>Interviews with small/subsistence farmers through extension personnel.</p>	<p><u>Assumptions for achieving goal targets:</u> a. Need for cowpeas to be conserved on small/subsistence farms remains constant or increases. b. A growing market at attractive prices exists for cowpeas off-farm.</p>
<p><u>Project Purpose:</u> Reduce cowpea losses due to insects in field production and storage</p>	<p><u>Conditions that will indicate purpose has been achieved:</u> a. Pest Management tactics used successfully by small/subsistence farmers will increase yield and quality 100% by 1984. b. A second doubling of yield and quality will occur by 1987 through development and application of additional tactics.</p>	<p>Visits to small/subsistence farms with Cameroonian extension workers before, during, and after harvest to assess efficacy of recommended tactics on cowpea yield and quality.</p>	<p><u>Assumptions for achieving purpose:</u> Insects continue to be a major cause of yield and quality loss.</p>
<p><u>Outputs:</u> a. Basic scientific knowledge of biology of cowpea insect/host plant relationships. b. Pest management tactics which are usable by small/subsistence farmers. c. Recommendations for cowpea pest management in place in Cameroonian extension training, extension, and advisory services. d. Cameroonian entomologists and technicians trained in entomological research methods.</p>	<p><u>Magnitude of Outputs:</u> a. Major insect pests, their time of occurrence, and nature of damage identified by the end of 1982. b. Pesticide/protectant tactics developed for use in 1983. c. Cowpea lines with resistance to one or more insect pests identified by the end of 1982. d. Recommendations for management of 3 major cowpea pests submitted to extension, training and</p>	<p>a. Insect data from samples collected from field research plots. b. Verification of recommended tactics and resistant lines in demonstration plots conducted by CREFFPY, extension agents, Young Farmers' Schools, the Seed Multiplication Project, and Regional Food Crop Protection trials.</p>	<p><u>Output Assumptions</u> CREFFPY, extension service, Young Farmers' Schools, Seed Multiplication Project and Regional Food Crop Protection Projects continue.</p>

advisory agencies for 1983 crop season.

- e. Non-chemical pest management tactics developed by 1985.
- f. Cameroonian entomologist completes M.S. degree in 1984.
- g. Cameroonian technicians trained in field plot technique, data collection, and entomological lab techniques by 1983.

c. Professional training verified by M.S. de

- d. Technical training verified by performance capability judged by U.S. and Cameroonian entomologists.
- e. Research bulletins and articles in scientific journals.
- f. Extension bulletins.

Inputs:

a. Univ. of Ga

Project Leader/Principal Investigator
U.S. entomologist in Cameroon.
Vehicle
Laboratory and field equipment and supplies.

b. BTI

Co-investigators (3)
Laboratory, growth chamber, and green house facilities.

c. IRA

Counterpart Principal Investigator student trainee.
Office and laboratory facilities.
Field research facilities.
Cooperation from CREPPHY, extension service, Young Farmers' Schools.

d. USAID

Logistic support
Cooperation from SAFGRAD,
Seed Multiplication Project,
Regional Food Crop Protection trials.

Salaries & Wages	202,663
Student Expenses	118,130
Expenses	217,150
Equipment	37,950
Supplies	30,705
Travel	85,300
Indirect Costs	232,095
Contingency	15,500
Total	946,693
Budget	957,250

Monthly and annual project and budget reports.

Input Assumptions:

- a. U.S. entomologist will be available for work in Cameroon throughout the project.
- b. Cameroonian P.I. and student trainees will be available.
- c. Adequate information exchange from small/subsistence farmers to project (and vice versa) through extension and other demonstration media takes place.
- d. Vehicle, equipment and supplies are available and arrive on time.

PROJECT REVIEW PROFILE

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

BIOLOGY, EPIDEMIOLOGY, GENETICS AND BREEDING FOR RESISTANCE TO
BACTERIAL AND RUST PATHOGENS OF BEANS (PHASEOLUS VULGARIS L.)

GOAL: To develop biological, epidemiological, genetic and breeding information on rust and bacterial pathogens, primarily rust and common blight of beans.

DESCRIPTION: The focus of this project is on character enhancement. Significant emphasis is placed on knowledge of bacterial blight and rust in the tropics and the genetics of inherited resistance to these diseases.

ROLE IN GLOBAL PLAN: This project, well integrated with the other two disease projects in Latin America, is contributing important basic information for enhancing genetic material useful in cultivar development of the other projects. Dominant constraint #1 (limitations due to diseases).

ACHIEVEMENTS:

1. Germplasm with resistance to common blight and rust has been identified.
2. The importance of plant genotype x bacterial strain interaction has been demonstrated.
3. The inheritance of resistance in leaf and pod to common blight has been determined.
4. Pathogenic variation has been determined.
5. One white resistant line (Arroyo Loro) has been developed for increase and release in the DR.
6. New sources of resistance to common blight and rust have been identified.
7. Laboratory and greenhouse facilities have been constructed in the DR.

CONTRIBUTIONS:

To HC--The incorporation of high levels of more stable and durable resistance to bacterial blight and rust pathogens of the main DR bean types will increase yields and hence lessen dependence on imports. Recent food riots reinforce the importance of this crop.

To US--The genetic material and information generated by the project will benefit bean-producing areas of the US that have conditions favoring common blight and rust diseases. Increased understanding of the genetics of the inheritance of diseases will assist all breeding programs.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 1): None. Focus on character enhancement encouraged.

ACTIONS TAKEN: None required.

RESOLUTION:

An improved nitrogen fixation component may be incorporated to test lines developed by the Brazil/University of Wisconsin (Bliss) CRSP project for blight and rust resistance.

SUBSEQUENT BOD EXTENSION RATING 1.

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Revised Log Frame Matrix - University of Nebraska/Dominican Republic (DR)
December 30, 1983

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Program or Sector Goal:</u> To improve yield and seed quality of beans through utilization of genes for resistance to pathogens.</p>	<p><u>Measures of Goal Achievements</u> The utilization of biological, epidemiological and genetic information and germplasm from our program in the development of adapted useful cultivars by UPR and DR programs.</p>	<p>(a) Dissemination of information in annual reports, peer reviewed publications and conferences. (b) Identification of our program contributions by the UPR and DR breeding programs for the production of superior cultivars.</p>	<p>Assumptions for achieving goal targets if the incentives and interest continue for small farmers to produce beans as a food for their own consumption and for a cash crop.</p>
<p><u>Project Purpose:</u> (1) To develop biological, epidemiological, genetic and breeding information on rust and bacterial pathogens, primarily common blight of beans. (2) To educate/train HC and US graduate students in plant breeding and plant pathology so that they can contribute to future research efforts in the DR or other LDC countries.</p>	<p><u>Conditions that will indicate purpose has been achieved:</u> (1) The derived information, methods, and germplasm will be used in the breeding programs and pest management strategies in the UPR, DR, and other CRSP projects. (2) Graduate students are enrolled at UNL.</p>	<p>(1) Information available in annual reports, professional and peer reviewed articles. (2) Information, methods, genetic strategy and germplasm being used in UPR, DR and other CRSP projects. (3) Genes identified by us utilized in improved cultivars developed by UPR, DR and others. (4) Graduate students with completed academic programs contribute to bean improvement program in DR or elsewhere.</p>	<p><u>Assumptions for achieving purpose:</u> (1) This depends on a continuation of effective cooperation between administrative and professional elements in host country and Univ. Nebr./Univ. Puerto Rico. (2) Students meet requirements of training program. (3) Genes can be incorporated into adapted, improved bean types.</p>
<p><u>Outputs:</u> (1) Identification of sources of stable/durable resistance to the strains of common blight and rust pathogens. (2) Identify variation in pathogenicity and monitor changes in pathogenicity in rust and blight pathogens.</p>	<p><u>Magnitude of Outputs:</u> (1) Information on methods of inoculation, pathogen strain variations, germplasm sources of resistance, and genetic information will be utilized in tropical breeding program to develop resistant varieties with reduced bacterial seed transmission by DR and UPR programs.</p>	<p>(1) Information on all of these research areas will be made available in annual reports, professional reports and meetings, and peer reviewed papers. (2) The germplasm, methods, and epidemiological and biological information will be used in the UPR, DR and CRSP projects.</p>	<p><u>Output Assumptions:</u> (1) Continued availability, enthusiastic and effective technical and administrative leadership in HC. (2) Continued availability of facilities.</p>

Narrative Summary	Objectively Verifiable Indications	Means of Verification	Important Assumptions
<p><u>Outputs:</u></p> <p>(3) Study inheritance of resistant reactions to pathogens and linkage relations with other traits.</p> <p>(4) Develop more effective breeding strategies to incorporate stable resistance.</p> <p>(5) Select for reduced seed transmission of common bacterial blight.</p> <p>(6) Develop new biological and epidemiological information on rust and bacterial blight pathogens that could be useful in pest management strategies.</p>	<p><u>Magnitude of Outputs:</u></p> <p>(2) Rust resistance stability, particularly in the black seed types, needs new strategies. The incorporation of red pinto seed type, virus resistance (UPR), high yield, and Pompadour rust resistance will be a major breakthrough.</p>		
<p><u>Inputs:</u></p> <p>(a) <u>Univ. of Nebr.</u> Principal Investigator (PI), Co-PI, Investigator, technicians, laboratory, greenhouse, field, equipment and supplies availability.</p> <p>(b) <u>Dominican Republic</u> Corresponding Principal Investigator, National Program Technical Personnel, CESDA Director Support, Student Trainees, Office, Laboratory facilities, Field Research Facilities, Extension Service Cooperation, Availability of project vehicle.</p>	<p>To use current project poster to determine continued personnel involvement and to examine annual reports to evaluate if facilities and other listed resources have been available to the project.</p>	<p>Annual Project, Budget and trip reports.</p>	<p><u>Input Assumptions:</u></p> <p>(1) The present AID/US and HC institution financial contributions will be available at planned increased levels.</p> <p>(2) The positions listed under inputs in US and HC will be sustained.</p> <p>(3) Administrative support listed under inputs will be sustained.</p> <p>(4) Graduate student trainees will be available/involved in the project.</p> <p>(5) Facilities, resources, and services listed under inputs will continue to be available.</p> <p>(6) Vehicle is maintained in working condition.</p>

PROJECT REVIEW PROFILE

DOMINICAN REPUBLIC • UNIVERSITY OF PUERTO RICO (Initiated June 1981) • BEANS
López-Rosa

IMPROVEMENT OF BEAN PRODUCTION IN THE DOMINICAN REPUBLIC THROUGH BREEDING
FOR MULTIPLE DISEASE RESISTANCE (MDR) IN THE PREFERRED STANDARD CULTIVARS

GOAL: Produce a MDR bean germplasm base in order to provide cropping security over time in the DR. Preserve or improve the agronomic characteristics, yield and quality of the preferred Dominican cultivars to assure economic and efficient production that will meet the acceptance and fulfill the nutritional requirements of the population.

DESCRIPTION: This project focuses primarily on cultivar development and builds on work begun under the auspices of an AID/USDA/MITA project. Five new breeding lines with good yield potential and high levels of MDR were released in 1983.

ROLE IN THE GLOBAL PLAN: This is one of two projects in Latin America (the second with same US PI) concentrating on MDR cultivar development for this region. Dominant constraint #1 (limitations due to diseases).

ACHIEVEMENTS:

1. Breeding lines L-226-10, L-227-1, 3M-150, 3M-152 and 4M-99 were made available through official release to other breeding programs for use as parents in crossing schemes. White-seeded line 2W-33-2 is being considered for release in 1984.
2. Articles on the incidence of bean diseases in the DR, the practical applications of bacterial blight research and the identification of genotypes with stable yield traits are in preparation.
3. There is a notable high level of cooperation and complementarity with the Nebraska project.

CONTRIBUTIONS:

- To HC--Release of the new lines is a significant contribution toward increasing bean yields in the DR.
- To US--Research results will also help strengthen the Puerto Rico winter nurseries of the US bean industry.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 1): None.

ACTIONS TAKEN: None required.

RESOLUTION:

1. New US PI named (Dr. James Beaver) with the promotion of Dr. Julio López-Rosa.
2. There is an expected change in HC PI as Dr. César Paniagua has indicated his intention to leave the project when he has located a suitable replacement.

SUBSEQUENT BOD EXTENSION RATING 1.

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Dominican Republic/UPR Bean/Cowpea CRSP Project

LOGICAL FRAMEWORK MATRIX
(December 1983)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p>	<p>Measures of Goal Achievement (A-2)</p>	<p>(A-3)</p>	<p>Assumptions for achieving goal targets (A-4)</p>
<p>To make available to the national legume program multiple disease resistant dry bean breeding lines/cultivars capable of achieving yield stability over time.</p>	<ul style="list-style-type: none"> - A measure of the Improvement of yield stability, and yield level of MDR varieties over traditional varieties (Pompadour seed type) by 1988-1990. - A measure of acceptance of MDR varieties by small farmers. 	<ul style="list-style-type: none"> - Comparison of the performance of MDR varieties produced by the program with original base-line data. - Determine the quantity of MDR seed planted by small farmers and the production levels they obtain. 	<ul style="list-style-type: none"> - Small farmers continue to grow dry beans in the Dominican Republic. - The national seed program will increase seed of the new varieties. - The extension service will promote their use.
<p>Project Purpose (B-1)</p>	<p>Conditions that will indicate purpose has been achieved. End-of-Project status (B-2)</p>	<p>(B-3)</p>	<p>Assumptions for achieving purpose (B-4)</p>
<ul style="list-style-type: none"> - Reduce losses due to diseases by incorporating multiple disease resistance (MDR) into productive genotypes with a seed type suitable to the Dominican consumer. - Enhance the capability of the Dominican bean research team through training, collaborative research, and improvement of facilities. 	<ul style="list-style-type: none"> - Incorporation of MDR into the Pompadour and black bean types leading to improved yield stability level. - Training of graduate students and technicians. - Improvement of research infrastructure such as screen houses, laboratory equipment and vehicles. 	<ul style="list-style-type: none"> - Yield loss studies will be conducted to determine the importance of the different diseases. - MDR will be demonstrated by the establishment of demonstration plots on small farms, baseline data, and by test plots containing traditional and MDR cultivars. - Physical evidence of improvement of research infrastructure. 	<ul style="list-style-type: none"> - Sources of resistance incorporated into local varieties remain stable. - A bean disease currently identified as a minor problem does not emerge as a major problem. - Bean research team in DR remains active and trained personnel continue to work with the project. - No natural disasters that might destroy research infrastructure.

Project Outputs (C-1)	Magnitude of Outputs (C-2)	(C-3)	Assumptions for achieving output (C-4)
<ul style="list-style-type: none"> - Identification of stable sources of resistance to the major diseases affecting bean production in the Dominican Republic. - Incorporation of these sources of resistance into productive genotypes with a seed type suitable to the Dominican consumer. 	<ul style="list-style-type: none"> - Development of varieties with improved levels of resistance to one or more diseases resulting in significantly increased yield stability and yield level. - Sufficient quantity of disease-free seed of the improved varieties to be made available to the national seed program. 	<ul style="list-style-type: none"> - Sources of MDR will be tested at several locations in the DR. - MDR lines will be tested at several locations in the DR. - Breeder seed of the most promising lines will be made available to the national seed program. 	<ul style="list-style-type: none"> - Reasonably heritable sources of resistance can be identified for the important bean diseases. - Breeding methods are appropriate to incorporate these resistances into local seed types. - The national seed program is capable of increasing seed of promising MDR varieties and making it available to small farmers, and the extension service effectively promotes their use.

INPUTS (D-1)	INDICATORS (D-2)	MEANS OF VERIFICATION (D-3) (What data needed and how to get it)	ASSUMPTIONS (D-4)
<p><u>University of Puerto Rico/</u> <u>USDA-ARS</u></p> <ul style="list-style-type: none"> - Principal Investigator - Two Co-investigators - Two Research Associates. - One Technician. - Laborers. - Adequate facilities for personnel to conduct research programs in breeding and pathology. - Administrative infrastructure. 	<ul style="list-style-type: none"> - Use of project roster to determine continued involvement of personnel. - Examination of annual reports to determine performance of personnel and to evaluate if facilities and resources are made available to the project. 	<ul style="list-style-type: none"> - Use of baseline data to measure acceptance of the improved MDR varieties by the small farmers and to verify the yield stability and yield levels. - Research results obtained from the Dominican Republic and Puerto Rico. - Annual Reports. 	<ul style="list-style-type: none"> - The present USAID, UPR and HC financial support remains at the planned level. - Involvement of personnel at all levels listed in D-1 will be continued. - Facilities mentioned in D-1 will remain to be available.

Inputs (D-1)	Indicators (D-2)	Means of verification (D-3)	Assumptions (D-4)
<ul style="list-style-type: none"> - Bean germplasm of potential value to the Dominican Republic. 		<ul style="list-style-type: none"> - Trip reports. - Fiscal reports. 	
<p><u>Dominican Republic</u></p>		<ul style="list-style-type: none"> - Quarterly activities and fiscal reports from the HC. 	
<ul style="list-style-type: none"> - Principal Investigator. 			
<ul style="list-style-type: none"> - Adequate personnel from CESDA and CENDA to conduct bean research. 			
<ul style="list-style-type: none"> - Adequate facilities at the Arroyo Loro experiment station to conduct a bean breeding program. 			
<ul style="list-style-type: none"> - Cooperation from Extension Service. 			
<ul style="list-style-type: none"> - Cooperation from local small farmers. 			

PROJECT REVIEW PROFILE

EQUADOR • CORNELL UNIVERSITY (Initiated September 1981) • BEANS
Wallace

AGRONOMIC, SOCIOLOGICAL AND GENETIC ASPECTS OF BEAN YIELD AND ADAPTATION

GOAL: Examine the agronomic and socio-economic aspects of bean production by small farmers. Adapt appropriate farming systems research (FSR).

DESCRIPTION: Agronomic and genetic research is to be developed but emphasis to date has been on the sociological work. Through testing various types of interview schedules and microcomputer techniques, a methodology for FSR is being developed for this site. This methodology and the information it generates will be used to identify agronomic problems. A US researcher has been on-site in this country.

ROLE IN THE GLOBAL PLAN: This is one of four CRSP projects with a major socio-economic component. It is the only one taking this particular FSR perspective. Dominant constraints #3 (limitations of the physical environment) and #8 (socio-cultural factors).

ACHIEVEMENTS:

1. An outline for structured interviews was developed and tested in which respondents report farm-related practices in the region. The interview guide is available in three languages; a team report and three specialized reports on the zone also have been prepared.
2. From a list of all landowners in one zone, a microcomputer program was used to pull a stratified random sample. An applied questionnaire was designed and used to interview the sample families.
3. Work is progressing on a microcomputer methodology which will strengthen INIAP's and similar institutions' abilities to conduct FSR. A manual for the analysis of agricultural census data has been prepared.

CONTRIBUTIONS:

To HC--The emphasis on FSR methodology will allow INIAP to better direct its agronomic research to the needs of various categories of small farmers.

To US--The methodology developed has similar applications in the US. The agronomic-genetic component will advance the work being done by the same team in Guatemala but in a different ecology.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 2): None. There was a delay in the identification of technical personnel for residence in Ecuador.

ACTIONS TAKEN: Interviews were held with names submitted to HCs.

RESOLUTION:

1. A US agronomist (Mr. Wesley Kline) and a social scientist (Dr. Kris Merschrod) were named and approved by HC.
2. Surveys provided guidance and priorities for the agronomic research component to begin with the arrival of Cornell agronomist and sociologist.
3. The project Log Frame updated.

SUBSEQUENT BOD EXTENSION RATING 2.

LOGICAL FRAMEWORK - CORNELL/INIAP

Ecuador

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROGRAM/SECTOR GOAL	MEASURES OF GOAL ACHIEVEMENT		ASSUMPTIONS FOR ACHIEVING GOAL TARGETS
To understand agronomic and socioeconomic aspects of bean production by smallholders	Professional publications on interface between agronomic and socioeconomic determinants	Articles in referred journals	Continued interest at Cornell and INIAP in the organization of smallholder production
PROJECT PURPOSE	CONDITIONS THAT INDICATE PURPOSE WAS ACHIEVED		ASSUMPTIONS FOR ACHIEVING PURPOSE
1) To conduct FSR in at least one province	diagnosti. research conducted by Cornell/INIAP teams; follow up by smaller team	technical reports on province published by INIAP	re-establishment of <u>stable</u> and high exchange rate
2) to develop an economic methodology for FSR	adoption of Cornell methodology by others	costs to apply methodology after two more years of development	maintenance of self-critical attitude by researchers, currently flushed by initial success
3) to identify researchable problems via field research for experiment station programs	establishment of new research programs in legumes at experiment stations	staff and budget allocations within legume program	strong leadership within legume program plus resources to expand research activities

LOGICAL FRAMEWORK - CORNELL/INIAP

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OUTPUTS	MAGNITUDE OF OUTPUTS		OUTPUT ASSUMPTIONS
1) redefine and operationalize concept "dominios de recomendaciones"	document elaborating demarcation rules; application of rules to one province	maps and precise documentation on demarcation rules	staff stability in the province(s)
2) train INIAP staff in methodology	10 trained in FY 82; another 5-10 to be trained in FY 83	budget allocation and technical reports	motivation of INIAP staff and identification of appropriate province for diagnostic research
INPUTS			INPUT ASSUMPTIONS
1) Cornell, on campus: time of Co-I's, secretaries and G.S.'s	3-4 person/months in country	professional calendars (We dare you!) and trip reports	informed staff do not quit in desperation with paperwork and bureaucratic hassles
2) Cornell off campus: sociologist, agronomist and equipment	most equipment delivered; sociologist arrived July, 1982; agronomist due January, 1983	budget	appropriate students available, interested and acceptable to INIAP
3) INIAP 2 counterparts, office space and support staff, vehicle maintenance and per-diems for INIAP staff.	staff, office and budgetary allocations		continued goodwill and genuine interest by INIAP staff; recuperation of INIAP budget to permit expenditure of counterpart funds

PROJECT REVIEW PROFILE

GUATEMALA • CORNELL UNIVERSITY (Initiated September 1981) • BEANS
Wallace

AGRONOMIC, SOCIOLOGICAL AND GENETIC ASPECTS OF BEAN YIELD AND ADAPTATION

GOAL: Improve the production of beans by small subsistence farmers through agronomic and socio-economic investigations. Conduct research aimed at understanding the agricultural systems in the Highlands and to identify the daylength, temperature and genetic bases for variations in days to maturity and of adaptation of bean cultivars.

DESCRIPTION: Research has focused on bean plant adaptation to temperature and daylength because socio-agronomic studies have been hampered by the unsettled conditions in the Highlands. Work at the experiment station proceeded well.

ROLE IN GLOBAL PLAN: This is one of four CRSP projects integrating production and non-production issues. Dominant constraints #3 (limitations of the physical environment) and #8 (socio-cultural factors).

ACHIEVEMENTS:

1. Project findings regarding bean plant adaptation of temperature and daylength have wide significance: separate genes for early and late flowering plus for minimal days and optimal temperature interact with daylength and/or temperature to divide the world into zones.
2. Farming systems studies are planned in three contiguous but vertically ordered zones managed by indigenous farmers. These investigations complement the agronomic research by providing information on the social and economic aspects of bean production.
3. This project is working with the CRSP INCAP project to make maximum use of human and financial resources.

CONTRIBUTIONS:

- To HC--Information yielded to date provides a better understanding of plant adaptation which will assist in bean breeding all over the world.
- To US--Research findings represent a significant contribution to scientific understanding of the physiological genetics of bean plant maturity.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 2): None. Unsettled political situations in some areas and the difficulty of the US Co-PI (sociologist) participating in these areas have slowed some aspects.

ACTIONS TAKEN: New sociologist Co-PI from Cornell requested.

RESOLUTION:

1. A new US Co-PI is in charge of the sociological component (Dr. Harold Capener).
2. Links between this project and the CRSP INCAP/Washington State University project being forged, especially with regard to socio-economic research.

SUBSEQUENT BOD EXTENSION RATING 2.

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LOGICAL FRAMEWORK -- CORNELL/ICTA
 PHYSIOLOGICAL GENETICS OF MATURITY, ADAPTATION AND YIELD

<u>NARRATIVE SUMMARY</u>	<u>OBJECTIVELY VERIFIABLE INDICATORS</u>	<u>MEANS OF VERIFICATION</u>	<u>IMPORTANT ASSUMPTIONS</u>
<p><u>CRSP Goal</u></p> <p>Improve the production of beans by small/subsistence farmers.</p>	<p><u>Measures of Goal Achievement</u></p> <p>Yields per unit land area will increase by 1994.</p>	<p>Productivity census. Yield trial data.</p>	<p>Farmers are and will continue to be interested in increasing bean yields.</p>
<p><u>Purpose</u></p> <p>To identify the daylength, temperature and genetic bases for variations in days to maturity and of adaptation of bean cultivars, and of the consequent effects on yield.</p>	<p>Interpretable knowledge about the genetic directions over maturity and yield, and about the controls over this direction that are modulated by the variations in daylength and temperature.</p>	<p>Peer reviewed and accepted publications on the biology of variations in days to maturity and attendant variations in yield of beans.</p>	<p>Daylength, temperature genotype and time are assumed to be the input resources used by the plant to biointegrate a days to maturity plus the attendant biological and economic yields.</p>
<p><u>Outputs</u></p> <p>Capability to more efficiently breed new cultivars with consistently high adaptation and yields across years or planting seasons, or for specific climatic zones and locations and planting seasons</p>	<p>Identification of breeding lines of different and physiologically-genetically defined characteristics of adaptation and yield.</p>	<p>Consistent capability to efficiently breed and select lines, to evaluate them, and to release higher yielding cultivars in fewer years than required before the biology of maturity, adaptation and yield was understood.</p>	<p>Continuous application of CRSP effort across at least one to one and a half durations of the 10-12 years normally required to breed, evaluate and release a new variety. The time must be sufficient to elucidate the biology and then use it in applied bean breeding.</p>
<p><u>Inputs</u></p> <p>Physiological, genetic and breeding research efforts by ICTA and Cornell.</p>	<p>Allotment toward the objectives of research efforts by the ICTA and Cornell principal investigators, graduate students, and technicians.</p>	<p>Budget and time commitments and their appropriate application.</p>	<p>CRSP and other funding will be adequate, even after inflation.</p>

PROJECT REVIEW PROFILE

HONDURAS • UNIVERSITY OF PUERTO RICO (Initiated March 1982) • BEANS
López-Rosa

IMPROVEMENT OF BEAN PRODUCTION IN HONDURAS THROUGH BREEDING
FOR MULTIPLE DISEASE RESISTANCE

GOAL: Increase the tropical production of beans and cowpeas through improved varieties resistant to major diseases and pests.

DESCRIPTION: Most of the work has been done in Puerto Rico although there has been performance testing in HC at the experiment station and on farmers' fields of the new breeding lines developed.

ROLE IN GLOBAL PLAN: This project is one of the three CRSP projects focusing on disease resistance in beans in Latin America and provides an ecology different from the other two. Its excellent undergraduate host institution provides another CRSP perspective and resource. Dominant constraint #1 (limitations due to diseases).

ACHIEVEMENTS:

1. Collaborated with other CRSP programs in development of five new breeding lines.
2. Field trials in Honduras have also been most effective.
3. One of the five new lines (black beans) already being planted by growers.

CONTRIBUTIONS:

- To HC--Multiple disease resistant lines important for HC consumption and sale.
- To US--Multiple disease resistant lines have already been requested by US breeding programs.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 3):

1. High turnover in HC PIs.
2. Inadequate HC/US communication.
3. Inadequate HC institutionalization.
4. Greater level of US PI participation in HC needed.

ACTIONS TAKEN:

1. US administrator and MO joined US/HC team meeting per ERP and Board recommendation.
2. Permanent HC PI requested.
3. Adjustment in US PI contribution requested.

RESOLUTION:

1. New HC PI committed (Mr. Rafael Diaz).
2. Previous US PI promoted and new US PI experienced with this project identified (Dr. Jim Beaver).
3. HC institution commitment obtained.
4. New work expanding research on farmers' fields.

SUBSEQUENT BOD EXTENSION RATING 2.

Honduras/UPR Bean/Cowpea CRSP Project

LOGICAL FRAMEWORK MATRIX
(December 1983)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p>	<p>Measures of Goal Achievement (A-2)</p>	<p>(A-3)</p>	<p>Assumptions for achieving goal targets (A-4)</p>
<p>To make available to the national legume program multiple disease resistant (MDR) dry bean breeding lines/cultivars capable of achieving yield stability over time.</p>	<ul style="list-style-type: none"> - A measure of improvement of yield stability, and yield level of MDR varieties over traditional varieties (small red seed type) by 1988-1990. - A measure of acceptance of MDR varieties by small farmers. 	<ul style="list-style-type: none"> - Comparison of the performance of MDR varieties produced by the program with original base-line data. - Determine the quantity of MDR seed planted by small farmers and the production levels they obtain. 	<ul style="list-style-type: none"> - Small farmers continue to grow dry beans in Honduras. - The national seed program will increase seed of the new varieties. - The extension service will promote their use.
<p>Project Purpose (B-1)</p>	<p>Conditions that will indicate purpose has been achieved. End-of-Project status (B-2)</p>	<p>(B-3)</p>	<p>Assumptions for achieving purpose (B-4)</p>
<ul style="list-style-type: none"> - Reduce losses due to diseases by incorporating multiple disease resistance (MDR) into productive genotypes with a seed type suitable to the consumer. - Enhance the capability of the Honduran (Escuela Agrícola Panamericana and Secretaría de Recursos Naturales) bean research team through training and collaborative research. 	<ul style="list-style-type: none"> - Incorporation of MDR into the small red bean type leading to improved yield stability level. - Training of graduate students and technicians. 	<ul style="list-style-type: none"> - Yield loss studies will be conducted to determine the importance of the different diseases. - MDR will be demonstrated by the establishment of demonstration plots on small farms, baseline data, and by test plots containing traditional and MDR cultivars. 	<ul style="list-style-type: none"> - Sources of resistance incorporated into local varieties remain stable. - A bean disease currently identified as a minor problem does not emerge as a major problem. - Bean research team in Honduras remains active and trained personnel continue to work with the project.

Project Outputs (C-1)	Magnitude of Outputs (C-2)	(C-3)	Assumptions for achieving output (C-4)
<ul style="list-style-type: none"> - Identification of stable sources of resistance to the major diseases affecting bean production in Honduras. - Incorporation of these sources of resistance into productive genotypes with a seed type suitable to the Honduran consumer. 	<ul style="list-style-type: none"> - Development of varieties with improved levels of resistance to one or more diseases resulting in significantly increased yield stability and yield level. - Sufficient quantity of disease-free seed of the improved varieties to be made available to the national seed program. 	<ul style="list-style-type: none"> - Sources of MDR will be tested at several locations in Honduras. - MDR lines will be tested at several locations in Honduras. - Breeder seed of the most promising lines will be made available to the national seed program. 	<ul style="list-style-type: none"> - Reasonably heritable sources of resistance can be identified for the important bean diseases. - Breeding methods are appropriate to incorporate these resistances into local seed types. - The national seed program is capable of increasing seed of promising MDR varieties and making it available to small farmers, and the extension service effectively promotes their use.

INPUTS (D-1)	INDICATORS (D-2)	MEANS OF VERIFICATION (D-3) (What data needed and how to get it)	ASSUMPTIONS (D-4)
<p><u>University of Puerto Rico/</u> <u>USDA-ARS</u></p> <ul style="list-style-type: none"> - Principal investigator - Two Co-investigators - Two Research Associates - One Technician - Laborers - Adequate facilities for personnel to conduct research program in breeding and pathology. - Administrative infrastructure. 	<ul style="list-style-type: none"> - Use of project roster to determine continued involvement of personnel. - Examination of annual reports to determine performance of personnel and to evaluate if facilities and resources are made available to the project. 	<ul style="list-style-type: none"> - Use of baseline data to measure acceptance of the improved MDR varieties by the small farmers and to verify the yield stability and yield levels. - Research results obtained from Honduras and Puerto Rico. - Annual Reports. 	<ul style="list-style-type: none"> - The present USAID, UPR and HC financial support remains at the planned level. - Involvement of personnel at all levels listed in D-1 will be continued. - Facilities mentioned in D-1 will remain to be available.

Inputs (D-1)	Indicators (D-2)	Means of verification (D-3)	Assumptions (D-4)
<ul style="list-style-type: none"> - Bean germplasm of potential value to Honduras. 		<ul style="list-style-type: none"> - Trip reports. - Fiscal reports. 	
<p><u>Honduras</u></p>		<ul style="list-style-type: none"> - Quarterly activities and fiscal reports from the HC. 	
<ul style="list-style-type: none"> - Co-Principal Investigator 			
<ul style="list-style-type: none"> - Adequate personnel and facilities from the Escuela Agrícola Panamericana to conduct bean research. 			
<ul style="list-style-type: none"> - Adequate support (facilities, experimental plots, transportation) made available by the Secretaría de Recursos Naturales (GH). 			
<ul style="list-style-type: none"> - Cooperation from Extension Service. 			
<ul style="list-style-type: none"> - Cooperation from local small farmers. 			

PROJECT REVIEW PROFILE

INCAP • WASHINGTON STATE UNIVERSITY (Initiated November 1981) • BEANS
Swanson

IMPROVED BIOLOGICAL UTILIZATION AND AVAILABILITY OF DRY BEANS

GOAL: Improve the utilization, availability and nutrient quality of dry beans. Integrate post-harvest physiology, food technology and nutritional research with genetic and breeding programs for dry beans.

DESCRIPTION: A standardized methodology for evaluating bean quality has been developed and nutritional standards for bean breeders are being set. Constraints to bean utilization in the areas of handling/storage, utilization/consumption and nutrition are being addressed.

ROLE IN GLOBAL PLAN: This project addresses significant post-harvest issues in its own right and also helps to link these issues with the breeding and production-oriented research in the total CRSP. Dominant constraint #7 (nutrition, food preparation and health factors).

ACHIEVEMENTS:

1. Methods to reliably estimate in vivo digestibility of common beans, to determine the procyanidins in testa and cotyledon of dry beans and to estimate biological activity of lectin of kidney beans were developed as was a sophisticated Instron method to determine the optimum bean-cooking time.
2. Means to reduce the hard-to-cook phenomena were discovered.
3. A survey of the array of professional techniques for assessing bean quality well underway.
4. A bean quality assessment service to other CRSP projects is being provided.

CONTRIBUTIONS:

To HC--Because of the limited availability of animal protein, increasing the nutritional value and digestibility of beans and hence contributing to improved nutritional status is important in Latin America and Africa.

To US--This research, especially the efforts to improve biological utilization and to reduce the hard-to-cook phenomena in dry beans, will result in a better nutritional commodity for the US market as well.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 1): None. Because of the size of the project, participants have had to pay special attention to maintaining communication among the five US institutions.

ACTIONS TAKEN: None required.

RESOLUTION:

1. US PI has increased level of communication with participants.
2. Problems in funds transfer to INCAP resolved.
3. Plans to hold a CRSP-wide workshop on nutritional guidelines for bean breeders being developed.

SUBSEQUENT BOD EXTENSION RATING 1.

LOG FRAME - Washington State Univ. - Swanson/INCAP

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Program or Sector Goal:</u> Integrate post-harvest physiology, food technology and nutrition research with genetic and breeding programs for dry beans; to enhance production, nutritional quality, acceptance and utilization of dry beans in Central American countries.</p>	<p><u>Measures of Goals Achievement:</u> Farmer interest in production of dry beans and improved storage and cooking technology will increase; the availability and consumption of dry beans will increase; the nutrient contribution of dry beans to the diet of the rural populations in Central America will increase.</p>	<p>Comparison of dry bean production, interest and use survey taken before and after introduction of improved cultivars of dry beans and storage and cooking recommendations to rural populations of Guatemala and Central America. Evaluation of nutritional quality of available dry bean cultivars.</p>	<p><u>Assumptions for Achieving Goal Targets:</u></p> <ol style="list-style-type: none"> Guatemalen and Central American farmers continue to produce dry beans store them in their homes for their own use, and rely upon dry beans to fulfill protein and other nutrient requirements of adults and children The farmers maintain an interest in growing dry beans that will provide more nutritional quality and more convenient preparation for his family; and provide for advantageous marketing to others. Additional nutritional quality and cooking convenience will be an advantage to consumers and producers of dry beans.
<p><u>Project Purpose:</u> Evaluate and develop methods for the study of nutritional quality, storage characteristics and cooking potential of dry beans.</p>	<p><u>Conditions that will indicate purpose has been achieved:</u> Improved cultivars of dry beans will be introduced to farmers. Acceptance and use of dry beans will increase in rural Central America.</p>	<p>Evaluation of surveys integrated with visits and assessment of health of rural populations consuming dry beans. Assessment of nutritional quality of dry beans available to farmers in Guatemala and Central America.</p>	<p><u>Assumptions for Achieving Purpose:</u></p> <ol style="list-style-type: none"> Dry beans remain a significant protein source in diets of rural families. Dry bean production remains advantageous for farmer storage, sale and consumption - in preference to producing a more marketable crop and purchasing other foods. Fuel economy and methods of preparation remain a factor in preparation of foods in rural areas - cooking convenience of dry beans important to person preparing meals. Improved cultivars of dry beans developed and distributed to farmers

Outputs:

- a. Develop analytical methods for polyphenolic compounds in dry beans.
- b. Determine the protein quality and digestibility of dry beans.
- c. Investigate conditions of storage in Central America and determine how changes during storage may affect cooking and nutritional quality of dry beans.
- d. Initiate genetic studies on relationship of dry bean polyphenolics to production, storage and nutritional quality, digestibility and cooking quality.

Magnitude of Outputs:

- a. Dry beans will consistently contribute more than 10% of the diet of the rural population.
- b. Digestibility and protein quality of dry beans will be increased by 25%.
- c. Improved cultivars of nutritious dry beans will be introduced into rural Guatemala.
- d. Recommendations for storage and cooking of dry beans will be distributed to rural populations of Guatemala.

- a. Survey use of dry beans in diets of Guatemalan farmers and families.
- b. Compare digestibility and protein quality of improved cultivars of beans with initial cultivars of dry beans.
- c. Assess acceptance of dry beans of different colors and flavors by rural populations.
- d. Assess storage of dry beans and incorporation into diet based on recommendations.

Output Assumptions:

- a. Continued cooperation and achievement of objectives among HC and US research scientists.
- b. Continued availability of facilities and resources.
- c. Maintenance of interest of rural farmers in developed cultivars and innovations of CRSP research teams.
- d. Production of dry bean seed and recommendations that will be distributed to farmers in Central America.

Inputs:

- a. Washington State University
Co-Principal Investigator - Food Scientist
Graduate student training
Laboratory research - chemistry and nutritional quality
Animal feeding studies
- b. Institute of Nutrition of Central America and Panama
Co-Principal Investigator - Nutritionist
Professional Research Scientists - Food Chemists
Laboratory Research - Chemistry
Human & animal feeding studies
Surveys of rural perspectives, production, utilization and consumption patterns for dry beans
- c. Michigan State University
Research Scientists - Agronomist and Food Scientist
Breeding program and plots
Standard lines of dry beans
Laboratory research - storage and cooking quality.

Review of research progress and personnel involvement. Review annual progress reports and listed publications. Evaluate facilities and resource allocation and utilization.

Quarterly and annual research progress and financial support statements; travel reports.

Input Assumptions:

- a. USAID financial support and US and HC Institution contributions (cost-sharing) and interest remain strong and available.
- b. Training proposals be sustained and scientists returned to HC to maintain programs.
- c. Collaborative research progress continue and standard methods established and accepted by dry bean breeders, research scientists and consumers.

- d. University of Puerto Rico
Research Scientists - Chemist
and Bean Breeder
Laboratory research - chemistry of
tannins and proteins
- e. Colorado State University
Research Scientist - Agronomist
Breeding, field trials and plots
Evaluate production
environment relationship to
nutrient quality.
Laboratory research - nutrient
composition
- f. Kansas State University
Research Scientist - Agronomist
Laboratory research - cooking
quality of dry beans

PROJECT REVIEW PROFILE

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

IMPROVEMENT OF DROUGHT AND HEAT TOLERANCE OF DISEASE
RESISTANT BEANS IN SEMIARID REGIONS OF KENYA

GOAL: Develop improved bean cultivars for growth in semiarid zones which will contribute to food availability and bean improvement programs of national and international organizations throughout the world.

DESCRIPTION: Most of the research has taken place in California. Germplasm exchanges between Kenya and California and the subsequent generations of crosses provided the material for massive screenings.

ROLE IN GLOBAL PLAN: This is the only CRSP project emphasizing heat as well as drought resistance in beans. The HC provides some ecology unique in the CRSP. It is also developing greater collaboration with CIAT, which is stationing a person in Kenya and has requested the crosses from this project. Dominant constraint #3 (limitations of the physical environment).

ACHIEVEMENTS:

1. Bean x tepary crosses developed which are fertile.
2. Additional cultivars identified with morphological characteristics related to drought and heat tolerance.

CONTRIBUTIONS:

- To HC--Technology developing for stabilization of bean yield in semiarid regions.
- To US--Beans with identified genes will be able to be grown under more stressful conditions by US growers.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 3):

1. Financial management in Kenya has been unacceptable.
2. Research management in Kenya has been unacceptable.
3. Drought tolerance research not sufficiently inclusive.

ACTION TAKEN:

1. Requested PI and team adjustment in Kenya.
2. University of California, Davis administrator and MO finance officer joined project team for on-site review and meeting.
3. Requested new plan of work.
4. TC reviewed project closely including draft new plan of work.

RESOLUTION:

1. New HC PI named (Dr. David Ngugi).
2. New HC PI travelled to UCD to develop new plan of work with US PI.
3. New fiscal procedures in place with UN controller.
4. Ph.D.-level UCD researcher (Ms. Cynthia Cory) to be placed at UN.

SUBSEQUENT BOD EXTENSION RATING 2.

I. Log Frame Matrix - University of California/Kenya
February 15, 1983

Narrative Summary	Objectively Verifiable Indicators	Mean of Verification	Important Assumptions
<p><u>Program or Sector Goal:</u> To increase drought and heat tolerance of disease-resistant beans grown by subsistence farmers in semi-arid regions.</p>	<p><u>Measures of Goal Achievements:</u> Yields of beans grown by subsistence farmers in semi-arid areas will be stabilized and/or will improve as a result of increased tolerance to environmental stress, reduction in prevalence of disease, and improved knowledge of appropriate breeding and agronomic management techniques.</p>	<p>Comparisons of yields and stability of yields over time with initial data from pilot experiments in California and Kenya.</p> <p>Visits to appropriate sites (other CRSP projects and international centers).</p> <p>Comparisons of initial project results and methodology with information from other CRSP and other similar projects.</p> <p>Awarding of degree for advanced training to Kenyan, attendance at workshops, professional scientific meetings, publications.</p> <p>Adaptability and acceptability of new cultivars and/or new techniques by farmers in the semi-arid areas of Kenya.</p>	<p>Continued need for semi-arid land for crop (bean) growth in Kenya.</p> <p>Continued dependence on rainfall, rather than developing irrigation systems.</p> <p>Continued population expansion in Kenya.</p> <p>Continued commitment by US-AID and UC Davis and Riverside to the project.</p> <p>Continued low and/or fluctuating yields of beans as grown by subsistence farmers.</p>
<p><u>Project Purposes:</u> To establish collaborative relationships among scientists with interests in the project.</p> <p>To undertake pilot projects which will provide information relevant to the program goals.</p>	<p><u>Conditions that will Indicate Achievement of Purpose:</u></p> <p>Reduction in incidence of disease. Reduction in incidence of crop failure or very low yield in environmentally stressed regions.</p>	<p>Screening and splitter field trials in California and Kenya at appropriate locations.</p> <p>Laboratory and greenhouse experiments on bean/tefary crosses.</p> <p>Acceptance of Kenyan students into programs of UC Davis and</p>	<p>Continued interest in the project by Kenyan scientists and Kenyan governmental personnel, cooperation with other CRSP scientists and those at international agricultural centers.</p> <p>Success in identifying</p>

To instruct scientists in approaches, techniques and methodology of the project.

To develop cultivars and agronomic management approaches consonant with the project goal.

Increased dissemination of information relevant to bean growth and development by trained personnel.

Acceptance and planting of improved cultivars by subsistence farmers.

Riverside, attendance of students at workshops and professional meetings.

Laboratory studies and publication on morphological features of promising cultivars.

promising cultivars from screening and sprinkler trials in the U.S. and Kenya.

Identification of interested scientists and evidence of willingness to participate.

<u>Outputs:</u>	<u>Magnitude of Outputs:</u>		
Screening for identification of cultivars with drought and heat tolerance.	Improved tolerance and yield of cultivars grown in semi-arid areas.	Accumulation of appropriate information on environmental stress, abscission, disease resistance and yield, and comparisons with similar investigations in other (CRSP) projects.	New cultivars and agronomic approaches will be consonant with needs of subsistence farmers and will be acceptable to them.
Breeding for development of drought, heat and disease resistant cultivars. Training of Kenyan students in project methodologies.	Resistance to disease, heat and drought in tepary/bean crosses.		
Identifying plant characteristics that enhance tolerance to stressful environments.	Trained personnel available to interact with scientists at the University and with subsistence farmers.		
Correlating information on environmental stress, flower and pod abscission and yield.	Compilation of information appropriate to all aspects of the project.		

<u>Inputs:</u>	<u>Magnitude of Inputs:</u>		
University of California, Davis - Principal Investigator, Cooperators, technical laboratory and field personnel, computer operator, greenhouse, growth chamber, laboratory and field facilities and supplies, graduate students, office personnel and facilities, external consultants.	Indicated by project reports, budgets, working papers, continued involvement of personnel and expansion of project contacts.	Various reports, publications, budgetary data, special information bulletins.	Screening program will indicate possible cultivars for adaptation to semi-arid regimes.
University of California, Riverside - Co-Principal Investigator, cooperators,			Drought, heat and disease resistance cultivars can be developed over time.
			From field trials, cultivars with tolerance will have some common morphological characteristics which are related to ability to withstand

Best Available Document

technical laboratory and field personnel, greenhouse, laboratory and field facilities and supplies, graduate students, office personnel and facilities, external consultants.

University of Kenya - Co-investigator, cooperators, field personnel, field facilities, graduate students, consultants.

environmental stress.

Evidence in the form of results from field trials and laboratory studies will gradually accumulate and indicate appropriate directions for further study.

Funding to continue and maintain the investigation will continue as originally planned.

Young Kenyan scientists will continue to come to UC Davis and Riverside to study in graduate programs related to this project; the US commitment will also continue.

The Management Office will continue to facilitate project implementation and continuance, and will respond to PIs difficulties--particularly in budgetary matters and paperwork.

PROJECT REVIEW PROFILE

MALAWI • MICHIGAN STATE UNIVERSITY (Initiated February 1982) • BEANS
Adams

GENETIC, AGRONOMIC AND SOCIO-CULTURAL ANALYSIS OF DIVERSITY
AMONG BEAN LAND-RACES IN MALAWI

GOAL: Contribute to a viable bean improvement program for small farmers through analysis of biological/social bases for the maintenance of bean diversity.

DESCRIPTION: Project focuses on the natural survival needs of important, irreplaceable germplasm and on understanding the maintenance and importance of mixtures in the farm family system. Experiments carried out on frequency of heterozygosity, heterozygote superiority, yield stability, outcrossing and genetic variation in beans. Socio-economic data collected on bean-producing households in Northern Zone emphasize women's roles in agricultural production. Two expatriate researchers (Dr. E. Ayeh and Mr. G. Martin) in the HC.

ROLE IN GLOBAL PLAN: This is one of the projects with agronomic/socio-economic integration. Dominant constraints #2 (plant response limitations) and #8 (socio-cultural factors).

ACHIEVEMENTS:

1. Extensive germplasm collections were made in identified areas.
2. Evidence for heterozygosity found in some bean seed collections.
3. Data generated on importance/contributions of mixtures in yield stability.
4. Socio-economic research instruments tested and refined.
5. Agronomic and social baseline data collected.

CONTRIBUTIONS:

To HC--The study of bean preferences, growing practices of small farmers and the means by which bean land-races are maintained will contribute valuable information to the bean improvement program in Malawi.

To US--Many of the issues raised as well as the germplasm collected will eventually contribute to US researchers and to the US bean industry.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 1): None. Agronomic/social science integration of interest to ERP.

ACTIONS TAKEN: A second expatriate researcher (a social scientist) sought.

RESOLUTION:

1. Two expatriate researchers (horticulturalist and sociologist) to be stationed in Malawi.
2. The name of a female social scientist submitted to the GGM for approval.
3. Socio-economic studies in the Northern Zone will be expanded and interwoven more fully with the agronomic research.

SUBSEQUENT BOD EXTENSION RATING 1.

BEAN/COWPEA CRSP MALAWI PROJECT LOGFRAME

NARRATIVE SUMMARY	CRITERIA OR OBJECTIVES INDICATORS	DATA NEEDS OR MEANS OF VERIFICATION	ASSUMPTIONS OR REQUIRED "GIVENS"
<p>GOAL</p> <p>Analysis of the biological/social bases for the maintenance of bean diversity in Malawi</p>	<ol style="list-style-type: none"> 1. Significant factors in each subarea (genetic, agronomic, sociological, cultural) identified 2. Factors concerned with production, distribution, utilization and consumption identified 	<ol style="list-style-type: none"> 1. Identification of relevant ecological zones 2. Farm household observations and surveys 3. Field and greenhouse studies on Malawi beans 	<ol style="list-style-type: none"> 1. Biological/social data can be collected on the same farm households in each region 2. Residents, especially women, will cooperate 3. Biological/social data can be integrated in a comprehensive analysis
<p>PURPOSE</p> <p>Provide information necessary to develop a viable bean improvement program supportive of small farmers, especially women and their families in Malawi</p>	<ol style="list-style-type: none"> 1. Survey and observations of small farm households throughout production cycle 2. Bean collections from each area throughout production cycle 3. Resident reports of socio-cultural factors 	<ol style="list-style-type: none"> 1. Multivariate analysis of data generated 2. Description of bio-social environment 3. Definition of roles of family members in farm household life cycle and the maintenance of diversity 	<ol style="list-style-type: none"> 1. A national bean program can help the bean farmers of Malawi 2. Residents, especially women, will cooperate 3. Bio-social data can be integrated in an analysis
<p>OUTPUTS</p> <ol style="list-style-type: none"> 1. Comprehensive report of analysis of bean diversity within context of farm family system 2. Recommendations for bean improvement plan for USAID, CIM and Bunda 3. Important contributions to relevant literature and Bean/Cowpea CRSP 4. Increased numbers of Malawian scientists trained 	<ol style="list-style-type: none"> 1. Multiple copies of report available for distribution 2. Report used by GOM in conjunction with Bunda College to develop long-term bean program for Malawi 3. US and Malawi scientists publish jointly in appropriate journals 4. Graduates from identified graduate programs 	<ol style="list-style-type: none"> 1. Computer printouts read and interpreted in relation to all other available data 2. Findings disaggregated by geographic region, point in production cycle and gender 3. Extensive notes kept by US and Malawi scientists throughout process 4. University records 	<ol style="list-style-type: none"> 1. Such a report can be valid, useful and appropriate 2. Positive use will be made of the information in support of small farm families 3. Information from this project will be useful to others 4. There are potential students prepared and available for advanced training
<p>INPUTS</p> <ol style="list-style-type: none"> 1. Materials, supplies and equipment 2. Survey and data gathering trips including collecting seed samples 3. Greenhouse and field space for multiplying and studying plants grown from the collections 	<ol style="list-style-type: none"> 1. Landrover, motorcycles, bicycles, irrigation and greenhouse equipment 2. Trained team of Malawi female researchers to gather socio-cultural data 3. U. S. researchers on site collaborating with Malawian scientists 	<ol style="list-style-type: none"> 1. Approvals requested received, equipment purchased 2. Personnel at appointed locations with support materials and logistics in order 3. Necessary approvals received, research plan begun 	<ol style="list-style-type: none"> 1. Necessary materials either available in Malawi or can be transported into country 2. Women to be hired and trained are available 3. Project personnel are compatible and can work together

PROJECT REVIEW PROFILE

MEXICO • MICHIGAN STATE UNIVERSITY (Initiated March 1983) • BEANS
Adams

IMPROVING RESISTANCE TO ENVIRONMENTAL STRESS IN BEANS THROUGH GENETIC SELECTION
FOR CARBOHYDRATE PARTITIONING AND EFFICIENCY OF BIOLOGICAL NITROGEN FIXATION

GOAL: Assist INIA Mexico in the development of bean varieties and associated rhizobial systems which perform better than existing varieties under conditions of low rainfall and low soil N status prevailing on the small farms of the semiarid zones of the country.

DESCRIPTION: The research is concerned with breeding for combined drought resistance and N fixation in bean seed and plant types.

ROLE IN GLOBAL PLAN: This project is complementary to those in Kenya, Senegal and Brazil, adding the dimension of carbohydrate storage and remobilization and combining it with selection for N-fixing efficiency. This configuration of research issues is unique in the CRSP. Dominant constraint #2 (plant response limitations).

ACHIEVEMENTS:

1. A rain-out shelter has been constructed, making possible the imposition of drought stress to coincide with particular bean developmental stages.
2. Fifteen hundred bean genotypes have been screened preliminarily for drought tolerance in Mexico.
3. A series of some sixty crosses has been made among lines tolerant to drought and nitrogen stress, and four bean strains were identified that show promise as stress-resistant or -tolerant lines.

CONTRIBUTIONS:

To HC--Research on combined drought resistance and high nitrogen fixing capability will contribute to the development of more resistant bean varieties for small farmers in the Mexican Highlands.

To US--The research and the resulting bean genotypes will be of use in similar environmental conditions in the US.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 1): None.

ACTIONS TAKEN: None required.

RESOLUTION:

HC PI (Ing. Jorge Acosta) to be replaced by Dr. Rogelio Lepiz-Ildefonso as Ing. Acosta will be coming to the US to pursue doctoral studies.

SUBSEQUENT BOD EXTENSION RATING 1.

LOG FRAME MATRIX

Project Title: Mexico/Michigan State University

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: Develop bean varieties with a improved tolerance to drought & with high nitrogen-fixing capability in dryland conditions.</p>	<p>Measure of Goal Achievement: Development & release of bean varieties in major agronomic type(s) possessing higher levels of tolerance to drought & having improved N-fixing capability.</p>	<p>Performance trials conducted by INIA (Mexico), Michigan State University & the University of Minnesota.</p>	<p>Beans will continue to be an important food source in the diets of Mexicans; Uncertain rainfall will continue to be a problem in the central highlands of Mexico; small farmers will accept & use new varieties of beans.</p>
<p>Project Purpose: To mediate the effect of drought & low nitrogen availability upon bean production in the dry upland production zones of Mexico & to increase the stability of production in Michigan where drought stress occurs.</p>	<p>Condition that will indicate <u>project purpose</u> has been achieved: When bean growers in Mexico (dry uplands) & Michigan have been supplied with & accepted the improved varieties and/or practices, & adopted them into their production system.</p>	<p>When growers begin to purchase seed of the improved varieties in quantities sufficient to represent a substantial (greater than 20%) part of grower acreage each year.</p>	<p>That government agencies maintain incentives to seed & commercial edible bean production; that seed organizations participate in the increase & distribution of new improved varieties.</p>
<p>Project Outputs: 1. Improved drought and/or N-fixing varieties in one or more major classes of beans. 2. Trained research personnel. 3. Germplasm that can be introduced into other programs. 4. Ideas and/or technics of value to other projects.</p>	<p>Magnitude of Outputs: 1. Trained personnel--current & continuous, at a level of 1-2 M.S. students/year and 1 doctoral student every 3rd year. 2. Improved germplasm--some new lines identified annually. 3. Varieties--not in the immediate (1-2 years) future, but within a 3-5 year period.</p>	<p>1. University records of students trained and/or degrees granted. 2. Theses produced from the project or papers presented at meetings or conferences. 3. Research reports from the project annual summaries. 4. Eventually, varieties release notices or registrations.</p>	<p>That the project remain funded & that it receive appropriate cooperation & leadership from the institutions</p>
<p>Project Inputs: US--Land, laboratory & other facilities, technician & secretarial time & time of PI & Co-PI. Mexico--Personnel of INIA in Mexico City, Iquala & Guadalajara--Durango have all contributed time to the project. In addition, in Iquala, Mazatlan, & Durango, land, laboratories, labor, transportation, & equipment have been made available when required.</p>	<p>Implementation target: Personnel \$259,000 Equipment 97,000 Travel 52,000 Materials & Supplies 59,000 Other Direct Costs 45,000 Indirect Costs 52,000 Total 564,000</p>	<p>Annual project reports, trip reports, budget analyses.</p>	<p>Sufficient funding will continue to support project activities; staff will remain at full strength & committed to project goals.</p>

PROJECT REVIEW PROFILE

NIGERIA • MICHIGAN STATE UNIVERSITY (Initiated November 1981) • COWPEAS
Markakis

MEDICAL ASPECTS OF FEEDING COWPEAS TO CHILDREN

GOAL: Stimulate the development of programs to realize the nutritional benefit of cowpeas in the diets of young children in developing countries and hence enhance their growth, development and resistance to disease.

DESCRIPTION: This study explores the possible relationship between cowpea consumption and the high incidence of diarrhea and other adverse effects in weanling children. If this relationship is confirmed, the factors in cowpeas that cause the problems will be identified and, if possible, removed. Study of cowpea use in rehabilitating under- and mal-nourished children will be examined.

ROLE IN GLOBAL PLAN: This project is unique in the CRSP in that it focuses on infant nutrition. Dominant constraint #7 (nutrition, food preparation and health factors).

ACHIEVEMENTS:

1. Two surveys were conducted in Nigeria (Jos and Ibadan areas) to explore the relationship between cowpea consumption and GI disturbances in children 6-24 months of age. Results indicate that cowpeas are associated with GI symptoms in approximately ten percent of the sample populations.
2. Six Nigerian cowpea varieties have been analyzed for stachyose and raffinose, two oligosaccharides implicated in the incidence of flatulence in adults.

CONTRIBUTIONS:

- To HC--Studies to realize better utilization of cowpeas and other legumes high in protein are increasingly important in Nigeria because the current dependence on milk as a source of protein for children may have to be reduced as the cost of its importation grows.
- To US--New knowledge about cowpeas may contribute to an increase in the small US market for black-eyed peas. A study of cowpea anti-nutritional factors will ultimately result in better utilization.

MAJOR PROBLEMS IDENTIFIED BY ERP (RATED 2): None. However, communications within Nigeria continue to be structural problem which makes significant demands on team resources.

ACTIONS TAKEN: None required.

RESOLUTION:

1. HC PI (Dr. A. Omolulu) changed to Dr. M. A. Hussain. Dr. Omolulu on extended sabbatical leave.
2. Linkages between this project and other CRSP projects in Nigeria to be strengthened through joint meeting being planned.

SUBSEQUENT BOD EXTENSION RATING 2.

LOG FRAME MATRIX

Project Title: Nigeria/Michigan State University

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS														
<p><u>Program or Sector Goal:</u> Identify & remove the factors in cowpeas that cause gastro-intestinal (GI) problems in young children.</p>	<p><u>Measure of Goal Achievement:</u> Young children will be able to eat cowpeas without suffering (GI) problems.</p>	<p>Surveys will be conducted with families reporting GI problems in children consuming cowpeas. After problem agents are identified & new procedures developed to eliminate the problems, controlled studies will be conducted with the same families to determine that the problem has been eliminated.</p>	<p>Cowpeas will continue to be an important food source in the diets of Nigerians. Government officials & administrators at MSU, Ibadan, & Jos will continue to provide project support; institutions & personnel will remain stable & committed to project; families in Nigeria will accept new processing methods.</p>														
<p><u>Project Purpose:</u> 1. Verify the alleged relationship between cowpea consumption & ill effects in children. 2. Isolate the agent(s) causing the GI problems. 3. Develop new procedures that will eliminate or neutralize the agent(s) causing the problems.</p>	<p><u>Conditions that will indicate project purpose has been achieved:</u> Young children can consume cowpeas without suffering GI problems.</p>	<p>Results obtained from interviews with mothers of children reporting GI problems; data obtained from hospital records.</p>	<p>Effective cooperation between medical personnel & families reporting problems; necessary & timely funding for equipment required to test and analyze research data.</p>														
<p><u>Project Outputs:</u> 1. Verification that cowpeas cause GI problems in young children. 2. Identification of the agent(s) causing the GI problems. 3. Develop new procedures for preparation of cowpea foods to eliminate GI problems.</p>	<p><u>Magnitude of Outputs:</u> 1. GI problems in young children documented. 2. Food preparation procedures devised to eliminate GI problems.</p>	<p>Data from family surveys; nurse observations in homes; hospital records; medical school controlled studies.</p>	<p>Families will cooperate in interviews & in-home nurse visitations; hospital & laboratory staff will have adequate time & facilities to conduct tests; new procedures for food processing will be disseminated & available to general populace in Nigeria.</p>														
<p><u>Project Inputs:</u> MSU--PI, Co-PI, 2 consultants & appropriate secretarial staff providing consultation & chemical/bio-chemical studies of cowpeas. Univ of Jos--PI, Co-PI, & support staff & physical facilities. Univ of Ibadan--PI, 2 Co-PIs & support staff & physical facilities (hospitals, labs, homes).</p>	<p><u>Implementation Target:</u></p> <table border="0"> <tr> <td>Personnel</td> <td>\$234,000</td> </tr> <tr> <td>Equipment</td> <td>105,000</td> </tr> <tr> <td>Travel</td> <td>118,000</td> </tr> <tr> <td>Materials & Supplies</td> <td>32,000</td> </tr> <tr> <td>Other Direct Costs</td> <td>15,000</td> </tr> <tr> <td>Indirect Costs</td> <td>58,000</td> </tr> <tr> <td>Total</td> <td>562,000</td> </tr> </table>	Personnel	\$234,000	Equipment	105,000	Travel	118,000	Materials & Supplies	32,000	Other Direct Costs	15,000	Indirect Costs	58,000	Total	562,000	<p>Annual project reports, trip reports, budget analyses.</p>	<p>Sufficient funding to support project activities will continue; staff will remain committed to project goals; personnel changes will be minimal.</p>
Personnel	\$234,000																
Equipment	105,000																
Travel	118,000																
Materials & Supplies	32,000																
Other Direct Costs	15,000																
Indirect Costs	58,000																
Total	562,000																

PROJECT REVIEW PROFILE

NIGERIA • UNIVERSITY OF GEORGIA (Initiated April 1981) • COWPEAS
McWatters

APPROPRIATE TECHNOLOGY FOR COWPEA PRESERVATION AND PROCESSING AND A STUDY OF
ITS SOCIO-ECONOMIC IMPACT ON RURAL POPULATIONS IN NIGERIA

GOAL: Develop appropriate technology to increase cowpea processing efficiency and encourage increased utilization among Nigeria's rural population and urban poor.

DESCRIPTION: Appropriate technology packages for dry dehulling and milling cowpeas to be used at the village level are being developed. Nutritional, sensory quality and storage studies are underway as are socio-economic surveys.

ROLE IN GLOBAL PLAN: Through its focus on cowpea storage and processing issues, this project makes a unique contribution. Dominant constraint #7 (nutrition, food preparation and health).

ACHIEVEMENTS:

1. It was found that cowpeas have a high protein content compared to other legumes and that processing further improved the quality.
2. Wet and dry cowpea decortication techniques and a method to quantify the extent of testa removal were devised. Milling procedures producing cowpea meal with similar particle size distribution to traditional cowpea paste were devised. Various storage studies were undertaken to reduce damage done by fungi and weevils. An electronic device to monitor cooking time of seeds was developed.
3. Cowpea products developed of commercial interest to restaurant industry in Georgia.

CONTRIBUTIONS:

To HC--Reduced losses during storage and appropriate technology to facilitate processing will result in increased utilization of cowpeas.
To US--Many techniques and methodologies developed as a result of this research program directly relevant to the US food & livestock industries.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 2): None. However, structural problems within Nigeria inhibit communication.

ACTIONS TAKEN: Greater resources used to maintain required communication level.

RESOLUTION:

1. Socio-economic surveys identifying the role of cowpeas in the nutritional, social and cultural milieu being expanded.
2. A complete package of cowpea flour manufacturing technology in prototype to be developed and tested at the village level with attention to impact on women.
3. Closer links between this project and the Nigeria/Michigan State University project being developed and efforts made to strengthen US-HC communications.

SUBSEQUENT BOD EXTENSION RATING 1.

Log Frame Matrix - Nigeria/University of Georgia/McWatters
August 6, 1982

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Program or Sector Goal:</u> Develop appropriate technology to increase the efficiency of processing and encourage increased utilization of cowpeas among Nigeria's rural population and urban poor.</p>	<p><u>Measures of Goal Achievements:</u> Successful development of practically feasible techniques to: (a) process cowpeas to produce shelf-stable cowpea meal/floor for utilization in traditional Nigerian dishes, and (b) store cowpeas prior to and after processing.</p>	<p>Interviews with consumers, comparison of data of cowpeas stored with and without treatment to prevent insect infestation and microbial spoilage, comparison of data of cowpeas processed by traditional and new methods.</p>	<p><u>Assumptions for Achieving Goal Targets:</u> The need for cowpeas as an important food source in the diets of Nigerians continues to exist; Work will progress as planned without undue hinoerance and delay by administrators at UGA, MO OR USAID.</p>
<p><u>Project Purpose:</u> (a) Identify cowpea usage patterns and social and technical factors which prevent efficient utilization of cowpeas. (b) Develop appropriate technologies and products to promote resourceful utilization of cowpeas. (c) Train host country and U.S. graduate students in food science.</p>	<p><u>Conditions that will indicate purpose has been achieved:</u> All the items identified in the Output category are completed.</p>	<p>Results obtained from interviews with consumers and small-scale producers of cowpeas; records of data obtained from storage, processing, functionality, and nutritional studies; completion of training programs by host country and U.S. graduate students.</p>	<p><u>Assumptions for Achieving Purpose:</u> (a) Effective cooperation between administrative and research personnel at each institution and between collaborating institutions will continue. (b) Necessary and timely funding, equipment, supplies, facilities, and personnel will be available for project activities. (c) Students will fulfill requirements of training program.</p>

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Outputs:</u></p> <p>(a) Identification of cowpea usage patterns and constraints which limit cowpea utilization.</p> <p>(b) Development of treatments to prevent insect infestation and microbial spoilage in field-dried, shelled cowpeas during storage.</p> <p>(c) Development of processes to produce a convenient, shelf-stable, functional, and nutritious cowpea product (meal/flour) and optimization of process conditions.</p> <p>(d) Training of host country and U.S. graduate students.</p>	<p><u>Magnitude of Outputs:</u></p> <p>(a) Cowpea usage patterns and utilization constraints identified.</p> <p>(b) Treatments to reduce storage losses devised.</p> <p>(c) Process to produce a convenient, ready-to-use cowpea product devised.</p> <p>(d) Host country and U.S. students trained in food science.</p>	<p>(a) Data from survey.</p> <p>(b) Data from storage, processing, functionality, and nutritional studies.</p> <p>(c) Publications and oral presentations.</p> <p>(d) Degree requirements fulfilled.</p>	<p><u>Output Assumptions:</u></p> <p>(a) Cooperation of all personnel responsible for timely development of the survey instrument and completion of the survey.</p> <p>(b) Full support from MO and USAID in speedy approval of project-related activities such as equipment purchase requests and travel requests.</p> <p>(c) Acquisition of Nigerian cowpea cultivars for research activities at UGA.</p> <p>(d) Availability of qualified host country and U.S. graduate students for training.</p> <p>(e) Improved communication between U.S. and host country institutions.</p>
<p><u>Inputs:</u></p> <p><u>Univ. of Georgia</u> Principal Investigator, Co-Investigators (4), technical and secretarial support, laboratory equipment and supplies, pilot plant facilities, UGA administration support, graduate student candidates.</p> <p><u>Univ. of Nigeria</u> Principal Investigator, Co-Investigators (7), technical and secretarial support, materials and supplies, graduate student candidates.</p> <p><u>MO and USAID</u> Funding and project operational support.</p>	<p>Examination of project roster to determine continued involvement of personnel; examination of annual reports to evaluate availability of equipment, facilities, and other resources to the project.</p>	<p>Annual project reports, trip reports, and budget analyses</p>	<p><u>Input Assumptions:</u></p> <p>(a) Sufficient funding to support project activities will continue.</p> <p>(b) Support by U.S. and host country institution administrations will continue.</p> <p>(c) Commitment to project objectives by U.S. and host country personnel will continue.</p> <p>(d) Host country and U.S. graduate student candidates will be available for project involvement.</p> <p>(e) Project management is efficient and not unduly burdensome for researchers.</p>

PROJECT REVIEW PROFILE

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

A PROGRAM TO DEVELOP IMPROVED COWPEA CULTIVARS FOR PRODUCTION AND UTILIZATION IN SEMIARID ZONES

GOAL: Increase seed production and yield stability of cowpeas grown in hot semiarid zones by subsistence farmers.

DESCRIPTION: This project is developing cowpea cultivars with improved drought and heat resistance and improved management methods that will result in increased seed production and yield for small farmers in the semiarid zone of Senegal.

ROLE IN GLOBAL PLAN: This is the only project on cowpea improvement for semiarid zones. Dominant constrain 3 (limitations of the physical environment).

ACHIEVEMENTS:

1. Results include innovations in the areas of improved drought adaptation, heat tolerance and insect resistance. Among these are several extremely early cowpea strains, developed at the University of California, Riverside and tested for three years in Senegal, that have been found to give high yields.
2. Heat tolerance has also been discovered in certain cowpea strains and is being incorporated into cowpeas from Senegal.

CONTRIBUTIONS:

To HC--The Senegalese cowpea research capability has been increased, and improved cowpea production systems are being developed for subsistence farmers in the semiarid zone.

To US--New cowpea varieties are of benefit to the US industry because the variety presently most relied upon is sensitive to heat and to fusarium wilt.

MAJOR PROBLEMS IDENTIFIED BY EPP (RATED 1): None.

ACTIONS TAKEN: None required.

RESOLUTION:

1. New HC PI named (Dr. M. Ndoye) with the promotion of previous HC PI, Dr. M. Mbodj.
2. Links between this and other CRSP projects are being strengthened.

SUBSEQUENT BOD EXTENSION RATING 1.

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Section Goal: Increase seed production and yield stability of cowpeas grown in hot semiarid zones by subsistence farmers.</p>	<p>Measures of Goal Achievements: Average seed yield of cowpeas will increase significantly, and variation in seed yield will decrease significantly for farmers in target locations by 1990.</p>	<p>On-farm experiments by farmers and extension workers in several locations within semiarid zones in which new cowpea cultivars and management methods are compared with traditional cultivars and methods.</p>	<p>Assumptions for Achieving Goal: Governments and international organizations place more emphasis on cowpea research, extension, and marketing, and an effective international network of cowpea breeders, agronomists, and extension workers is developed.</p>
<p>Project Purpose:</p> <ol style="list-style-type: none"> 1) Develop cowpea cultivars with improved drought and heat resistance, and management methods that result in increased seed production and yield stability in hot, semiarid zones. 2) Develop improved cowpea production systems for subsistence farmers in the semiarid zone of Senegal. 	<ol style="list-style-type: none"> 1) With improved cultivars and management methods, average seed yields will increase, and variation in yield will decrease significantly compared with local controls in experiment station trials in hot, semiarid zones by 1985. 2) Practical, improved cowpea production systems are developed by ISRA which could be usefully adopted by subsistence farmers in the semiarid zone of Senegal. 	<ol style="list-style-type: none"> 1) Cooperative cowpea yield trials in different locations with wetter and drier conditions, and with different thermal regimes within semiarid zones over 5 years. 2) On-farm evaluation of the new cowpea production systems in comparison with traditional systems by extension workers and farmers. 	<ol style="list-style-type: none"> 1) Project funding is no less than original estimates, and adequate supplemental resources and support are available at the U.S. universities. 2) ISRA develops, maintains, and provides adequate support for a complete team of cowpea research and extension workers. Effective germplasm and advice (especially with respect to solving problems due to insect pests) is provided to the team by IITA.
<p>Outputs:</p> <ol style="list-style-type: none"> 1) Screening techniques for drought and heat resistance are developed and applied. Germplasm with drought and heat resistance is discovered and successfully incorporated into advanced lines which have genetic backgrounds which are suitable for specific uses within semiarid zones. 2. Identification of appropriate cropping systems for Senegal. Development of appropriate cultivars and management methods. A cowpea breeder/agronomist is trained for the permanent staff of ISRA. 	<ol style="list-style-type: none"> 1) Advanced lines will exhibit higher average seed yields and decreased variation in yield in trials where water is limiting and temperatures are high, than presently available cultivars. 2) New cowpea production systems will be productive, stable, profitable, and attractive to subsistence farmers in Senegal. A breeder/agronomist with appropriate experience and abilities will be working full time on cowpeas for ISRA. 	<ol style="list-style-type: none"> 1) Drought resistance will be evaluated by yield trials under controlled levels of drought. Heat resistance will be evaluated by yield trials in hot environments. Resistance to both drought and heat will be evaluated in hot environments where water is limiting. 2) Productivity, stability, profitability, and practicality could be evaluated by research and extension workers conducting experiments on stations and farmers' fields. The quality of the academic program and cowpea improvement program of the cowpea breeder/agronomist could be evaluated. 	<ol style="list-style-type: none"> 1) Earliness, increased partitioning of carbohydrate to reproductive tissue, and improved rooting are key factors limiting the adaptation of cowpeas to semiarid environments, and useful genetic variation is available for these characters. Genotypes can be developed with improved tolerance to heat which are not at the same time more susceptible to damage caused by moderately low temperatures. 2) Practical solutions to problems due to insect pests can be developed for Senegal. The level of cooperation between research and extension divisions, and effectiveness of on-farm research can be enhanced.
<p>Inputs: Key personnel of ISRA and U.S. universities are needed on a long-term basis. Excellent experiment station facilities are needed. Certain items of equipment, resources, and supplies must be available at critical times (such as sowing, etc., to harvest).</p>	<p>Project rosters, attendance, and numbers of cooperative meetings, extent and quality of field experimentation, and reports from project personnel.</p>	<p>Annual reports, budget reports, and project reviews.</p>	<p>CRSP, U.S., and ISRA financial contributions are sustained at least at the original planned levels. Key ISRA and U.S. personnel will be available for the duration of the project. CRSP management and USAID personnel will continue to support the projects. The weather will be reasonably predictable during the growing seasons.</p>

PROJECT REVIEW PROFILE

TANZANIA • WASHINGTON STATE UNIVERSITY (Initiated June 1981) • BEANS
Silbernagel

BREEDING BEANS FOR DISEASE AND INSECT RESISTANCE AND
DETERMINATION OF ECONOMIC IMPACT ON SMALLHOLDER FARM FAMILIES

GOAL: Develop high yielding, widely adapted disease and insect resistant bean cultivars for the smallholder family. Estimate the economic viability of the new cultivars and their impact on women's roles in the production, consumption and marketing process.

DESCRIPTION: Socio-economic information on small farming households was acquired to provide baseline data against which to measure the impact of introduced changes. Work is moving ahead on the development of insect resistant, high yielding, widely adapted cultivars acceptable to farmers and consumers.

ROLE IN GLOBAL PLAN: This project integrates micro-economics with cultivar development for Tanzania. Dominant constraints #6 (production-consumption economics) and #1 (limitations due to pests and diseases).

ACHIEVEMENTS:

1. A cultivar (Kabanmina) has been identified that out-yields most cultivars at cool high elevations. Growing mixed cultivars reduces rust and angular leaf spot and increases yield; cleaning seed lots reduces seed transmission of disease and increases yield; oil treatment of seeds reduces storage losses by bruchids; and pepper and neem extracts reduce injury by insects.
2. Socio-economic surveys contributed to bean production research decisions and clarify women's agricultural production roles in the farming systems.
3. A monoclonal antibody technique for detection and identification of international seed-borne viruses in beans developed.

CONTRIBUTIONS:

To HC--The production of high yielding, multiple disease and insect resistant bean cultivars will assist this food-deficient country toward food self-sufficiency and will contribute to the alleviation of hunger and malnutrition through increasing and stabilizing a vital food protein source.

To US--Materials developed in this project will have potential utilization in the US by domestic bean breeders. Selections will be made for adaptation to the Northwest seed-producing areas. The antisera technique will facilitate international use of potentially useful germplasm in bean improvement programs.

MAJOR PROBLEMS AS IDENTIFIED BY ERP (RATED 1): None.

ACTIONS TAKEN: A food scientist in the HC has been added to the team to assess bean quality of the lines being developed.

RESOLUTION:

1. Screening methods for drought tolerance will be developed because many beans are grown in dry areas of Tanzania. Attention being given to integrating this work with the Kenya project as appropriate.
2. A methodology for nutritional improvement in beans is under study.

SUBSEQUENT BOD EXTENSION RATING 1.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY- 81 to FY- 85

Project Title & Number: Title XII BC/CRSP WSU-Tanzania/Silbernagel
breeding beans (Phaseolus) for disease and insect resistance and
determination of economic impact on small farm families.

Total US Funding \$877,618

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Sector Goal: The broader objective to which this project contributes: (A-1)	Measures of Goal Achievement: (A-2)	(A-3)	Concerning long term value of program/project: (A-4)
Sector Goal: Self Reliance in food production for developing African countries.	An upturn in the average annual growth in farm production; which has declined to 1.3% for Africa since the 1960's, while birth rates have increased to 2.9%.	Agricultural statistics published by national gov't's, FAO or other international development groups like US-AID.	Food shortage in most of Africa will continue at least through year 2000 because of socio-economic conditions and the scarcity of developmental resources for rapid improvement in human and/or agricultural potential.

(B-1)	(B-2)	(B-3)	(B-4)
Program Goal: Improve Tanzanian bean production field levels and stability, while reducing labor inputs (mostly women's). Reduce storage losses.	Annual GDT national bean production will increase steadily with demand. Ample supplies are available at reasonable prices in village open markets, as well as large cities. Ultimately (2000) excess food beans should be available for export.	Long term village background studies and in-depth family interviews by project socio-economists. Regional and national agricultural production statistics.	a) That self reliance in food production, and food related research continue to be high GDT priorities. b) That GDT farmer education and extension service capabilities will be capable of "selling" the new varieties and improved production methods to small farmers in all parts of the country, quickly and effectively.

LOGICAL FRAMEWORK cont.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: (C-1)	Conditions that will indicate purpose has been achieved: End of project status. (C-2)	(C-3)	Affecting purpose-to goal link: (C-4)
Project Purpose: Evaluate and reduce production and storage losses due to diseases, and insects; thereby increasing yield, production efficiency, and small farm family income.	a) Small farmer trials of disease resistant interim varieties will show 50% yield increases by 1985. c) Family labor inputs required per kilo of beans consumed (or sold) will decrease significantly as growers utilize improved varieties and storage practices.	Village background studies and in-depth family interviews by project socio-economists.	a) That GDT bean transportation, storage and marketing infrastructure achieve a high level of economic efficiency. b) That normal weather conditions prevail in major production areas. c) That farmers will be given sufficient financial incentive to produce excess beans for sale.
Outputs: (D-1)	Magnitude Of Outputs necessary and sufficient to achieve purpose: (D-2)	(D-3)	Affecting output-to-purpose link: (D-4)
Outputs: a) Develop disease and insect resistant bean varieties. b) Develop integrated farming systems management practices that lessen the severity of losses due to disease and insects. c) Develop socio-economic back-ground information, crop loss estimates, assess impact of new cultural practices and varieties on family income and labor required, especially women. d) Graduate students trained to continue research on above outputs and goals.	a) Several improved varieties produced and distributed by Tanseed, which small farm families accept and produce. b) Improved cultural practices adapted by growers which increase yields and production efficiency. c) Improved varieties, production and storage practices are economically viable. Utilization reduces labor, improves family well being. d) Trained students obtain advanced degrees in research fields required to continue bean program.	GDT regional and national statistics. Bean team field research. Published information. Family and village economic impact studies by team socio-economists. GDT and/or USDM employment rosters and research assignments.	a) That designated trained scientists remain on jobs, maintain bean research priorities and be given required research support. b) That the information and varieties developed by project, be disseminated by appropriate GDT agencies (i.e. Extension Service, Tanseed seed multiplication) to small farm families in other areas. c) Bean CRSP funding continued at or above originally planned levels.

LOGICAL FRAMEWORK cont.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: Activities and Types of Resources: (E-1)	Level of Effort/Expenditure for each activity. (E-2)	(E-3)	Affecting input-to output link: (E-4)
Inputs: a) USAID-MSU Title XII Bean-Cowpea/CRSP program leadership and funding.	Personnel \$228,181 Equip. \$112,867 Travel \$157,971	Annual reports and external review panels	a) That the diseases and insects presently causing production and storage losses, and highly variable supply situations will continue b) That the need for beans as a staple source of dietary protein for a large part of the population will continue.
b) WSU-USDA Principal Investigator-Plant Pathologist, office, Lab, Greenhouse, and field facilities and equipment. One grad student M.Sc. Plant Pathology.	Materials & Sup. \$ 43,881 GDC \$166,747 IDC \$728,423 Ind C \$149,195 Budget \$877,618		
c) University of Illinois Co-Investigator, Agricultural Economist. Office and computer facilities. One grad student Ph.D.			
d) University of Dar es Salaam 1 Principal Investigator Plant Physiologist 2 Agronomists 3 Plant Pathologists 3 Entomologists 2 Plant Breeders 1 Soil Microbiologist 1 Soil Scientist 1 Socio-Economist 3 Grad Students			

PROJECT EVALUATIONS BY INSTITUTIONAL REPRESENTATIVES

All CRSP Institutional Representatives (IRs) were requested to provide information pertaining to the CRSP projects located at their universities. They were to consider: (I) Benefits to HC Agriculture, (II) Benefits to US Agriculture, (III) Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals, (IV) Impact of the CRSP on On-Going Domestic Research Programs and (V) Impact of the CRSP on On-Going International Research Programs. IRs were also asked to identify issues and problems that should be addressed during the review and extension process. Responses were obtained from all but two of the IRs.

The following section presents the significant excerpts from their letters responding to the individual issues. They are arranged alphabetically by project Host Country with the name of the Institutional Representative indicated at the beginning of each statement.

BOTSWANA/COLORADO STATE UNIVERSITY

Commentary on the Botswana project prepared by Wayne F. Keim, Head of the Agronomy Department and Institutional Representative for Colorado State University, and submitted to the Bean/Cowpea CRSP May 4, 1984.

I. Benefits to HC Agriculture

Dr. C. J. deMooy, CSU Professor of Agronomy, has acquired over the years an outstanding reputation as an international agricultural scientist. His great expertise has provided a significant benefit to Botswana. Barbara deMooy, with a B.S. degree in Agronomy from CSU, has added a new dimension with her enthusiasm, vigor and knowledge of agronomic practices and plant breeding methods. Karen Conniff, an American graduate student, will also provide valuable knowledge and competence to the program when she arrives soon. Dr. D. R. Wood, CSU bean breeder, is a scientist of great skills over a long and productive career. He serves as the campus backup for the project and has provided Dr. deMooy with needed information and materials.

II. Benefits to US Agriculture

Matching with CSU San Juan Research Center funds has permitted the identification of chickpea (Cicer arietinum L.) germplasm as a new legume grain crop for southwestern Colorado. Chickpea yield data when compared to the dry bean (Phaseolus vulgaris L.) data have surprised us with the yield advantage toward the chickpea. Studies currently are in progress to examine adaptation, seeding and stand establishment and seedling emergence.

The coordinating aspects of bean research in Washington, Idaho and California are an important benefit to US agriculture. Germplasm is frequently and regularly exchanged among bean breeders.

Our researchers are studying factors important in cropping systems such as shading.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

CSU research programs on beans have the specific objectives of developing new cultivars and identifying cultural practices for increased production in semiarid regions.

IV. Impact of the CRSP on On-Going Domestic Research Programs

There exists a stimulatory effect with colleagues involved in similar research problems. Also important is graduate-student training: it provides an international experience for which there is no substitute. It stimulates the demand for increased course work locally in international agriculture. Students and faculty with CSRP experience exude enthusiasm for international agricultural activity which rubs off on inexperienced students. Another important aspect is the common use of excerpts from the CSRP Annual Report in teaching international agriculture at CSU.

V. Impact of the CRSP on On-Going International Research Programs

It adds to an increased understanding of cropping systems programs. It also enhances our involvement with IITA.

BRAZIL/UNIVERSITY OF WISCONSIN

Commentary on two Brazil projects prepared by Richard L. Lower, Chairman of the Department of Horticulture and Institutional Representative for the University of Wisconsin, and submitted to the Bean/Cowpea CRSP April 25, 1984.

I. Benefits to HC Agriculture

Much of the land on which beans are grown is among holdings of small-scale landowners. Frequently the mineral nutrition status of these areas is poor, particularly with regard to nitrogen. Depending on other factors such as pH, other elements may be either insufficient (e.g. phosphorus) or in excess (e.g. aluminum). Improvement of the biological nitrogen fixation (BNF) potential of beans is an attractive approach to minimizing a yield constraint without the added need for fertilizer, particularly where it may be too expensive and difficult to obtain.

Increasing the potential for BNF of bean cultivars adapted to Brazilian small farm conditions will reduce the need for fertilizer (N) while simultaneously raising the potential for increased yields. However, preliminary research results suggest that some genotypes may respond to added N in situations where fertilization is feasible and/or desirable. It must be emphasized that the maximum potential of enhanced BNF will be realized when it is combined with other desirable traits, e.g. high yields, disease resistance, improved nutritional quality.

The Host Country will also benefit from the development of improved techniques that allow identification of germplasm with multiple disease resistance. Disease resistance will be necessary to reach maximum yield and quality potentials.

These research projects will add to the resources of the Host Country additional trained scientists, information, plant materials and rhizobial strains to allow continued effective breeding for enhanced BNF in the national and regional programs.

II. Benefits to US Agriculture

Currently the BNF research program is the only US program directed specifically at breeding beans for enhanced potential. In fact, there are few other breeding programs of such objectives for any of the grain legumes including soybean. Success of this breeding effort will allow US bean breeders to obtain breeding lines with enhanced potential for BNF. If these traits are incorporated into commercial bean cultivars, our estimates suggest that fertilizer N requirements for dry bean production could be reduced by at least one-half, depending on local growing conditions.

Likewise the development of improved techniques for screening for multiple disease resistance provides for increased stability of bean germplasm across environments. Ultimately this translates to greater yields.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The UW domestic research programs interface directly with the goals of these CRSP projects and probably indirectly with several others. Students work on inter-related projects with complementary goals.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The impact of CRSP existence on regular on-going domestic research program is both positive and negative. Because of the CRSP, we have broader programs that encompass more problems and opportunities. We also have the opportunity to breed for a broader range of growing conditions. The biggest negative influence is the incredible amount of paper work required for the rather modest (net) research support. The domestic programs move much faster than the CRSP project with less time requirements.

V. Impact of the CRSP on On-Going International Research Programs

The impact of the CRSP on our international research program is rather minimal since our programs are extensive and multi-faceted without the CRSP, and it really hasn't changed them much.

CAMEROON and NIGERIA/UNIVERSITY OF GEORGIA

Commentary on the Cameroon and Nigeria projects prepared by Charles W. Laughlin, Associate Director of the Agricultural Experiment Station and Institutional Representative for the University of Georgia, and submitted to the Bean/Cowpea CRSP May 4, 1984.

I. Benefits to HC Agriculture

I can see several benefits. One is that it is an opportunity for Host Country scientists to work collaboratively with scientists in this country, gain exposure to current techniques and research technologies and have access to sophisticated equipment and supplies which might be difficult for Host Country scientists to obtain without a CRSP. Host Country scientists also have an opportunity to obtain germplasm from improved cultivars developed in this country. The collaborative effort also enhances the confidence of the Host Country in themselves to accomplish scientific efforts. Beans and cowpeas are often produced in mixed cropping systems. Bean and cowpea yields are quite low so that if these yields can be increased, particularly cultivars that will still retain leaves to be used as fodder as well as increasing the seed yield of the plant, this would provide a tremendous advantage to the small farmer. Also, pest control in storage would be almost as beneficial as pest control under field conditions.

II. Benefits to US Agriculture

One of several benefits is that the cowpea is indigenous to Africa, and African cultivars may be identified which can provide germplasm for incorporating pest resistance and/or tolerance into varieties presently grown in the US. The CRSP broadens the perspective of US scientists to include what is happening in other parts of the world and may expose them to problems that do not yet exist in the US. If and when they do become present in the US, they will know how to deal with the situation.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

I think that scientists with mutual interests, when they become better acquainted with each other, cannot help but be advantageous to our country as well as the developing world by broadening the base for sharing questions and information to strengthen research efforts.

IV. Impact of the CRSP on On-Going Domestic Research Programs

Much of the information that is stated above discusses the impact or influence of a CRSP on the regular on-going domestic research program.

V. Impact of the CRSP on On-Going International Research Programs

It's too early to tell what the full impact will be of the CRSP's existence upon regular on-going international research programs. It is still not fully understood by AID people what the real potentials and impacts can be upon research. Collaborative research activities are far better than having our researchers go to the country, do the research and leave. The CRSP is providing the opportunity for the development of a trained cadre of Host Country scientific researchers so that research activities will continue after the departure of the US scientists. The collaborative relationship developing between scientists provides opportunities for Host Country scientists to be in touch with our people for sharing knowledge, questions and support.

DOMINICAN REPUBLIC/UNIVERSITY OF NEBRASKA

Commentary on the Dominican Republic project prepared by Roger D. Uhlinger, Head of the Department of Horticulture and Institutional Representative for the University of Nebraska, and submitted to the Bean/Cowpea CRSP May 9, 1984.

I. Benefits to HC Agriculture

Research: Bacterial and rust diseases significantly reduce bean yields and seed quality of this important, nutritious staple crop in the Dominican Republic. The need for more abundant and reasonably priced basic foods was emphasized by the recent riots in the country when prices of basic foodstuffs were increased dramatically.

A MITA (UPR) white seeded breeding line (based on extensive testing in the Dominican Republic) named Arroyo Loro #1 was identified and released in 1983 in cooperation with the University of Puerto Rico. This is a widely adapted variety with moderately high resistance to rust. It has performed better than the standard local white seeded variety.

New strains and races of the pathogens causing the bacterial and rust diseases were detected by use of differential reaction on host varieties/lines. Laboratory tests were also used to distinguish between strains of the bacterial blight pathogens. Strain and race differentiation is essential for conducting genetic and breeding investigations for resistance to these pathogens.

New sources of resistance to the pathogens causing rust and bacterial blight diseases were detected. These are being utilized in the genetic and breeding programs.

Training/Education of Host Country Students and Technicians: Currently, there are two DR students enrolled (project funded) in a Master of Science degree program at the University of Nebraska, Lincoln. One student, Eladio Arnaud Santana, is studying plant breeding and a second student, Wenceslao Ramirez, is studying plant pathology. They participated in a course on nitrogen fixation of beans at the University of Wisconsin (funded by a CRSP project, F. Bliss, University of Wisconsin). This experience will benefit Host Country agriculture when they return.

In-country training has been of great benefit to the Host Country technicians involved in this CRSP project. With improved facilities (CRSP funded) and better technical expertise, the bean improvement program has made great strides in the last two years. Little progress would have been possible without the CRSP. An extensive bean course in cooperation with CIAT was conducted in the country in October, 1983. Over thirty technicians attended this course. In addition, technical training at CIAT and UPR has been conducted with more expected in the near future.

Organization: Good progress is being made in institutionalizing the project. The CRSP project has been incorporated into the National Legume Program. The CRSP PI in the DR, Dr. César Paniagua, is in charge of the entire program. Dr. Paniagua is trying to develop the Arroyo Loro Experiment Station into a center of research devoted to beans in a similar manner to their Rice Research Center. This would effectively institutionalize the project and secure funding for it after the Title XII project terminates. The DR has contributed facilities and

personnel to assist in the research but has not contributed funds directly. We do not expect them to contribute substantial funds in 1984, 1985 or 1986 because of the difficult economic times in the country.

Facilities and Equipment: At the initiation of the project on July 1, 1981, facilities were lacking to conduct a breeding and pathology program. A plant pathology laboratory, a seed storage room, a seed preparation room and two screenhouses were constructed at the Arroyo Loro Experiment Station using project funds. The plant pathology laboratory has been partially equipped and additional equipment is on order. The screenhouses have permitted the initiation of the bean breeding program.

International Cooperation: Cooperation with CIAT has been of immense benefit to the project since it has led to the identification of useful disease resistant lines for crossing. This cooperation will be maintained and enhanced. However, the amount of material sent for testing should be decreased since much of it is of limited value to the program. CIAT needs to be more selective in sending material for testing since too much project funding and effort can be tied up in testing materials of limited value to the country. Dr. Paniagua has discussed this with CIAT.

Women in Development: A number of female technicians (3) are currently involved with the project and the experience has been beneficial to them and to the project. They serve as good role models for other women in the DR and indicate the opportunities available to women in agricultural research.

Additional Comments: The lead time required for travel authorization for PIs and others to visit the Host Country restricts flexibility which is desirable when dealing with biological organisms. Specific to the work in the DR, crop development and stages of disease development are subject to weather conditions. Therefore, it is quite difficult to anticipate by several weeks the time which would be most favorable for people from Nebraska, Puerto Rico, CIAT and the DR to meet in the DR for the purpose of evaluating material and making on-site decisions about program activities. Therefore, a shorter lead time or more flexibility for travel authorization would improve the effectiveness of the DR project.

Host Country institutionalization is very, very limited--in large part as a result of Host Country economic conditions. Presently land, facilities and some staff are made available by the Host Country but no operating support funding accrues to the CRSP project. A desirable and important signal from the Host Country would be to dedicate Arroyo Loro to bean research (as has been done with another station for the rice research program).

II. Benefits to US Agriculture

Research: Common blight and rust of beans are major diseases reducing yield and seed quality in many areas of production in the US. Common blight has always been a problem in the western Nebraska dry bean growing area. In recent years, rust has been serious in southwestern Nebraska and in northeastern Colorado and has been observed late in the season in the North Platte Valley, Nebraska. There is no chemical control for common blight. Rust can be controlled by chemicals, but this adds to the cost of production and conditions may not be suitable for spraying at certain times. Disease resistant varieties adapted to the US are desired. There is a need to develop more stable resistance to rust

since most of the resistant bean varieties have become susceptible to rust in recent years due to the development of new races of the pathogen. In the course of the present investigations, we have detected sources of resistance to rust which have small pustule size (less than 300 mu). We need to determine the inheritance of this type of resistance and find out if it is more stable than the hypersensitive type of reaction (necrotic lesion--no sporulation) which is simply inherited. We have also detected new sources of resistance (varying levels of resistance) in the DR trials and in Puerto Rico to the bacterial common blight and determined that there can be a differential reaction of pod and leaves to different strains of this pathogen. Information derived from studies which have been conducted will lead to higher levels of resistance in commercial varieties.

Rust Workshop: There was a serious need among pathologists and breeders involved with rust in the US to standardize inoculation and testing procedures, disease evaluation (rating) procedures and differential varieties, in order to provide for more effective communications regarding host (bean) resistance and the race situation both in the US and overseas. This project stimulated workers to arrange an international meeting, funded by this project and CIAT, in Puerto Rico in order to achieve this goal. This workshop was a great success and is contributing to accelerated progress in this area.

Technical Support: We have been able to obtain the services of a full-time technician (male) on bacterial research (strain tests), half-time technician (male) on rust research in the Department of Plant Pathology and half-time technician (female) on genetics and breeding for resistance in the Department of Horticulture. These technicians work on rust and bacterial problems common to Nebraska and the DR. We would not have this personnel support without CRSP project funds.

Training: We are seeking a graduate student to work on a Ph.D. program on rust resistance useful to Nebraska and the DR. The plant pathologists are looking for two postdoctorals to work on the small rust pustule size (its value) and on strain variation and bacteria seed transmission in common blight. This research is valuable for Nebraska and the US. We would not be able to obtain these types of contributions without project funding.

In addition, Nebraska's three participants have acquired moderate competency in the Spanish language which has improved their ability to work in the Host Country and in Latin America.

The three participants in the project are all involved in teaching graduate courses in their respective fields to graduate students (involved in research). Many of them come from Third World tropical countries. The experience of working in a tropical area has brought a new dimension to certain aspects of their courses. Experience with continuous cropping and observations on associated cropping have given the participants a new view of food production and its problems in breeding, genetics and plant pathology.

Facility and Equipment Improvement and Use: We were able to use project funds to purchase halide lamps for all the greenhouses in Horticulture and Plant Pathology that are used to grow beans for both the DR and US projects. We had difficulty previously growing beans during the winter months because of low light intensity. Laboratory supplies have been purchased for the laboratories of Drs. Vidaver and Steadman. This has been of immense value to their programs.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The cooperators, D. Coyne (genetics/breeding), J. R. Steadman (pathology/-epidemiology) and Anne Vidaver (bacteriology) currently have approved state/Hatch Experiment Station projects that deal specifically with the areas of expertise and objectives outlined in the CRSP project. Our state projects provide for a mutual benefit for the DR and Nebraska and can be considered complementary in nature (parts dealing with rust and common blight).

IV. Impact of the CRSP on On-Going Domestic Research Programs

Since the research on rust and bacterial blight in Nebraska complements that for the DR, the Nebraska program derives benefit from the CRSP funding for technical assistance, for graduate student training and postdoctoral assistance, for travel expenses from Lincoln to Scottsbluff (400 miles) to conduct experiments and for improvement of facilities to conduct bean research at Lincoln. We have only limited financial support from the dry bean industry (Rocky Mountain Bean Dealers Association and none so far from the new Dry Bean Growers Association). Dr. Steadman receives numerous small grants from chemical companies and Dr. Vidaver has secured competitive federal grants.

V. Impact of the CRSP on On-Going International Research Programs

Institutional Level: The Bean/Cowpea CRSP project is small in comparison with the new Nebraska/Morocco project and the INTSORMIL Sorghum project. Nebraska is the lead institution in both of these projects. However, it does make a useful contribution to our overall international research program since it is making use of long-time specific expertise on bacterial and rust pathogens of beans and breeding/genetics for resistance to those pathogens.

Bean Program Level: The existence of the international CRSP has facilitated greater exchange and communication with the Bean International Center (CIAT), which is of great mutual value to the DR as well as Nebraska bean program. In addition, it has fostered greater communication and exchange of information and materials among the other involved Bean/Cowpea CRSP participants, both in the US and Host Countries. Dr. Fred Bliss, University of Wisconsin, CRSP PI, is providing expert advice on nitrogen fixation evaluation of lines for people in the DR. Dr. Don Hagedorn, CRSP PI, has interacted on rust and blight.

Rust Workshop: Under the leadership of Dr. J. R. Steadman (Nebraska), Dr. J. Staveley (USDA, Washington, DC), Dr. G. Freytag (UPR-MARS) and Dr. H. Schwartz (Colorado), an international rust workshop was organized (funded by the CRSP and CIAT) to coordinate all international research on rust of beans. This has had a far-reaching effect on our own CRSP project as well as that of all others in the international arena involved with rust (see Section I above for details).

ECUADOR/CORNELL UNIVERSITY

Commentary on the Ecuador project prepared by Edwin Oyer, Director of International Agriculture and Institutional Representative for Cornell University, and submitted to the Bean/Cowpea CRSP April, 1984.

Introduction

With all of the outstanding success and achievement in the science and technology of agricultural development, one of the most elusive and intractable problems has been how to transmit new beneficial knowledge to people positioned toward the bottom of the socio-economic ladder. In Ecuador and Guatemala small land-holders constitute the majority of the farmers.

The farming systems research philosophy undergirding the Bean/Cowpea CRSP in Ecuador and Guatemala proceeds under quite a different set of assumptions from those giving thrust to the Green Revolution. In the latter, the assumption was one of designing, preparing and packaging the technology, assuming that it would naturally find its way and be transmitted across political, social and cultural barriers to reach the small and poor farmers. It is true the Green Revolution spread with remarkable success. Unfortunately, the small scale subsistence farmers constituting the vast majority of farmers in the Third World countries did not and could not avail of its benefits.

Farming Systems Research (FSR) philosophy is a potential antidote to the increasing distance between the advantaged and the disadvantaged. The operational feature of FSR is to place the applied research worker in the field with the farmer. Together, the farmer and scientist carry through on-site research, procedures and processes that are relevant, appropriate and feasible as means of improving technology of the small farmer. This proceeds with a ground-up philosophy. It yields greater insight and understanding of the political, social and cultural realities of appropriate technology transfer problems.

I. Benefits to HC Agriculture

The Bean/Cowpea CRSP provides specific support to the national legume program and generalized support to farming systems activities with INIAP. Consequently, the CRSP helps Ecuador meet the needs of small scale producers of beans and other legumes by sponsoring activities which are incorporated into INIAP's research and development planning and by complementing other externally-funded activities.

The CRSP has supported the expressed interest of INIAP to move off station and to serve small scale producers. Since the CRSP began, INIAP leadership has changed. Current administrators are very supportive, and this position is not expected to be affected by future changes in personnel. Therefore, in Ecuador the CRSP exists in an institutional context. Staff of both the national legume program and regional technicians for smallholders have uniformly and consistently supported FSR. AID/E and the projects they have funded, notably the Rural Technology Transfer Systems Research, have also been supportive.

The CRSP has contributed to FSR methodology. We have developed a procedure which combines the analysis of secondary data with structured interviews and have evaluated the relative merits of informant and sample survey techniques. The CRSP has provided INIAP with a principled discussion of intellectually defensible but economical field research methodologies.

The CRSP has provided INIAP with the microcomputer hardware and software which make FSR possible. INIAP appreciates that the CRSP has made an important contribution to its field research activities and is coordinated with efforts which are funded by other grants and loans.

CRSP funds have focused attention on regions which might not have received preference in INIAP's allocation of resources. The three identified zones for CRSP activities all represent specific types of legume production which are important in both an international and national context.

CRSP funds have allowed Ecuador's National Legume Program to initiate regional activities and to begin a breeding program. A well-trained plant breeder has been placed in charge of the grain legume program. Active bean breeding using crosses made at INIAP is beginning, replacing selection only of the best land race cultivars or of lines provided by CIAT. The National Legume Program has been weak in comparison to other commodity programs within INIAP. CRSP resources allow INIAP to focus resources on specific programs and zones in order to achieve a multiplier effect.

To date, CRSP efforts have been concentrated in the Province of Imbabura and in the zone of Pimampiro. Constraints to bean production have been identified by farmers and researchers working together, including limitations of varieties, plant spacing, cultural practices, seed selection and seed storage. CRSP-sponsored FSR has, therefore, met a major objective; it has identified researchable problems for reorienting experiment station activities toward meeting the needs of small-scale farmers. This CRSP research has provided INIAP with the first link between baseline research and appropriate technology--a link that does not assume that an appropriate technology had already been developed on station and simply awaits demonstration by researchers before adoption by small-holders.

II. Benefits to US Agriculture

The Bean/Cowpea CRSP has facilitated multidisciplinary research by focusing attention on the needs of small scale producers of beans and other legumes. The CRSP is the first of several projects at Cornell to adopt a farming systems orientation. In all cases, concerns which arose in an international context caused researchers to re-define and re-examine the situation in New York. Several mechanisms have allowed CRSP researchers to apply in the US lessons that were learned in international settings.

Our collaboration with CIAT, Ecuador and Guatemala has made valuable germplasm available to New York State. Crosses are being made between New York bean cultivars and cultivars identified as being later to flower because of a mechanism other than sensitivity to long daylength and high temperature. These cultivars are late in spite of insensitivity to these environmental factors. The later maturity by a different physiological mechanism may facilitate higher yields of beans under the long summer days of New York.

Tropical locations have proven more effective for assaying the control over days to flower and maturity of bean by daylength and/or high temperature than is the climate of New York State. Thus, international collaboration has provided Cornell with an improved geographical location for verifying that daylength and temperature control the days to flowering and maturity of bean in the field, just as they do in the growth chamber. This shows us how to efficiently select for early, intermediate, late or very late maturity. It sharpens our knowledge about

how to select for the different maturities that are needed to maximize cultivar adaptation and bean yields for all different world areas, including the temperate climate of New York State and such areas as lowland tropics, moderate elevation tropics and highland tropics.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The Cornell FSR Seminar, in which CRSP staff have taught, provides an approach for learning by staff and students from international activities. The field trips of this course and the complementary seminar on Household Food Production Systems both study limited resource farmers in New York. The assumption behind work in New York is precisely the same as that behind research in Ecuador and Guatemala: It is necessary to analyze existing farming systems, to evaluate research and/or extension activities which would improve them and to develop technologies which are appropriate to meet farmers' felt needs.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The CRSP has fostered a reciprocal relationship between domestic and international research, especially in the development of procedures for collecting sociological and political data. Our first pre-test to evaluate structured interviews as a data collection technique was conducted during one summer with organic farmers in up-state New York. Another pre-test was conducted in Mexico. Both sites identified major but different problems in collecting certain information. This facilitated development of the interview guide now being used in CRSP interviews in Ecuador. These experiences, in turn, influenced the design of a questionnaire administered to smallholders in another country state. The latter research was funded by a Title XII strengthening grant concerned with a domestic/international comparison of appropriate technologies. A graduate student is analyzing these data for her dissertation. Although this research was not funded by the CRSP nor by Cornell, it illustrates how international experience influences domestic research via both formal and informal channels.

Public presentations of project research and activities have elicited very positive reactions from domestically oriented colleagues. Senior staff have had especially strong and positive reactions. The farming systems approach reminds them of the collaboration which was more common in the past between and among social and production scientists.

As international research influences domestic research, Land Grant institutions may be able to achieve improved research balance between: (1) problems which require a narrow and specialized disciplinary focus and (2) problems which benefit from broader multidisciplinary collaboration. A positive regard for holistic perspectives can again characterize Land Grant institutions.

V. Impact of the CRSP on On-Going International Research Programs

Without the CRSP, on-going international research on beans at Cornell would be almost non-existent.

GUATEMALA/CORNELL UNIVERSITY

Commentary on the Guatemala project prepared by Edwin Oyer, Director of International Agriculture and Institutional Representative for Cornell University, and submitted to the Bean/Cowpea CRSP April, 1984.

Introduction

With all of the outstanding success and achievement in the science and technology of agricultural development, one of the most elusive and intractable problems has been how to transmit new beneficial knowledge to people positioned toward the bottom of the socio-economic ladder. In Ecuador and Guatemala small land-holders constitute the majority of the farmers.

The farming systems research philosophy undergirding the Bean/Cowpea CRSP in Ecuador and Guatemala proceeds under quite a different set of assumptions from those giving thrust to the Green Revolution. In the latter, the assumption was one of designing, preparing and packaging the technology, assuming that it would naturally find its way and be transmitted across political, social and cultural barriers to reach the small and poor farmers. It is true the Green Revolution spread with remarkable success. Unfortunately, the small scale subsistence farmers constituting the vast majority of farmers in the Third World countries did not and could not avail of its benefits.

Farming Systems Research (FSR) philosophy is a potential antidote to the increasing distance between the advantaged and the disadvantaged. The operational feature of FSR is to place the applied research worker in the field with the farmer. Together, the farmer and scientist carry through on-site research, procedures and processes that are relevant, appropriate and feasible as means of improving technology of the small farmer. This proceeds with a ground-up philosophy. It yields greater insight and understanding of the political, social and cultural realities of appropriate technology transfer problems.

I. Benefits to HC Agriculture

CRSP research in Guatemala has found that the ability of climbing bean cultivars to compete with or out-compete the associated corn crop is conditioned primarily by the bean plant's days to maturity and attendant high vs low positioning on the stem of flowers and pods. That is, early vs late maturity plus vertical distribution of the pods along the stem constitute the primary genetic variability that plant breeders of climbing beans must select for. Because of the CRSP research, this knowledge is on hand as ICTA begins intensive efforts to breed climbing bean cultivars for native Indian farmers of the highlands.

The CRSP research has shown that days to maturity and the height of pods on the stem are controlled by daylength and temperature acting jointly with the genetics of the plant.

In 1984 Guatemala is beginning to breed and select bush bean cultivars for extending production into the lowland tropics where beans do not now grow well. This effort follows CRSP demonstration in Guatemala that cultivars are adapted to the lowland tropics by having insensitivity to daylength and temperature and also by having a higher optimal temperature for flowering. This optimum temperature for flowering gives the cultivars fewest days to flowering. This can be measured for each cultivar by growing it across a range of elevations

(mean temperatures). Unexpectedly, beans best adapted to lowland tropics are insensitive to daylength like those that are best adapted to the temperate zone of New York.

The CRSP provided ICTA with its first microcomputer. This accelerated analysis of agronomic research data by the bean program. ICTA's other commodity programs are now seeking to acquire microcomputers.

The CRSP will shortly fund the employment of an anthropologist by ICTA. This will strengthen ICTA's socio-economic activities and thereby enhance the multidisciplinary approach of ICTA's Farming System Research.

ICTA has assigned a full-time agronomist to the CRSP activities and a part-time agricultural economist. These moves also strengthen the on-going Farming Systems Research.

Guatemala has intensified its agronomic and sociological work with native Indian farmers as a consequence of the CRSP. ICTA and the CRSP aim to learn about family and on-farm concerns and goals, as these factors relate to bean production and to other farming and non-farming activities of the farmers and their families.

ICTA states that a major benefit from the CRSP is the communication with US scientists and the linkage to new ideas, research objectives and research methodologies acquired from this communication with the broader scientific community.

II. Benefits to US Agriculture

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Impact of the CRSP on On-Going International Research Programs

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HONDURAS and DOMINICAN REPUBLIC/UNIVERSITY OF PUERTO RICO

Commentary on the Honduras and Dominican Republic/UPR projects prepared at the request of Miguel González-Román, Associate Dean of the College of Agricultural Sciences and Institutional Representative for UPR, by James Beaver, Professor of Agronomy at the University of Puerto Rico and Principal Investigator for both projects, and submitted to the Bean/Cowpea CRSP May 9, 1984, and by Simon E. Malo, Director of Escuela Agricola Panamericana, and submitted to the Bean/Cowpea CRSP May 1984.

Beaver:

I. Benefits to HC Agriculture

One of the major goals of the projects is to develop bean varieties for Honduras and the Dominican Republic with improved levels of multiple disease resistance. One variety, Arroyo Loro 1, has already been released in the Dominican Republic.

Another major objective is to enhance the research capacity of the bean research groups in Honduras and the Dominican Republic. Much progress has been made during the first three years of the project. Four members of the bean research team from the Dominican Republic have come to the University of Puerto Rico for graduate training. One person from Honduras has come to the University of Puerto Rico to complete a B.S. degree in the Crop Protection Department. Several research assistants have come to the University of Puerto Rico for short-term training. Short-term training has improved the quality of research being conducted in the Host Countries. Another important contribution of the CRSP project to Host Country research capabilities has been the construction of facilities and the purchase of equipment. The project in the Dominican Republic is a good example. With the assistance of the CRSP, the research team at the Arroyo Loro Experiment Station now has the infrastructure necessary for an effective bean breeding program.

The project has made a special effort to conduct a major portion of the research on small farms. The on-farm trials have enabled project personnel to gain a better understanding of the importance of different disease problems. It is hoped that the on-farm trials also will enable germplasm developed by the projects to be more rapidly adopted by small farmers.

II. Benefits to US Agriculture

Many of the bean diseases that cause economic damage in the tropics also are important diseases in the temperate bean-growing regions of the US. In fact, results from winter nursery work in Puerto Rico indicate that the tropics can provide more selection pressure for resistance to certain pathogens such as rust. Sources of genetic resistance identified by the CRSP can be used as breeding materials for US bean research programs.

The CRSP is directly beneficial to the bean research program in Puerto Rico. The presence of the CRSP permits a greater level of activity. The result is that local research goals can be met in a shorter period of time. Since the Dominican Republic is located near Puerto Rico, results from performance trials in the Dominican Republic provide us with an idea of how the germplasm will perform under local conditions.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The Department of Agronomy has three projects that are directly relevant to the CRSP projects in Honduras and the Dominican Republic. I am the Principal Investigator for a Hatch project which has the goal of developing dry bean varieties for Puerto Rico. Germplasm from this project has been used as parental material for the CRSP projects. I also am the Principal Investigator for a CSRS-supported research project which is investigating the effectiveness of different selection methods in the genetic improvement of large seeded dry beans. We feel that information from this research will help the CRSP project to be efficient in the improvement of the large seeded Pompadour beans for the Dominican Republic. At times, both facilities and personnel from these projects are shared with the CRSP projects. Dr. Eduardo Schroder is the Principal Investigator for a Biological Nitrogen Fixation Project. He has tested some of the most promising bean lines from the CRSP projects for nitrogen fixation and has participated in the informal training of personnel from the Host Countries. At present, Dr. Schroder's project is supporting a graduate student from the Dominican Republic. The winter nursery activities in Puerto Rico also are beneficial to the CRSP projects since US germplasm can be evaluated under tropical conditions.

The Department of Crop Protection is actively involved in bean research. Mildred Zapata is the Principal Investigator for a CSRS-supported project with the goal of developing bean germplasm with improved levels of resistance to bacterial blight. Since this disease is one of the most important diseases in Honduras and the Dominican Republic, the CRSP projects stand to gain much from her project. Dr. Julio Bird is the leader of a virology laboratory which is conducting research with the Bean Golden Mosaic Virus. He is presently serving as the major advisor for one of the CRSP-supported graduate students from the DR.

The projects also benefit from the USDA bean research program at the Tropical Agriculture Research Station. Dr. George Freytag is involved in a wide range of basic research with beans. Many of the important sources of disease resistance used in the Dominican Republic and Honduras CRSP projects were developed by a previous cooperative research project of the USDA and the University of Puerto Rico.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The overall impact of the CRSP on the bean research program at the university has been an expansion of activities. In order to develop beans for Puerto Rico, we must breed beans for tropical conditions. The CRSP project permits the screening of a greater amount of germplasm for resistance to a wider range of diseases. The support also allows a greater level of cooperative work with international centers such as CIAT.

The presence of the CRSP projects permits a great opportunity for the professional improvement of those scientists involved with projects. In addition to gaining a degree of expertise in dealing with bean research problems in the Host Countries, scientists involved with CRSP projects gain new insights into research and teaching. I find that I frequently use examples in my lectures that come from my experience working with the CRSP projects.

The presence of CRSP-supported graduate students from the Host Countries permits more research to be conducted on problems related to the goals of the project. I have found that the graduate students are a valuable resource when a "local expert" is needed. For example, one of the graduate students from the Dominican Republic proved to be very useful in evaluating a group of bean lines for seed type.

V. Impact of the CRSP on On-Going International Research Programs

I do not feel qualified to answer the last question related to the impact of CRSP existence on the regular on-going international research program.

VI. Additional Comments

There are three issues which I would like to recommend be considered for discussion.

1. How can the length of time to obtain permission from AID to purchase equipment be reduced?
2. How can researchers with a technical background become more effective in realizing objectives related to baseline data and the involvement of women in development?
3. The experience of collaboration between the University of Nebraska and the University of Puerto Rico in the Dominican Republic has been very positive. Could this sort of arrangement be useful in other countries?

Main:

1. CRSP vs Other Forms of Development
 - a. The CRSP represents a significant support to efforts already being made in Honduras and regions with bean improvement. The CRSP lends continuity to these efforts, which in most countries are haphazard and lack the proper technical base and guidance.
 - b. Compared to what the International Centers (ICs) are doing, particularly CIAT in the case of bean development in Central America, the CRSP can conduct research and development work at levels the ICs cannot reach. The ICs must work with the national programs according to the mandate of the funding agencies and, thus, are very much limited by them. The national programs are riddled with bureaucratic constraints, inefficiency and, especially, a lack of continuity. Programs stop and restart every time the Minister of Agriculture is changed, an occurrence which can happen every year in some countries. The CRSP in Honduras is already reaching the small farmer and assuming a leadership role in the national program (Programa Nacional de Frijol) which has had several starts in the last few years.
 - c. The CRSP gives needed support to some of the programs of the ICs; however, by working with private, independent organizations with continuity, like EAP, it is bound to succeed in areas where both the government and ICs have so far failed, areas dealing mainly with the medium and small farmer.

2. CRSP Potential and Ideas for Its Evolution and Progress

- a. Undoubtedly the potential of the CRSP is enormous. With a few well-selected bean varieties, we could revolutionize the diet of millions of people. Let me illustrate this point: In 1952 and 1953 Zamorano released two varieties of beans which became for thirty years the most popular in the markets of Honduras and other neighboring Central American countries. Today with perhaps three times more people in the area the impact obviously could be much larger.
- b. The research conducted by the government has been very unfruitful because:
 - (1) Meager resources are available.
 - (2) There is a lack of continuity in the work.
 - (3) There is a lack of logistical and institutional support.
 - (4) There is a lack of competent researchers because of the reasons mentioned above.
- c. Point (4) in the last paragraph illustrates the great need for training. The CRSP must emphasize training at all levels. If the national institutions train people adequately, they could continue the programs after the CRSP is terminated. It is the responsibility of the CRSP to become obsolete, perhaps in a generation, and let the local programs take over. Development is education, and it takes time and sometimes generations to obtain the needed human resources.
- d. Concrete results from the CRSP in Honduras cannot be expected in less than two years. Actually this initial period has been the most difficult for EAP. However, an infrastructure is being created: One man is being training at UPR, at least four more need to be trained abroad and another three or four at Zamorano on a regular basis. It has been difficult to find competent people for this program. However, we are gaining experience, and many bean lines already look very promising. A good Honduran program leader has been selected, and we believe that this is the time for more support from the CRSP. Positive results will speak for themselves in a very short time.

3. Progress in Honduras

Initial progress has been slow. We have had budget limitations, new personnel was difficult to attract and retain, and Honduras has been given an erroneously bad reputation in the international press. Now we have an entirely new team in the Agronomy Department. The Director and the COPI are new and we have a good project manager. As Drs. Barnes-McConnell, Gonzalez-Roman and Beaver saw at EAP in their March 1984 visit, our irrigated plots look good, initial harvesting results indicate that we are on the right track, the technicians are optimistic, and there is a certain dynamism in the whole project which augurs a good show in the future.

4. Administrative Structure of the Project

- a. The CRSP project functions at EAP within the Agronomy Department and receives technical and lab support from this department. It has a full-time investigator with the needed autonomy and support. The School is a base of operations for plot work being conducted in three other localities in the country.
- b. In Honduras the CRSP works cooperatively with the National Program of Agriculture Investigators, specifically the bean project, with which it interacts in as many ways as possible whenever they are operating.

5. Specific Contributions of the CRSP Bean Project to Honduras

- a. Training of technicians and agronomos in the many areas and facets of bean improvement. This is the most lasting and perhaps most important contribution.
- b. Teaching and "in-service" training of both male and female students, or the future agronomists, in conducting bean research and production in the field. This is the great advantage of an association with the CRSP by a practical, private, international institution such as EAP. The multiplying factor of this knowledge in the whole tropical American region is very significant.
- c. The evaluation of Honduran genetic material and other bean collections contained in the School's germplasm bank.
- d. The broadening of the genetic base in the search for genes resistant to diseases and insects.
- e. An understanding of the magnitude of the losses caused by insects and diseases in the different regions and planting seasons of the country.
- f. Evaluation of promising lines which could be released eventually as tolerant cultivars or their identification as promising parent material.

6. Level of Communication and Interaction. Is It Really Collaborative?

- a. The collaboration with UPR has permitted the training of one agronomist so far. We have used F₄ and F₆ genetic bean materials which show much promise. The visits of UPR personnel, although few, have contributed to the improvement of our field methodology and in gathering useful information.
- b. EAP has contributed more than \$7,000.00 to the project (May 1982-May 1984) or about 10 percent of the direct costs: food and lodging of scientists and technicians, use of equipment, irrigation, land, supplies, student labor, transportation, communications, phone and other overhead.
- c. We are contributing materials, supplies, irrigation pumps, land and labor to officials of the Ministry of Agriculture. The results of EAP's research and data are made available to them immediately and we help them in field demonstrations and in hosting their national meetings.

7. Possible Changes Which Could Be Considered Over Time to Improve the Program
 - a. We are in the process of integrating the Bean/Cowpea CRSP with our programs of Integrated Pest Management (IPM) and Biological Nitrogen Fixation (BNF) at the School in cooperation with the Universities of Florida (Dr. J. B. Sartain and Dr. D. H. Hubbell) and Wisconsin (Dr. F. Bliss).
 - b. We believe the CRSP should be integrated to include experiments in multiple cropping and other agronomic research in dry areas; and, perhaps, marketing tests could be conducted at the School and throughout the country.
 - c. Considering the multiplicity of microclimates and regions in Honduras, we believe the geographic scope of the CRSP should be broadened in the country with the objective of releasing bean varieties for specific areas rather than for the whole country.
 - d. Increase the capacity for design, analysis, interpretation and use of the research data, perhaps decreasing the dependence on UPR on several aspects.
 - e. Considering that the most important bean diseases are seed-borne and seed-transmitted, we believe it is a must to increase virus-free seed production at the School in the future.

8. What Can the CRSP Do to Increase the Overall Effectiveness of the Program in Honduras?
 - a. Visit the School more often in order that the real problems of carrying out the research can be recognized and appreciated. We must add that a bit more credit for what we have done would not be wasted on us. Working in underdeveloped countries is an entirely different hallgame and something that has to be appreciated first-hand.
 - b. Support is needed when programs are being launched. We need patience and understanding from our CRSP colleagues who work in areas where all the means and tools for research are available.
 - c. We believe our budget could benefit from an increase to improve the scope of activities, particularly training agronomos in service and formal training of our students.
 - d. It is very desirable to speed up administrative procedures such as purchases, hiring personnel, etc. We have to go through UPR for most contacts with CRSP headquarters; thus, we are limited to the flexibility and administrative agility of UPR.
 - e. Finally, we believe at least six scholarships should be made available to EAP to train its own students in-house (learning-by-doing) and abroad after they graduate from EAP.

INCAP/WASHINGTON STATE UNIVERSITY

Commentary on the INCAP project prepared at the request of Landis L. Boyd, Director of the Agricultural Research Center and Institutional Representative for Washington State University, by Barry G. Swanson, Professor of Food Science and Technology at WSU and Principal Investigator for the project, and submitted to the Bean/Cowpea CRSP March 30, 1984.

I. Benefits to HC Agriculture

The project develops new bean cultivars with greater protein concentrations and digestibility than current cultivars and equivalent acceptability for production and consumption in the rural areas of Guatemala. It provides information so that the land owner can select beans and avoid anti-nutritional factors that may adversely affect health if the beans are not prepared correctly.

The effects of more nutritious and better quality beans may lead the farmers to produce more beans for their own consumption. The increase in the nutritional quality and utilization of beans may also positively affect the health of individuals in other protein-deficient areas of developing countries.

II. Benefits to US Agriculture

The project will provide a solution to the "hardseed" and "hard-to-cook" phenomena of dry beans that is currently limiting the quantity of dry beans and other legumes processed in this country. It increases protein quantity and quality and the digestibility of dry bean cultivars. It retards the psychologically and socially unacceptable qualities that Americans associate with dry beans and provides information to the dry bean producers and handlers on appropriate growing, storing and handling parameters that may result in better dry bean utilization and acceptability than currently available.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The WSU nutritional quality evaluation laboratory (NQEL) assays nutritional quality and composition of legumes and cereal grains. An agricultural research center project exists with objectives to assay and study the protein, lipid and carbohydrate chemistry of dry beans. The cooperative Western Regional Research Project W-150, "Genetic improvement of beans (Phaseolus vulgaris L.) for yield, pest resistance and nutritional quality," incorporates research contracts, cooperation and constructive review. The extension program is interested in storage and processing of dry beans as they relate to dry bean production, while maintaining liaison with the dry bean handlers and processors in Washington and the Pacific Northwest.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The CRSP provides additional laboratory research support. It provides the PI an opportunity to travel nationally and internationally, gaining experience and learning from contacts with other researchers and administrators. It provides opportunities to conduct cooperative research with other Land Grant universities and international institutes which result in additional research publications, presentations and building of a national/international research competency. The

CRSP supports undergraduate and graduate training of students from the US and developing countries and contributes significant indirect costs which are utilized to maintain the research program and support laboratory equipment and physical facilities.

V. Impact of the CRSP on On-Going International Research Programs

The CRSP lends credence to the research program as a part of the campus-wide international research. It provides exposure for scientists, nationally and internationally, to make contact with other scientists with similar interests and encourages and offers opportunities for international research and consulting experience that contributes directly to the development, conduct and success of international research programs on campus.

MALAWI/MICHIGAN STATE UNIVERSITY

Commentary on the Malawi project prepared at the request of James H. Anderson, Dean of the College of Agriculture and Institutional Representative for Michigan State University, by Dale D. Harpstead, Chair of the Department of Crop and Soil Sciences at MSU and member of the CRSP Board of Directors, and submitted to the Bean/Cowpea CRSP May 11, 1984.

I. Benefits to HC Agriculture

An exceedingly wide range of genetic diversity exists in the bean production fields in Malawi. The individual bean types or land-races are selected by producers for special uses or maintained for production alone or in mixtures of types.

Production stability from minimal technological inputs may be a major benefit of growing mixtures. In addition, the project is evaluating germplasm for several socio-cultural/economic characteristics, which will form the basis of a varietal development and/or seed production program at the national level.

II. Benefits to US Agriculture

The diversity of germplasm in Malawi will provide a wealth of new germplasm available for potential incorporation into Michigan varieties and new understandings of genotype by environment interactions.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

Scientists have developed knowledge relative to the inheritance of economic traits in dry beans and to physiological and developmental properties that relate to adaptation, disease resistance, quality and yield, biological nitrogen fixation and interaction between bean genotypes and their environment. Through the CRSP, these principles can be extended to and tested under diverse circumstances and applied as appropriate to the development of new varieties.

IV. Impact of the CRSP on On-Going Domestic Research Programs

Scientists working in diverse environments but with mutual interests greatly influence domestic research by providing a much broader data base, new genetic resources and a greater range of opportunity for resource evaluation. In the case of anti-nutritional factors, it is helpful to be able to evaluate these under conditions of high individual levels of product consumption. A particularly important element is the sharing of information, experiences and germplasm among a community of dedicated researchers.

V. Impact of the CRSP on On-Going International Research Programs

Benefits to on-going international programs include the linkages that result between US and Host Country scientists, the training of investigators (especially young scientists) for effective program development in international settings and an awareness of problems encountered by Host Country researchers.

MEXICO/MICHIGAN STATE UNIVERSITY

Commentary on the Mexico project prepared at the request of James H. Anderson, Dean of the College of Agriculture and Institutional Representative for Michigan State University, by Dale D. Harpstead, Chair of the Department of Crop and Soil Sciences at MSU and member of the CRSP Board of Directors, and submitted to the Bean/Cowpea CRSP May 11, 1984.

I. Benefits to HC Agriculture

The project screens Mexican and exotic germplasm for both drought tolerance and N-fixation capability under Mexican conditions. The capacity of varieties to produce acceptable yields under conditions of moisture stress and to maintain a high level of nitrogen fixation is important to low-cost production systems for limited resource producers.

II. Benefits to US Agriculture

In response of bean genotypes to moisture stress and the capacity of the bean plant to fix nitrogen under stress conditions will contribute significantly to production stability if incorporated into local varieties and may limit the expense of purchase of nitrogen fertilizer.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

Scientists have developed knowledge relative to the inheritance of economic traits in dry beans and to physiological and developmental properties that relate to adaptation, disease resistance, quality and yield, biological nitrogen fixation and interaction between bean genotypes and their environment. Through the CRSP, these principles can be extended to and tested under diverse circumstances and applied as appropriate to the development of new varieties.

IV. Impact of the CRSP on On-Going Domestic Research Programs

Scientists working in diverse environments but with mutual interests greatly influence domestic research by providing a much broader data base, new genetic resources and a greater range of opportunity for resource evaluation. In the case of anti-nutritional factors, it is helpful to be able to evaluate these under conditions of high individual levels of product consumption. A particularly important element is the sharing of information, experiences and germplasm among a community of dedicated researchers.

V. Impact of the CRSP on On-Going International Research Programs

Benefits to on-going international programs include the linkages that result between US and Host Country scientists, the training of investigators (especially young scientists) for effective program development in international settings and an awareness of problems encountered by Host Country researchers.

NIGERIA/MICHIGAN STATE UNIVERSITY

Commentary on the Nigeria/MSU project prepared at the request of James H. Anderson, Dean of the College of Agriculture and Institutional Representative for Michigan State University, by Dale D. Harpstead, Chair of the Department of Crop and Soil Sciences at MSU and member of the CRSP Board of Directors, and submitted to the Bean/Cowpea CRSP May 11, 1984.

I. Benefits to HC Agriculture

Utilization of cowpeas, especially in the diets of young children is limited by local tradition. To improve the diets of children through the use of cowpeas as a protein source, it will be important to understand the true relationship of cowpeas to perceived dietary problems.

II. Benefits to US Agriculture

A study of the nutritional qualities of cowpeas will identify ways that anti-nutritional factors can be alleviated through breeding or processing.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

Scientists have developed knowledge relative to the inheritance of economic traits in cowpeas and to physiological and developmental properties that relate to adaptation, disease resistance, quality and yield, biological nitrogen fixation and interaction between cowpea genotypes and their environment. Through the CRSP, these principles can be extended to and tested under diverse circumstances and applied as appropriate to the development of new varieties. In cowpea utilization, the methodologies of breath hydrogen analysis are immediately available for dietary analyses in child nutrition.

IV. Impact of the CRSP on On-Going Domestic Research Programs

Scientists working in diverse environments but with mutual interests greatly influence domestic research by providing a much broader data base, new genetic resources and a greater range of opportunity for resource evaluation. In the case of anti-nutritional factors, it is helpful to be able to evaluate these under conditions of high individual levels of product consumption. A particularly important element is the sharing of information, experiences and germplasm among a community of dedicated researchers.

V. Impact of the CRSP on On-Going International Research Programs

Benefits to on-going international programs include the linkages that result between US and Host Country scientists, the training of investigators (especially young scientists) for effective program development in international settings and an awareness of problems encountered by Host Country researchers.

SENEGAL/UNIVERSITY OF CALIFORNIA, RIVERSIDE

Commentary on the Senegal project prepared by Lewis G. Weathers, Associate Dean of the College of Natural and Agricultural Sciences and Institutional Representative for the University of California, Riverside, and submitted to the Bean/-Cowpea CRSP April 2, 1984.

I. Benefits to HC Agriculture

The UCR/ISRA collaborative cowpea project has been operational for three years. During this short period, we have assisted ISRA in the development of a dedicated Senegalese cowpea research team and in the conduct of research that should soon result in improved cowpea production systems for farmers in one of the toughest environments on earth for growing crops--northern Senegal.

The Senegalese team has tested cowpeas with improved adaptation to drought, developed by UCR, under extremely harsh conditions in the semiarid zone of Senegal over three extremely dry seasons. Some of these cowpeas are very early. One of the local Senegalese cowpeas has substantial yield stability, even though it requires a longer growing season. We have concluded that farmers who grow both the best UCR cowpea and the best local cowpea will have a more secure farming system. During the summer of 1984, the ISRA cowpea research team will evaluate the performance of these cowpea varieties on farmers' fields in Senegal in cooperation with extension personnel.

The UCR team has also developed cowpeas that can tolerate the hot conditions of Senegal. This work began by the discovery at UCR that two cowpea strains from Africa have heat tolerance while the majority tested were sensitive to heat. The ISRA scientists chose the best Senegalese cowpeas for use as parents. Scientists at UCR crossed in the heat tolerance and selected heat-tolerant progeny using the extremely hot conditions of the Imperial Valley in the summer. Heat-tolerant cowpeas with genetic backgrounds suitable for Senegal were supplied to ISRA, and they will begin evaluating their performance in Senegal during summer, 1984. In addition, a field method has been developed at UCR for screening cowpeas for more extensive rooting, and it is being used by UCR scientists to develop cowpeas that can extract more moisture from soil under drought.

ISRA scientists, in collaboration with UC scientists, are making substantial progress in developing improved management methods for cowpeas that are suitable for the conditions under which Senegalese farmers have to struggle to make a living. This includes improved sowing densities and intercropping systems, fertilization practices, insect control measures and methods for post-harvest storage.

Cooperating scientists at UC-Davis have provided technical advice, assisted in graduate education of Senegalese scientists and made substantial progress in breeding cowpeas that partition more dry matter to grain. The emphasis of the UCD and UCR programs on breeding improved cowpeas for Senegal is viewed as being extremely important. The subsistence farmers of northern Senegal have few resources to help them tackle their harsh environment. Water is not available for irrigation in the cowpea zone, and the supply of agricultural chemicals is extremely limited. The major hope for improvement in farming conditions is new cowpea varieties that can resist the drought and heat and be productive in infertile soils.

II. Benefits to US Agriculture

The emphasis given by this collaborative project to cowpea breeding is particularly important for California. The cowpea industry in California presently depends mainly on a cowpea variety that was developed more than forty years ago. New varieties are a critical need because the present variety is sensitive to heat and to a major disease--fusarium wilt. The CRSP made possible the discovery of the heat-tolerant cowpeas which are now being used to develop improved varieties for both California and Africa. Cowpeas originated in Africa, and it is likely that other cowpeas obtained from Africa will have characteristics that will be useful in the California breeding program.

California is the major US producer of cowpeas for dry beans. The cowpea breeding programs at UCR and UCD are the major programs in the US for the development of cowpea varieties for dry bean production. Consequently, these programs are important for the cowpea-dry bean industries in other states such as Arizona and Texas.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The cowpea growers of California have provided grants which partially support the overall research programs of UC scientists working on the CRSP. They have provided 50 percent of the salary of a cowpea breeder/pathologist working in improving heat tolerance and resistance to disease for California and Senegal, while the CRSP provided the other 50 percent. UCR also provided critical research funds to assist this project. The cowpea growers have provided funds to the UCD program which is developing cowpeas with improved harvest index which would be useful to both California and Africa.

Work on improved management methods has less complementarity because cowpeas are grown under irrigation in California. However, the UCR CRSP scientists have developed cowpea management methods for California that result in more efficient use of water and nitrogen fertilizer, and this has important implications for Africa.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The intense cowpea research, stimulated by the CRSP, has acted to promote cowpea research in non-CRSP research units on the Riverside and Davis campuses, e.g., in the departments of Nematology, Plant Pathology and Soil Science at UCR and in Entomology at UCD.

In addition, the UCR administration, faculty and staff have been extremely supportive of this CRSP project, in many ways providing more resources to support this work than were asked for in the original grant. This is part of the overall philosophy of the University of California--that it has international as well as national responsibilities.

V. Impact of the CRSP on On-Going International Research Programs

The present policy of the University of California, Riverside, is to promote international cooperative research that makes good use of the expertise of our faculty and fits the goals of the University of California in research and education. However, UCR is not involved in contract research in which US staff are posted overseas for extended periods of time. Consequently, this CRSP project is ideal in that it enables UCR to be involved in international research and contribute to international development in a manner which makes effective use of permanent faculty, while being consistent with the overall goals of the University of California.

TANZANIA/WASHINGTON STATE UNIVERSITY

Commentary on the Tanzania project prepared at the request of Landis L. Boyd, Director of the Agricultural Research Center and Institutional Representative for Washington State University, by Matt J. Silbernagel of the USDA/SEA/AR Irrigated Ag Research and Extension Center at WSU and Principal Investigator of the project, and submitted to the Bean/Cowpea CRSP March 28, 1984.

I. Benefits to HC Agriculture

Improved bean cultivars (cvs) resulting from this program will carry multiple resistance to the major diseases and insect pests. This resource will help increase and stabilize a vital food protein source, while reducing the need for reliance on chemical control of diseases and insects. Improved cooking ability of these lines will reduce the need for scarce fuel, and improved biological nitrogen fixing ability will reduce the need for imported fertilizer.

The socio-economic family background studies will help define the role of women in agriculture. They will also help identify the acceptability criteria for new cvs and serve as a standard against which to measure future progress.

The monoclonal antisera to Bean Common Mosaic Virus (BCMV) being developed by WSU will help identify BCMV strains present in different production areas rapidly, inexpensively and without a lot of sophisticated training, equipment or facilities. This knowledge will greatly facilitate choice of correct sources of resistance (hybrid parents) and will improve the efficiency of the screening of segregating populations in order to recover the desired combinations of specific resistance factors needed in new cvs.

II. Benefits to US Agriculture

Materials being introduced via the Bean/Cowpea CRSP from CIAT and Africa, plus germplasm lines being developed at Prosser, will have potential for utilization in the US by domestic bean breeders. Selections will be made for adaptation to the northwestern US seed production areas and, in particular, southcentral Washington State. This becomes increasingly valuable to Washington State as the Federal (USDA) dry bean program at Prosser is reduced and possibly eliminated. Dr. Burke's strong USDA dry bean program has been very productive and accounts for most of the dry beans grown in the State of Washington. The materials developed through this Title XII program will keep Washington State active in the development of new improved dry bean germplasm materials from which area seedspeople and/or WSU can select new cultivars.

The monoclonal antisera to strains of BCMV which are being developed through this CRSP will be commercialized by private industry. Returns to a WSU Research Foundation from this operation will help support additional agricultural research activities at WSU. These antisera will help all US public and private research and production agencies monitor for the presence of new dangerous strains, to make sure what they ship to other areas is not carrying seedborne virus. This capability is especially pertinent to the USDA Plant Introduction Service bean collection (about 8,000+ bean accessions from all over the world). This assurance of freedom from virus diseases will help protect the international reputation of the northwestern commercial seed production areas, as being able to reliably produce disease-free seed stocks. These antisera used in conjunction

with the Prosser ELISA diagnostic laboratory will also make possible for the first time in history a rapid, inexpensive means of gathering epidemiological data on the occurrence and identity of BCMV in any production area of the world.

III. Extent to Which On-Going Domestic Research Programs Relate to CRSP Goals

The bean breeding programs at Prosser IAREC have been in operation for about twenty-five years. The dry beans and snap beans developed here are uniquely resistant to a range of important virus diseases and root rots. Through the years USDA breeders have worked closely with WSU cooperators to improve nutritional quality, biological nitrogen fixation, cold tolerance, halo blight resistance and virus resistance. Most of these objectives are in line with the global goals of the CRSP. Therefore, the WSU bean program is able to make a significant contribution to the bean research needs of East Africa and the bean production global objectives of the Title XII Bean/Cowpea CRSP.

IV. Impact of the CRSP on On-Going Domestic Research Programs

The CRSP has been the most significant boost to the WSU-USDA bean program since its initiation. We now have the extra budget needed to address important research needs in the area of BCMV and halo blight that we simply could not have afforded otherwise, i.e. graduate student stipends and support for the monoclonal antiserum production, land rental in Mt. Vernon to screen for halo blight resistance and cold growing season tolerance. We now have the funds to travel to other centers of bean research around the world and to attend key meetings and workshops. In this way, it is possible to get to know the researchers, the problems, the solutions and the germplasm that may benefit our domestic programs in a way never before possible. This international perspective not only helps identify solutions to our local and regional breeding and production problems, but also helps identify potential new markets for our growers, i.e. if we put anthracnose and halo blight resistance into our snap bean cvs, we can sell seed in Europe where those diseases are important. It is important to visit those areas to get to know their market needs.

The opportunity to work collaboratively with a major international center of expertise (CIAT) greatly magnifies our domestic program's access to information and germplasm available nowhere else and expands our research capability for both our domestic and international projects. The same applies to opportunities that grow out of cooperative efforts with PIs of other CRSP projects, both domestically and abroad (i.e. tolerance to heat, drought, cold, rust, anthracnose, nitrogen fixation, etc.).

V. Impact of the CRSP on On-Going International Research Programs

Prior to this CRSP, our bean program's international activities were restricted to correspondence with scientists in other areas of the world or, on rare occasions, a PL-480 review trip or attendance at a CIAT bean breeders workshop. The CRSP has greatly increased valuable exchange of information and germplasm with bean researchers in other countries and hence strengthened our research program.

PROJECT EVALUATIONS BY AID MISSIONS

As part of the three-year review and extension process, letters were sent to USAID Mission officials in February, 1984 requesting them to evaluate the Bean/Cowpea CRSP projects located in their Host Countries. Specifically, they were asked to address the following issues: (I) Project Strengths and Weaknesses, (II) Contributions to Development, (III) Coordination with Host Country Institutions and Development Strategies, and (IV) Appropriateness of Project Extension. Responses were received from all but two of the appropriate AID persons, where recent personnel turnover precluded it.

The following section presents the significant excerpts from their letters responding to the individual issues. They are arranged alphabetically by project Host Country with the name of the AID Mission official responding indicated at the beginning of each statement.

BOTSWANA

Evaluation of the Botswana project prepared by the USAID/Botswana Agricultural Development Officer, Anita Mackie, and submitted to the Bean/Cowpea CRSP March 13, 1984.

I. Project Strengths and Weaknesses

The outstanding achievements of the project to date are seen as: the initial results from trials of the short season variety of ER 7, the collection and description of 180 local cowpea lines and the satisfactory progress made in the training of Host Country nationals. The minimum tillage cultivator/planter which was developed in collaboration with EFSAIP and which reduced the number of draft animals required may have a major contribution to women farmers. They play an important role in cowpea production and have been handicapped by lack of access to draft oxen and their inability to handle large teams. If an implement requiring only two oxen or four donkeys can be used on a wide variety of soils, it will have an impact on small farmers' practices.

The severe drought experienced in Botswana during both growing seasons has hampered progress. During the 1982/83 season only 190 tons of beans/pulses were produced in all of Botswana and, for the present season, 1983/84, the tonnage is expected to be lower. The project will need to address: the failure of the Agricultural Research Station to identify a local counterpart to the US PI, the lack of entomological input and the marginal staffing given the ambitious research program of eleven different types of trials and twenty experiments.

II. Contributions to Development

Cowpeas could make a major contribution to improving nutrition in Botswana. Their potential as a drought and heat tolerant crop is being realized with the good yields being demonstrated by the project with the short season varieties, and a good start has been made on variety trials. Further work is needed on disease resistant early varieties and, additionally, the degree of infestation with thrips was unexpected. Close cooperation with the Farming Systems projects will be needed to evaluate the economic returns to spraying if this is required.

III. Coordination with Host Country Institutions and Development Strategies

The staff at the Agricultural Research Station have been pleased with the large number of research trials which have given useful data, especially in view of the limited staff working on the CRSP. Considerable ingenuity has been demonstrated by the CRSP team in overcoming constraints imposed by local conditions. Project staff have demonstrated their willingness to work long hours under difficult conditions to get results.

A good start has been made towards the development of working relationships with some of the farming systems teams (FSR), and more emphasis needs to be placed on utilizing all the teams' resources. Consideration of the additional workloads imposed by the CRSP-related trials, their costs and potential benefits should be further discussed among members of the FSR and CRSP teams so that the most important foci can be determined. The cooperation of the FSR teams is essential if the economic and social aspects of cowpea production are to be given appropriate attention. The work with EFSAIP has given important initial results.

Excellent bridges have been built to the Field Staff (extension services). Many of the extension officers (AD's) have undertaken cooperative variety and insect control trials on farmers' fields. The training circulars and crop research bulletins developed by the project will be useful documents. The importance of cowpeas as a drought resistant crop has been recognized by the AD's, and they will support any improved varieties or practices found by the CRSP project.

IV. Appropriateness of Project Extension

No agricultural research can be expected to achieve widely applicable findings after only two seasons and this is no exception. However, it has achieved important short-term goals and is making excellent progress on achieving longer-term goals. The potential returns to Botswana of developing a short season, disease and insect resistant cowpea variety could have an enormous impact on both nutrition and economic returns when produced as a cash crop. While the extreme drought conditions of the past two years are deplorable, they have demonstrated the ability of a sixty-day cowpea to yield a crop when planted either early or late according to moisture conditions. This ability was not recognized in prior years and gives the cowpea an advantage over the less drought resistant and longer growing season crops. Another reason to extend the research is the wide acceptance of farmers in all areas of the country to growing cowpeas and their popularity in the diet. Beans and cowpeas are universally popular, with little preference being shown to varied seed coat colors or shapes. This means that high yielding varieties will not encounter consumer resistance, irrespective of their characteristics.

The work on cowpeas is seen as an important component to the Agriculture Technology Improvement Project in northeastern Botswana. Cowpeas, with their potential to improve human nutrition, yield fodder crops for livestock and give cash returns to farmers, can provide a three-pronged attack on Botswana's cropping problems.

BRAZIL/ROBERTS--BRAZIL/BLISS--BRAZIL/HAGEDORN

Evaluation of the Brazil projects prepared by the US Embassy/Brazil Program Specialist, R. Nonato Rocha, and submitted to the Bean/Cowpea CRSP February 24, 1984, and by former Brazil USAID Representative, Samuel Taylor (who was associated with the Bean/Cowpea CRSP in Brazil from its inception and is now with the American Embassy in Mexico) and submitted to the Bean/Cowpea CRSP March 1, 1984.

Rocha:

In response to your letter of February 9, 1984, about the Bean/Cowpea CRSP projects, we feel that these projects are well suited for Brazil and even more so now that the Brazilian Government is investing every effort in agriculture in order to improve and increase food production.

There are many important points in these projects, such as the exchange of information between Brazilian and American technicians as well as the training of Brazilian researchers. As a weakness, we can point out that no phytopathology specialist has come so far for the projects.

These projects are highly respected by Brazilian officials and their extension is necessary and recommended in order to meet objectives.

Taylor:

I. Project Strengths and Weaknesses

In my opinion, the Bean/Cowpea CRSP projects in Brazil were and are highly effective mechanisms for the US government and universities to continue to have a positive influence on the direction of agricultural development in the more advanced developing countries such as Brazil, Mexico and Colombia. The key to the success of the activities was the truly collaborative nature of the projects; i.e., the jointly planned projects were in areas of priority concern for the Brazilians and, in most instances, the US scientists worked as equals not as "gringos" who dictated the terms of the research activities.

One of the weaknesses of the projects was that scientists who were not previously associated with the lead universities were sometimes hired to work on the projects. These newly hired scientists often had problems in dealing with the administration of the lead institution. Another weakness was that some of the scientists, at least initially, did not have adequate Portuguese language training to begin working.

II. Contributions to Development

The projects' contribution to the Host Country's development can be measured in terms of the specific outputs and scientific accomplishments. Besides the useful scientific information that has come out of the projects, which will help to increase the production of beans and cowpeas in Brazil and other LDCs, the projects also benefit the US institutions by expanding their capability to conduct research overseas. It is my observation that most US universities do not have the experience and expertise to assist overseas development activities

unless key members of the staff have participated in developmental projects such as CRSPs. I view the CRSP projects as a long-term investment in the development of the expertise and scientific process for sustained attention to development problems in the LDCs.

III. Coordination with Host Country Institutions and Development Strategies

I have frequently discussed the Bean/Cowpea CRSP projects with the Host Country government officials and can say that "without exception" the Brazilians are most pleased with the CRSP activities and would welcome increased participation in research projects with US universities.

IV. Appropriateness of Project Extension

I do not hesitate to recommend the extension of the Bean/Cowpea CRSP projects through FY 88.

CAMEROON

Evaluation of the Cameroon project prepared by the USAID/Cameroon Mission Director, Ron Levin, and submitted to the Bean/Cowpea CRSP March 12, 1984.

I. Project Strengths and Weaknesses

The Bean/Cowpea CRSP in Cameroon is a good effort largely as a result of the excellent research program conducted by Dr. Moffi Ta'Ama. I believe that the pest management strategies program for optimizing cowpea yields will lead to more applied control measures on Cameroon farms. Dr. Ta'Ama works well with his Cameroonian counterparts and USAID-supported researchers associated with SAFGRAD and the National Cereals Research and Extension Project. However, some of the weaknesses of the project are as follow:

- A. USAID/Cameroon has not been kept sufficiently informed or involved in project management and evaluation. I believe that many problems could have been avoided or solved earlier if the USAID/Cameroon Project Officer (Abdel Moustafa) had been consulted about the management decisions and had had an opportunity to evaluate the project performance with the members of the External Review Panel. Unfortunately, the evaluation of the Bean/Cowpea CRSP was conducted at the same time Dr. Moustafa was in the evaluation of a major cereals research project, which prevented him from being involved. The dates of future evaluations of the Bean/Cowpea CRSP in Cameroon should be approved by the Mission well in advance to ensure that Mission staff is available to participate.
- B. Communications have been a problem. The Management Entity (Michigan State University) and the Contractor (University of Georgia) have not yet developed an effective system of communications between IRA-Yaounde, IRA-Maroua or the USAID Mission. Many problems could have been avoided if all concerned parties had been well informed. The Mission has received telexes from the Bean/Cowpea CRSP which had not been copied to the AID/Washington Project Officer (Dr. B. Pollack). Communications with the AID/W Project Officer have likewise not always been copied to USAID/Cameroon. Other correspondence has been sent directly to IRA-Maroua without informing the USAID/Cameroon Mission. Arrangements concerning project finances, developed by the University of Georgia, have not been thoroughly explained or discussed with Cameroonian officials.

II. Contributions to Development

As stated above, the CRSP program of research in Cameroon is sound and comprehensive and should help develop agricultural practices and control measures to overcome or minimize insect damage to the cowpea crop in Northern Cameroon.

III. Coordination with Host Country Institutions and Development Strategies

We believe that the Host Country's feelings toward this project are not as positive as they should be for the following reasons:

- A. Project research plans are developed by the University of Georgia without proper consultation with the Institute of Agricultural Research. Our concern was conveyed to AID/Washington on December 2, 1983. This message stated the Director of IRA's strongly held belief " . . . that the Bean/Cowpea CRSP in Cameroon has isolated itself from his institution. He and the Chief of Center, IRA-Maroua, have not been consulted or requested to participate in CRSP program planning. In addition, many important financial and management decisions related to CRSP activities have been made without his approval."
- B. Moffi Ta'Ama has undertaken extensive travel and has been away from Cameroon for 30 percent of the 1983 calendar year. These absences cannot help but be disruptive to his research and are thus a major factor contributing to the CRSP's growing isolation from IRA. Cameroonian officials and USAID/Cameroon feel that one trip each year to the United States by Dr. Ta'Ama is sufficient.
- C. IRA believes that the budget needs a major revision and that too much money has been allocated to be spent outside of Cameroon and for travel. They note that \$30,000 was programmed for travel in FY 83/84. The budget that has been submitted is very difficult to understand. This confusion could have been avoided by thorough explanation to Cameroonian counterparts and the Mission.
- D. Neither IRA nor USAID/Cameroon understands how the research conducted at the Boyce Thompson Institute (BTI) contributes to optimizing cowpea production in Cameroon. The 1982 Bean/Cowpea CRSP Annual Report makes no reference to the work conducted by BTI. Results of the research conducted by BTI, as verbally explained by Moffi Ta'Ama, appear to be purely academic and of only marginal value to the project. Therefore, we recommend that reports of BTI's research results be made available to the Mission in order to allow IRA and the Mission to assess the contribution of this effort to the project.

IV. Appropriateness of Project Extension

USAID/Cameroon's position is that Dr. Moffi Ta'Ama is completing useful and relevant research. Therefore, the Mission would support an extension of this CRSP if the above coordination and communication problems can be solved and mutual agreement between all parties can be reached.

In summary, USAID/Cameroon believes that the CRSP program can be a worthwhile effort and has potential for success in Cameroon. However, the management of the project in Cameroon shows insufficient regard for the concerns of IRA in exercising coordination of all research activities being conducted under its auspices.

DOMINICAN REPUBLIC/UPR--DOMINICAN REPUBLIC/UNE

Evaluation of the Dominican Republic projects prepared by the USAID/Ecuador Agriculture/Rural Development Officer, Marion R. Ford, and submitted to the Bean/Cowpea CRSP February 23, 1984.

I. Project Strengths and Weaknesses

I think the CRSP is being managed well and is probably on schedule in achieving its goals. My only problem is conceptual. The CRSP attempts to give the DR the scientific capability to carry out rather sophisticated breeding programs for beans: hence, food legumes. My conceptual problem is whether that is really necessary in order to give the DR a continuous source of resistant varieties of beans, etc. to meet its production needs. It may be a cliché or oversimplification, but I think the proper use of superior CIAT germplasm is sufficient for short-term varietal improvement. The long-term needs are more difficult to assess, but I am forever fearful of duplicating the work done by the international centers.

II. Contributions to Development

With regards to your question about the CRSP's contribution to development, I think it has done quite a lot. The CRSP has created a bean center, thus a bean program. While I am not sure the CRSP so intended it, the center is developing into an excellent facility for testing material from CIAT. The San Juan center could eventually become for food legumes what Juma (Bonao) has been for rice. In short, I think the right thing may be happening but not entirely for the intended reason. If I could have my way, I would like to see the CRSP continue but with emphasis shifted from the scientific toward the applied.

III. Coordination with Host Country Institutions and Development Strategies and

IV. Appropriateness of Project Extension

As for the Host Country's feeling about the projects, I have certainly heard no criticism. Beans are a big priority and they want all the assistance they can get. Dr. César Paniagua and Ing. Richiez have told me they support the projects and they believe that they are providing "good" assistance.

ECUADOR

Evaluation of the Ecuador project prepared by the Chief of the Agriculture and Rural Development Office, Joseph Goodwin, and submitted to the Bean/Cowpea CRSP April 17, 1984.

I. Project Strengths and Weaknesses

To address your question of strengths and weaknesses of the CRSP in Ecuador, overall, the project's implementation and consequently its impact have been less than what was envisioned at the outset. This was due to two very serious constraints, which I feel are now being resolved.

First was the delay in securing the full-time agronomist and social scientist team to work in Ecuador on the project. The lack of the agronomist was especially critical given INIAP's reluctance to accept a social scientist in agricultural research. The agronomist, I feel, would have been able to facilitate the connection. This situation appears resolved with Cornell identifying two excellent individuals, Drs. Kris Merschrod and Wesley Kline, to fill the long-term social scientist and agronomist positions, respectively. The second reason for the lack of better progress was a series of changes which have occurred in key INIAP personnel and which resulted in, at best, indifference to the CRSP and which translated into lack of active support. Once again, this appears basically resolved due to recent appointments of INIAP officials who are demonstrably more sympathetic to the objectives of the CRSP.

Aside from the personnel issue, the main weakness of the CRSP in Ecuador has been in not coordinating sufficiently with other in-country activities having similar objectives or mutually supportive activities. This is particularly evident at the US university level. A specific example with which I am familiar relates to the Small Farming Systems Subproject which is being implemented by INIAP through USAID/Ecuador financing.

I saw no evidence of coordination or communication between Cornell and the University of Florida, which has the FSSP Cooperative Agreement with AID and is providing technical assistance to the subproject. I have raised this issue with both universities and have been promised closer coordination efforts. Opportunities for coordination with on-going and planned projects must be a prime concern of the CRSPs worldwide as all AID Missions are facing personnel reductions and, therefore, are less able to support isolated activities which are not integral to their overall program and development strategy.

II. Contributions to Development

The strength of the Bean/Cowpea CRSP is clearly its ability, in the case of Ecuador, to make a significant contribution to improving the overall well-being of the farmer and, by extension, the rural sector. The objectives of the CRSP, as presented in the initial AID/Michigan State University Agreement, are as valid today as ever, only now they are more urgent.

III. Coordination with Host Country Institutions and Development Strategies

I touched on the question of Host Country feelings earlier and, therefore, will only add that perceptions will most certainly become even more positive as the effect of the two full-time advisors is felt by INIAP research personnel.

IV. Appropriateness of Project Extension

Extending the Bean/Cowpea CRSP is certainly warranted given that it addresses an important development sector; i.e., the small farmer, and the situation of the small farmer has not reached the point where emphasis can be necessarily placed elsewhere. The real critical issue is not extension or no extension but how to incorporate the knowledge acquired into improving the effectiveness of the CRSP during the FY 86-FY 88 period.

GUATEMALA--INCAP

Evaluation of the Guatemala projects prepared by the USAID/Guatemala Chief of the Office of Rural Development, Harry E. Wing, and submitted to the Bean/Cowpea CRSP March 27, 1984.

I. Project Strengths and Weaknesses

As you are well aware, the common black bean plays an important role in the traditional Guatemalan diet. Little work other than that conducted through the Bean/Cowpea CRSP has been conducted to improve the prevalent bean cultivars, their method of home preparation and digestibility. The micro-climatic zones found here provide the researcher with a variety of genetic material and growing conditions under which experiments can be conducted. The principal local investigative institutions involved with this CRSP (ICTA and INCAP) are both staffed with well-qualified personnel.

II. Contributions to Development

The political situation in Central America is receiving a great deal of publicity in the US. It is our belief that the activities of the Bean/Cowpea CRSP in Guatemala have not been impeded by this situation and, in fact, the CRSP has the potential to improve the diets and lives of those most affected by this violence.

III. Coordination with Host Country Institutions and Development Strategies

We believe the administrations of ICTA and INCAP support the activities conducted in Guatemala under the Bean/Cowpea CRSP and would provide continued support in the advent of project extension. The central offices of these two institutions are located in Guatemala City, which provides a unique situation to facilitate agronomic and nutritional research. While ICTA and INCAP are well staffed, they lack the funds to properly operate field plots and to provide for expenses required for research. The Bean/Cowpea CRSP, in addition to providing important links with US universities, has provided needed funds and has helped address a serious constraint.

IV. Appropriateness of Project Extension

USAID/Guatemala believes the Bean/Cowpea CRSP has provided and is able to continue to provide a positive contribution to the people of this country. We support and encourage a three-year expansion of these projects in Guatemala.

HONDURAS

Evaluation of the Honduras project prepared by the USAID/Honduras Food and Agricultural Development Office Director, Stephen C. Wingert, and submitted to the Bean/Cowpea CRSP February 29, 1984.

I. Project Strengths and Weaknesses and II. Contributions to Development

The Bean/Cowpea CRSP project has been working in Honduras in direct collaboration with the Panamerican Agricultural School at El Zamorano. The project pursues increased production through the lowering of yield loss due to bean diseases. To this effect, sources of disease resistance are identified by the University of Puerto Rico and then made available for incorporation into local bean varieties. As we perceive it, adequate assessment of bean diseases on crop production, introduction of disease resistance into local cultivars and extensive field testing of the "improved" materials are general guidelines for effective project contribution to bean production in Honduras.

There has been one major constraint for effective project implementation in Honduras. This has been the lack of continuity of the Panamerican School staff associated with the project and failure to substitute them promptly. This needs to be adequately addressed; otherwise, stated goals will not be reached.

III. Coordination with Host Country Institutions and Development Strategies

The Bean/Cowpea CRSP project could play a critical role in improving bean production in Honduras. We would suggest that stronger linkages should be secured with research and extension staff from the Ministry of Natural Resources and the proposed Agricultural Research Foundation, as well as individual bean producers and associations. This may give more exposure to the project and the chance to benefit more from local input.

IV. Appropriateness of Project Extension

We strongly feel that the project should be extended in Honduras for several reasons. The first is the importance of beans in the Honduran diet and its small farmer based production. These factors combined with the low bean productivity in Honduras and the importance the country has for US foreign assistance efforts should mandate a project extension. Secondly, the Mission is planning major interventions in agricultural research in Honduras through the creation of an Agricultural Research Foundation, which would provide a future institutional setting for Bean/Cowpea CRSP efforts.

KENYA

Evaluation of the Kenya project prepared by the USAID/Kenya Research Project Manager, Curtis R. Nissly, and submitted to the Bean/Cowpea CRSP April 18, 1984.

I. Project Strengths and Weaknesses

A major strength of the Bean/Cowpea CRSP is in giving needed support to University of Nairobi professionals, allowing them to carry out research in their field of interest. Money has been very scarce to carry out any sort of research. Also the ability to establish linkages with US universities and US researchers is very beneficial.

We are well aware of the problems that the Kenya coordinator has had in meeting CRSP objectives in terms of getting financial support and needed equipment. One of the major weaknesses as we see it has been the lack of coordination and effective communication between the PIs at Davis and Riverside and the Kenyan researchers. The problem of reimbursement for expenses due to the lack of forwarder receipts was, in our opinion, unresolved for an excessive length of time. Possibly there has been a lack of understanding of the problems and difficulties that university researchers have in conducting their work. Another weakness is that CRSP research has been largely carried out in isolation of other bean research in Kenya. Some very good bean work has been sponsored by the Dutch government at the Thika Horticultural Station. In the future we believe work should be done in collaboration with bean research conducted by the Ministry of Agriculture and Livestock Development.

II. Contributions to Development

As you realize, beans are a very important crop for Kenyan farmers especially in the drier areas. The fact that CRSP work in Kenya is concentrating on the development of drought resistant lines speaks to its contribution to agriculture development in Kenya. However, the impact of this contribution has been minimal to date due to problems of implementation.

III. Coordination with Host Country Institutions and Development Strategies

It is difficult to get a reading as to official GOK response to the CRSP project. However, as was mentioned above, the fact that the CRSP is supporting research conducted by University of Nairobi professionals is very positive, but greater collaboration between University of Nairobi researchers and Ministry of Agriculture researchers would, of course, be desirable and should raise the credibility of the CRSP with the GOK.

IV. Appropriateness of Project Extension

The USAID/Kenya Agriculture Office would support the extension of Bean/Cowpea CRSP activities in Kenya. This, of course, would take for granted that changes recommended by Dr. Webster and others after their recent visit would be implemented. Collaboration and cooperation among the limited professional manpower in Kenya is essential. Another factor would be the coordination of CRSP activities with that of CIAT's proposed work in Kenya. There should be a top-level Memorandum of Understanding between the CRSP and CIAT prior to continued work.

MALAWI

Evaluation of the Malawi project prepared by the USAID/Malawi AID Representative, Sheldon W. Cole, and submitted to the Bean/Cowpea CRSP April 4, 1984.

I. Project Strengths and Weaknesses

The USAID Mission to Malawi and the Government of Malawi strongly support the concept and intent of the Bean/Cowpea CRSP project in Malawi, but some issues have been raised about the amount of time the Principal Investigator, Dr. Edje, invests in this project. A misunderstanding appears to have arisen between Dr. Edje and Bunda College regarding the CRSP from the standpoints of the time Dr. Edje spends on his research and of how the funds are administered. Bunda apparently regards the position Dr. Edje holds with the College as his primary job and looks with some disfavor on the time he must spend away from his responsibility in order to conduct his research for the CRSP. Perhaps the most expeditious and amenable way of resolving the issues is for research progress reports and budgetary allocations to be submitted at regular intervals throughout the life of the project. That these issues exist is unfortunate because the Ministry of Agriculture looks to Bunda College for leadership in bean research. The Bean/Cowpea CRSP project is the most significant and best-funded biological research effort in the University of Malawi. Professor Edje is an ambitious, articulate and dedicated scientist.

II. Contributions to Development

So far, the contribution of this research project to Malawi development is minimal, except for the very important contribution that it makes to development of the research system in Bunda College. As you are aware, the concept of the CRSP is different from other types of S&T projects. The CRSPs will continue to be vulnerable to the criticism that they do not contribute to development so long as they fail to report findings in a way that can and will be used by developing countries. The Bean/Cowpea CRSP with its eighteen researchable problems is more vulnerable than others. Who knows but that the findings of one or more of the other seventeen areas of investigation may prove to be more valuable to Malawi than the one underway here? It is for this reason that we were so pleased to receive the summary report of the Small Ruminant CRSP which so completely summarizes the results of all components of that CRSP in a very readable format.

III. Coordination with Host Country Institutions and Development Strategies and IV. Appropriateness of Project Extension

We fully support the extension of the Bean/Cowpea CRSP component in Malawi, but the CRSP management will need to resolve these issues and assure both itself and the GOM that this component will contribute within the overall research plan in Malawi. All effort and funds invested in Malawi must fully contribute to solving the problem which has been identified.

NIGERIA/MSU--NIGERIA/UGA

Evaluation of the Nigeria projects prepared by USAID/Nigeria Affairs Officer, Keys McManus, and submitted by cable to the Bean/Cowpea CRSP March 19, 1984

As you know, no bilateral funds are available at this time in Nigeria. Yet, Nigeria has very real needs for technical assistance, particularly in agriculture. Thus, centrally funded projects such as this CRSP are of utmost importance and are greatly appreciated by the government.

The importance of beans/cowpeas to the Nigeria diet cannot be overstated. As population continues to increase and importation of food products is restricted by foreign exchange limitations, the dependence on beans/cowpeas can only increase.

We urge extension of the CRSP and continuation of efforts in Nigeria, homeland of one in every five Africans.

SENEGAL

Evaluation of the Senegal project prepared by the USAID/Senegal Agricultural Development Officer, John Balis, and submitted to the Bean/Cowpea CRSP March 30, 1984.

I. Project Strengths and Weaknesses and II. Contributions to Development

Under marginal rainfall conditions, cowpeas are seen as having considerable potential as both a subsistence and cash crop. ISRA believes that many high yielding varieties have been developed through the CRSP program which are well adapted to Senegal's climatic and soils conditions. The results of the last two years have demonstrated the value of the Bean/Cowpea CRSP to the ISRA program and we have noted considerable interest in continuing this working arrangement between US and Senegalese researchers.

There are still several obstacles to greatly expanding acreage and yields of cowpeas in Senegal and further research and field tests are required. Major problem areas are in insect control, storage and marketing.

III. Coordination with Host Country Institutions and Development Strategies

The Bean/Cowpea CRSP is viewed by USAID and Senegalese agencies (including agricultural research and extension institutions ISRA and SODEVA) as a project with great importance to Senegal. The Senegalese development agency in the Groundnut Basin, SODEVA, is aware of the CRSP program and, in many instances, have met with CRSP personnel and discussed progress made to date and the nature of farmers' constraints. SODEVA is anxious to collaborate more closely in conducting field trials of new varieties and production techniques. Coordination among various research efforts and field trials can be further enhanced.

IV. Appropriateness of Project Extension

USAID feels strongly that an extension of the Bean/Cowpea CRSP would be appropriate. An emphasis for the extension should be placed on field testing techniques of production and storage, as well as the variety and other work now being done.

1983 BUDGET REPORT

The Bean/Cowpea CRSP document on Distribution of Direct and Indirect Costs and Contributions was originally prepared at the request of the External Review Panel in January, 1984. The data were compiled from project quarterly financial reports that had been received in the Management Office through the end of December, 1983 (but not necessarily expended through that date). The report now has been updated to include all data reported as expended through the end of FY 83. The updated information has resulted in a few minor changes to the data in the ERP report, but the important points highlighted in that report remain unchanged and are listed below:

1. The distribution of direct/indirect costs for the research projects is 83 percent/17 percent. Thus, 83 percent of AID funds for the projects are placed directly in the hands of project personnel for research and training. Of the 83 percent direct costs, 53 percent are spent in or on behalf of the Host Country and 47 percent in the US. This is in compliance with a CRSP policy that a minimum of one-half of the project funds, excluding indirect costs, be spent in or directly on behalf of the Host Country.
2. If the Management Office is included as an overhead expense, the direct/-indirect cost split is 63 percent/37 percent with the HC/US distribution of the 63 percent direct costs unchanged at 53 percent/47 percent. The indirect cost rate of 37 percent is considered acceptable in that it is comparable to the AID negotiated indirect cost rates of individual US institutions.
3. Through year 3, total CRSP contributions (counting contributions from all recorded sources) were comprised of AID 72 percent, US institution contributions 17 percent and HC contributions 11 percent. The cost sharing component of the US portion of the CRSP was split 63 percent AID and 37 percent US institutions (this figure required to be 25 percent). US institutions thus contributed the equivalent of 59 percent ($\$1,145,674 \div \$1,922,822$) of AID contributions to US project costs. In addition, HC institutions contributed the equivalent of 41 percent ($\$756,615 \div \$1,840,739$) of AID contributions to HC project costs. US and HC institutions are making substantial contributions to CRSP resources.

Bean/Cowpea Collaborative Research Support Program
Distribution of Direct and Indirect
Costs and Contributions through 1983

Last Qtrly Report	Country	U.S. Direct Costs (A)	U.S. Indirect Costs (B)	H.C. Direct Costs (C)	H.C. Indirect Costs (D)	Total U.S. Costs (E)	Total H.C. Costs (F)	Total U.S. & H.C. Indirect Cost (G)	U.S. Direct Cost (H)	H.C. Direct Cost (I)	U.S. Contr. (M)	H.C. Contr. (N)	Total Contr. (O)	Total Cost	
9-30-83	Botswana/CSU	5,133 (7%)	1,523 (2%)	122,154 (8%)	24,914 (1%)	6,656 (4%)	147,068 (8%)	26,437 (1%)	5,133 (1%)	122,154 (8%)	2,176 (1%)	28,678 (2%)	30,854 (3%)	164,578	
9-30-83	Brazil/BYI	94,055 (70%)	40,867 (30%)	145,956 (100%)	- (0%)	134,922 (48%)	145,956 (52%)	40,867 (15%)	94,055 (33%)	145,956 (52%)	105,951 (15%)	111,218 (15%)	217,169 (20%)	496,047	
9-30-83	Brazil/Bliss	31,802 (60%)	16,413 (30%)	24,058 (100%)	- (0%)	48,215 (68%)	24,058 (32%)	16,413 (20%)	31,802 (40%)	24,058 (30%)	19,037 (15%)	5,293 (4%)	24,330 (19%)	96,603	
9-30-83	Brazil/Magedom	47,695 (78%)	13,117 (22%)	5,890 (100%)	- (0%)	60,612 (81%)	5,890 (8%)	13,117 (20%)	47,695 (72%)	5,890 (9%)	34,353 (18%)	- (0%)	34,353 (100%)	141,055	
9-30-83	Cameroon/UGA	51,190 (79%)	13,549 (21%)	173,470 (80%)	43,231 (20%)	64,739 (27%)	216,701 (77%)	56,780 (21%)	51,190 (18%)	173,470 (62%)	47,180 (18%)	86,680 (26%)	133,860 (34%)	415,300	
9-30-83	Dom. Rep./U-N	60,077 (78%)	16,987 (22%)	164,576 (97%)	5,750 (3%)	77,064 (51%)	170,326 (69%)	22,737 (9%)	60,077 (26%)	164,576 (64%)	114,712 (26%)	26,678 (6%)	141,390 (32%)	366,780	
9-30-83	Dom. Rep./UPR	172,731 (100%)	- (0%)	133,879 (95%)	5,801 (4%)	172,731 (55%)	139,680 (45%)	5,801 (2%)	172,731 (55%)	133,879 (43%)	96,915 (26%)	33,523 (9%)	130,438 (35%)	442,649	
9-30-83	Ecuador/ODR	67,440 (74%)	24,132 (26%)	79,770 (89%)	9,707 (11%)	91,522 (51%)	89,477 (49%)	33,839 (19%)	67,440 (37%)	79,770 (44%)	57,344 (19%)	14,647 (5%)	71,991 (24%)	253,040	
9-30-83	Guatemala/ODR	70,061 (72%)	27,869 (28%)	69,585 (85%)	12,905 (15%)	97,940 (56%)	82,090 (44%)	40,374 (21%)	70,061 (39%)	69,585 (35%)	63,812 (23%)	33,655 (12%)	97,467 (35%)	277,487	
9-30-83	Honduras/UPR	88,254 (100%)	- (0%)	41,384 (80%)	7,616 (15%)	88,254 (60%)	49,000 (30%)	7,616 (8%)	88,254 (60%)	41,384 (30%)	48,776 (20%)	20,090 (8%)	68,866 (28%)	166,120	
9-30-83	INCAP/MSU	137,159 (70%)	58,986 (30%)	91,080 (70%)	38,501 (30%)	196,145 (60%)	129,581 (40%)	97,487 (30%)	137,159 (42%)	91,080 (28%)	141,526 (28%)	43,405 (9%)	184,931 (37%)	510,157	
9-30-83	Kenya/UC-D	180,547 (77%)	52,837 (23%)	112,694 (92%)	4,925 (4%)	233,364 (66%)	117,615 (34%)	57,762 (17%)	180,547 (51%)	112,690 (31%)	66,436 (18%)	89,387 (24%)	155,823 (42%)	506,824	
9-30-83	Malawi/MSU	59,968 (60%)	30,902 (30%)	63,488 (100%)	- (0%)	90,870 (59%)	63,488 (41%)	30,902 (20%)	59,968 (39%)	63,488 (41%)	12,343 (12%)	24,125 (24%)	36,468 (36%)	190,826	
9-30-83	Mexico/MSU	22,104 (64%)	12,601 (36%)	25,862 (100%)	- (0%)	34,705 (57%)	25,862 (43%)	12,601 (21%)	22,104 (36%)	25,862 (43%)	16,813 (28%)	9,828 (16%)	26,641 (44%)	67,208	
9-30-83	Nigeria/U-GA	79,159 (87%)	16,560 (17%)	88,220 (100%)	- (0%)	95,719 (52%)	88,220 (48%)	16,560 (9%)	79,159 (47%)	88,220 (48%)	48,484 (24%)	98,606 (50%)	147,290 (74%)	331,229	
9-30-83	Nigeria/MSU	30,135 (58%)	21,380 (42%)	33,848 (100%)	- (0%)	51,515 (60%)	33,848 (40%)	21,380 (25%)	30,135 (35%)	33,848 (40%)	16,310 (18%)	13,677 (15%)	30,187 (35%)	115,590	
9-30-83	Senegal/UC-R	141,049 (71%)	57,182 (29%)	129,525 (85%)	23,148 (15%)	198,231 (56%)	152,673 (44%)	80,330 (23%)	141,049 (40%)	129,525 (37%)	179,444 (26%)	62,595 (9%)	242,039 (35%)	592,943	
9-30-83	Tanzania/MSU	119,646 (67%)	59,772 (33%)	152,581 (69%)	6,625 (4%)	179,418 (57%)	159,206 (47%)	66,397 (20%)	119,646 (39%)	152,581 (48%)	74,560 (24%)	54,130 (17%)	128,690 (41%)	467,314	
Total Country Research Projects		1,458,205 (76%)	464,677 (24%)	1,658,016 (90%)	182,723 (10%)	1,922,882 (51%)	1,840,739 (49%)	647,400 (17%)	1,458,205 (39%)	1,658,016 (44%)	1,145,674 (28%)	756,615 (19%)	1,902,289 (47%)	5,065,910	
Cost Sharing AID/US						6%						3%			
Management Office								1,190,423						1,190,423	
Total Grant								1,837,823 (27%)		1,458,205 (21%)		1,658,016 (24%)		1,902,289 (28%)	6,856,333
Distribution of Grant Direct Cost										4%		5% (L)			
Distribution of AID/US Contribution/H.C. Contribution								4,954,044 (72%)		1,145,674 (17%)		756,615 (11%)		[P]	
Distribution of AID Indirect Cost/AID Direct Cost & US/H.C. Contribution								1,837,823 (27%)		5,018,510 (73%)		[Q]			

Explanation of Data Components

COMPARISON OF US DIRECT/INDIRECT COSTS

- (A) US Direct Costs
Direct Costs reported by US institutions
- (B) US Indirect Costs
Indirect Costs reported by US institutions

COMPARISON OF HC DIRECT/INDIRECT COSTS

- (C) HC Direct Costs
Direct Costs reported by HC institution
- (D) HC Indirect Costs
Indirect Costs reported by HC institution

COMPARISON OF US/HC TOTAL COSTS (DIRECT AND INDIRECT)

- (E) Total US Costs
Total Direct and Indirect Costs reported by US institutions
- (F) Total HC Costs
Total Direct and Indirect Costs reported by HC institution

COMPARISON OF TOTAL INDIRECT COSTS; US DIRECT COSTS; AND HC DIRECT COSTS

- (G) Total US and HC Indirect Costs
Total Indirect Costs reported by US and HC institutions
- (H) US Direct Cost
Total US Direct Cost reported by US institution
- (I) HC Direct Cost
Total HC Direct Cost reported by HC institution
- (J) Distribution of Country Research Project Indirect Cost; US Direct Cost; HC Direct Cost
- (K) Distribution of Total Grant (Including Mgmt. Office) Indirect Cost; Direct Costs; and US/HC Cost Sharing
- (L) Distribution of Grant Direct Costs

COMPARISON OF COST SHARING

- (M) US Contribution
Cost sharing reported by US institution on Quarterly Reporting Form
- (N) HC Contribution
Estimates of HC cost sharing from approved budgets $\left(\frac{\text{HC Contribution}}{\text{HC AID Budget}} \times \text{Total Reported HC costs} \right)$
- (O) Total US and HC Cost Sharing

DISTRIBUTION OF TOTAL GRANT COST

- (P) Distribution of AID Contribution; US Cost Sharing; HC Cost Sharing
- (Q) Distribution of AID Indirect Costs; AID Direct Costs + US/HC Cost Sharing

Bean/Cowpea Collaborative Research Support Program
 Management Office Expenditures by Function
 Year 1 (FY 1981) through Year 3 (FY 1983)

	FY 81	FY 82	FY 83	3 Year Total
Management Office ¹	374,798	346,179	334,373	1,055,350
Board of Directors				
- Travel	6,533	5,525	5,107	17,165
- Meeting Expense	<u>1,733</u>	<u>1,356</u>	<u>4,019</u>	<u>7,108</u>
Total BOD	8,266	6,881	9,126	24,273
Technical Committee				
- Travel	14,167	30,718	19,650	64,535
- Meeting Expense	<u>1,165</u>	<u>2,454</u>	<u>4,478</u>	<u>8,097</u>
Total TC	15,332	33,172	24,128	72,632
External Review Panel				
- Travel	-0-	863	19,538	20,401
- Meeting Expense	-0-	-0-	1,212	1,212
- Consultant Fee	-0-	870	<u>8,340</u>	<u>9,210</u>
Total ERP	-0-	<u>1,733</u>	29,090	30,823
Technical Assistance	875	1,142	937	2,954
Publications				
Exec. Sum/Ann. Rep.	-0-	189	3,081	3,270
Technical Summary	-0-	-0-	-0-	-0-
ERP Report	-0-	-0-	334	334
Other ²	-0-	-0-	<u>787</u>	<u>787</u>
Total Publications	-0-	189	4,202	4,391
Total	399,271	389,296	401,856	1,190,423

¹ Includes Staff Salaries, Fringes, Equipment, Material and Supplies, Staff Travel, Other Direct Costs and MSU Indirect Costs

² Includes Pulse Beat

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CONCLUSION

The CRSP has concentrated on maintaining a well-integrated research and training program. It has attempted to strike a balance between the research needs of legume science for the common good and the more narrow special needs of participating US and HC research programs. A high level of communication among the participants and especially across the disciplines supports this balance (i.e., researchers rotating through terms on the Technical Committee, multidisciplinary participation in CRSP meetings and workshops). We are now beginning to see project leaders turn to one another for assistance in specified areas. Sometimes projects help train new personnel for one another. For example, a HC food scientist, beginning food quality assessments of the lines being developed by the CRSP disease resistance project in his country, visited with the food science US and HC team in another country to learn of the major ideas and findings emanating from their work. Another CRSP project on drought and heat tolerance is negotiating with a disease resistance project to have the promising lines for drought and heat screened by them for disease resistance. A similar service function to other CRSP projects is being performed by one of the projects concentrating on biological nitrogen fixation.

Slowly the real value of the wealth of resources represented by an organization of this size and complexity is making itself understood. While overall management keeps the few persons responsible for critical points in the operation, such as the AID program officer, the BIFAD liaison person, and the Management Office, extremely busy, all parts together suggest the energy and exciting potential in the program as a whole. The constraints identified are complex and stubborn and long-term research is expected to be required if they are to be adequately addressed. If there is any hope that this process can be accelerated, it will be through assembling an array of competent, dedicated persons who are heterogeneous in their professional and cultural backgrounds. Unencumbered by gender discrimination and national/ethnic neglect, this is best described as intellectual germplasm. And indeed, it is the true promise of the Bean/Cowpea CRSP.