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INTERIM PLANNING REPORT

OF THE

BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM

from

DEPARTMENT OF CROP AND SOIL SCIENCES

MICHIGAN STATE UNIVERSITY

May 15, 1979

INTERIM PLANNING REPORT
OF THE
BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM
MAY 15, 1979

APPENDICES

Appendix I	Letter from Director of the Agricultural Experiment Station to Title XII representatives of all U.S. institutions eligible to participate in Title XII programs. October, 1978.
Appendix II.1	Report of visit to the University of Missouri. October 23, 1978.
Appendix II.2	Missouri visit, Title XII discussions. October 23-24, 1978.
Appendix II.3	Visit and discussions with U.S./AID personnel in Washington, D.C. October 26-27, 1978.
Appendix II.4	Report of meeting in Washington, D.C. October 26-27, 1978.
Appendix III	Identification of constraints--questionnaire and interview.
Appendix IV.1	Report of visit to Guatemala, Panama, Costa Rica, Colombia, CIAT, Chile. January 24 - February 3, 1979.
Appendix IV.2	Report of visit to International Institute of Tropical Agriculture at Ibadan, Nigeria. February 13-15, 1979.
Appendix V	Brief report of the FAO meeting on limitations to production of pulses in the Caribbean and Central America-Panama, in Santo Domingo, Dominican Republic. February 19-23, 1979.
Appendix VI	Report of attendance at the Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alementicios XXV Annual Reunion in Tegucigalpa, Honduras. March 19-23, 1979.
Appendix VII	A proposed outline for the state-of-the-art (SOTA) analysis planning a bean/cowpea collaborative research support program.
Appendix VIII.1	Guide to proposal preparation for the Bean/Cowpea Collaborative Research Support Program.
Appendix VIII.2	Dealing with Risk and Uncertainty in Crop Production, a Lesson for Small Farmers by Luis A. Navarro. 1977.
Appendix VIII.3	Don Victor: A Small Farmer in Conta Rica
Appendix IX.1	Update of progress to date. December 22, 1978.
Appendix IX.2	Update of progress to date. January 29, 1979.
Appendix IX.3	Update of progress to date. March 14, 1979.

APPENDICES (cont'd)

INTERIM PLANNING REPORT
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May 15, 1979

I. AUTHORIZATION TO PROCEED WITH PLANNING

The Board for International Food and Agricultural Development, (BIFAD), at its July, 1978 meeting, authorized proceeding with planning of a Collaborative Research Support Program (CRSP) for beans and cowpeas.

Representatives of eleven Experiment Stations concerned with dry bean/cowpea research met in Chicago August 7, 1978. These representatives authorized Michigan State University, acting on behalf of all interested Agricultural Experiment Stations and U.S. institutions, to submit a planning grant proposal to AID. The proposal was submitted August 28, and the planning grant was awarded to MSU, effective October 1, 1978, with Dr. M. W. Adams as the Principal Investigator.

On October 1, 1978, Dr. Donald H. Wallace, bean breeder-physiologist was appointed, until June 30, 1979, to function as planning coordinator, while on leave from Cornell University. With Dr. M. Wayne Adams, Dr. Wallace has begun and coordinated all the planning effort included in this Interim Report.

II. DETERMINING MANIFEST INTEREST IN BEANS/COWPEAS

During the last two weeks of October, 1978 a letter was sent from the office of Dr. S. H. Wittwer, the Director of the Agricultural Experiment Station, to the Title XII representatives of all U.S. institutions eligible to participate in Title XII programs. This letter, a copy of which is attached as Appendix I, asked U.S. institutions with a manifest interest in the bean/cowpea CRSP to so indicate, by responding to the Bean/Cowpea CRSP Planning Office at MSU.

The forty-three institutions that indicated a manifest interest are as follows:

Alabama Agricultural and Mechanical University
University of Arizona
Auburn University
Boyce Thompson Institute for Plant Research at Cornell University
University of California, Davis
University of California, Riverside
Clemson University
Colorado State University
University of Colorado at Boulder

University of Florida
Fort Hays State University
University of Georgia
University of Hawaii
University of Idaho
University of Illinois at Urbana-Champaign
Kansas State University
Charles F. Kettering Research Laboratory
Langston University
University of Miami
University of Michigan
Michigan State University
University of Minnesota
Mississippi State University
University of Missouri
Montana State University
University of Nebraska
New York - Cornell University
North Carolina Agricultural and Technical State University
North Carolina State University at Raleigh
North Dakota State University
Oregon State University
Purdue University
University of Puerto Rico
Rutgers University
Southern University
South Carolina State College
South Dakota State University
Texas A & M University
United States Department of Agriculture
Utah State University
Virginia State College
Washington State University
University of Wisconsin-Madison

The above forty-three institutions listed about 231 scientists as having a manifest interest. This is a minimum number since several additional individuals from several institutions have recently expressed interest in participating. The grouping of these scientists by major areas of scientific discipline is as follows:

Discipline	Number of Scientists Expressing Manifest Interest
Breeding and Genetics	27
Diseases	23
Economists	11
Entomology	10
Food Science and Nutrition	53
Nitrogen - Rhizobium	32
Physiology	25
Production Practices	17
Seed Programs	9
Sociology	10
Soils	6
Weed Control	6
Total	231

Now in nutrition

III. ORIENTATION TRIPS AND ACTIVITIES

A. Visits to the University of Missouri and to USAID-Washington.

Visits to the University of Missouri and USAID-Washington by both Drs. Adams and Wallace occurred, respectively, on October 23-24 and 26-27, 1978. Full reports of these visits are included as Appendices II-1 through II-4. The major concepts learned from the Missouri and USAID visits were:

1. CRSP efforts are to be directed at the poorest LDC farmers; they are to support research that contributes directly to the needs of bean/cowpea programs in the LDCs.

2. There must be a major socio-economic input into the CRSP planning and ultimate plan, which should complement the biological inputs.

3. It is expected that a large part of the expenditures of the CRSP will be spent in the LDCs, perhaps directly by U.S. institutions or as pass-through funds, the expenditure of which is controlled by the collaborating LDC institutions.

4. It is expected that U.S. institutions will contribute from their own financial resources an average of 25% of the expenditures of the CRSP.

5. USAID bureaus and country missions are to work with U.S. educational and research institutions in implementing the Title XII CRSPs.

6. We should develop and defend three alternative CRSP plans. One that is appropriate for each of low, medium and high levels of funding.

7. In conjunction with the planning effort we should prepare a state of the art (SOTA) manuscript that can be published and will meet the needs of that full world-wide audience that may have scientific or policy interests in beans/cowpeas.

B. Developing a Questionnaire Regarding Constraints.

During the Missouri and USAID visits, it was suggested that we develop a questionnaire, for use primarily in the LDCs, to be used in ascertaining the constraints to production and consumption of bean/cowpeas in LDCs. This development was begun by first replacing sorghum/millet in the sorghum/millet questionnaire with beans/cowpeas, followed by also substituting appropriate diseases and insects. The resulting questionnaire was reviewed at MSU. A particularly valuable suggestion came from the Sahel-African Program of the MSU Department of Agricultural Economics. These reviewers considered the list of problems or constraints that this questionnaire asked about to be a mixed listing of problems and solutions.

They suggested that many of the problems, which had been placed on the listing by plant scientists, were problems from the scientists' viewpoint. However, from the viewpoint of the small farmer sitting in the center of his farm, these scientist-suggested problems were really solutions. For example, any aspect of varietal development and plant breeding would constitute a solution to the small farmer's problems. Similarly, entomology research, disease research, and nutrition research are not problems for the small farmer.

After the above feedback about a first version of the bean/cowpea questionnaire, the final questionnaire was developed and is attached as Appendix III. Using generally broad rather than specific statements, this questionnaire attempts to list all possible constraints to bean/cowpea production and consumption, as perceived on the small farm, by the farmer, scientist or extension specialist. The possible problems (constraints) were grouped under six headings:

I. Fertility, Plant Nutrition, Environment
II. Farming Practices and Management
III. Genetic Limitations
IV. Plant Pests - Insects, Diseases, Nematodes, Weeds
V. Utilization and Storage
VI. Socio-Cultural and Socio-Economic Considerations

For each of the above six groupings of problems, a corresponding broadly based, generally non-specific listing of potential solutions was included, to provide some suggestive procedures for solving the problems. Respondents to the questionnaire were asked to add to the constraint list any additional constraints deemed important, to specify the major constraint within each group of constraints, to specify the most serious overall constraints, and to provide their reasoning for these major and most serious constraints on a supplied separate format. This format was common for each problem. It asked the respondent to rank:

1. the severity of the problem
2. the extensiveness of the problem
3. the level of research knowledge about the problem.

Respondents were also asked for their suggestions of the most appropriate solutions for the constraint, and for recommended research to solve the constraint.

C. Visit to Guatemala, Panama, Costa Rica, Colombia, Chile, CIAT and IITA.

Drs. Adams and Wallace visited CIAT and the above Latin American countries, except Chile, between January 23 and February 3, 1979. Dr. Adams proceeded from CIAT on February 3 to visit Chile until February 8. The report of all these country visits and the visit to CIAT is presented as Appendix IV.1. Dr. Wallace visited IITA on February 13-15, 1979, and this report is attached as Appendix IV.2.

The conclusions from these visits are, in summary:

1. CIAT and IITA welcome collaboration and cooperation with U.S. scientists through a Bean/Cowpea CRSP. There is sufficient work for the international centers, U.S. institutions, and LDC institutions, and the differing mandates and capabilities of these institutions are such as to complement efforts of the other institutions.

2. This potential for complementarity comes about because:

   a. The U.S. institutions are most capable of providing the needed basic research and related research-training.

   b. The international centers have a mandate for applied research and are located to make their efforts directly applicable to the tropical environments of the developing countries.

   c. Only the LDC institutions have the capability of assisting the small farmers of the LDCs who alone are capable of increasing bean/cowpea production to solve LDC nutritional needs.

3. Both the U.S. institutions that will function under a Bean/Cowpea CRSP and the international centers already recognize the national institutions of LDCs that have bean/cowpea expertise as their target audience.

4. The LDC institutions need more personnel with M.S. and Ph.D. training.

5. International and regional institutions want assistance from U.S. institutions in the form of basic research. The need of the LDC institutions is for assistance with more applied research.

D. FAO Meeting on Limitations to Production of Pulses.

This meeting was held in Santo Domingo, Dominican Republic, February 19-23, 1979. Dr. Adams attended, along with one additional U.S. person and 61 from the Caribbean and Central American area. The meeting attempted to identify constraints to production of pulses and establish a plan for coordination of efforts on pulses. A report of the meeting is attached as Appendix V.

E. Cooperative Central American Program for the Improvement of Cultivated Food Crops.

This meeting was March 19-23, 1979, and was attended by Dr. Adams and Dr. D. D. Harpstead, Chairman of Crop and Soil Sciences at MSU. D. Harpstead introduced in Spanish the bean/cowpea planning to the bean session of this meeting and distributed a Spanish translation of the questionnaire. A report of the meeting is attached as Appendix VI.

F. Annual Meeting of the Western Region - 150 Bean Project.

This meeting was held at Berkeley, California on December 14-15, 1978. A two-hour breakfast meeting was held on December 15, at which Wallace reported on progress of planning for the Bean/Cowpea CRSP. Dr. John Yohe from USAID also attended this meeting. The participating institutions expressed an interest in being kept up to date via a monthly or near-monthly newsletter. The group in attendance favored preparation of the SOTA as a book, and indicated willingness to support this effort. It appeared that the Title XII Bean/Cowpea CRSP will help to solidify the cooperation on bean research that is desired from the W-150 regional project.

G. Meetings of Cowpea Workers.

Two meetings were held with U.S. cowpea workers to seek their involvement and input into the planning of both the bean/cowpea CRSP and the SOTA. On November 14, 1978, Dr. Wallace met with one cowpea worker from each of the states of Mississippi, Georgia, Alabama and Texas. The first developed outline of the SOTA was discussed, as was the general CRSP planning procedure. Those attending agreed to accept responsibilities for assisting with the SOTA, which assignments were subsequently delayed until the ultimate outline for the SOTA book was developed.

As a consequence of these discussions it was decided that a cowpea workshop could be convened at the Southern Region Meeting of the American Society of Horticultural Science scheduled for February 5, 1979 at New Orleans, Louisiana. At this meeting reports of cowpea activities were heard from Alabama, Arizona, Arkansas, California, Florida, Georgia, Louisiana, Mississippi, South Carolina, Tennessee, Texas, Virginia, and the USDA. This workshop was organized by Dr. Creighton Miller of Texas. It was attended by both Wallace and Glenn Beck of BIFAD, who presented the goals and concept of the Bean/Cowpea CRSP, and responded to questions. It had been hoped that organizing the cowpea workers would be considered, but available time did not permit this.

H. Planning the State-of-the-Art Book.

BIFAD, JRC and USAID incorporated into the Bean/Cowpea CRSP planning contract the preparation of a state-of-the-art (SOTA) manuscript. Our first reponse was to develop an outline and the expectation that the SOTA would be completed by the end of 9 months; i.e., at the end of Dr. Wallace's appointment as full-time planning coordinator. The first draft of an outline was shared with four cowpea scientists in Atlanta, Georgia on November 14, 1978, and tentative assignments were made for responsibility and seeking substantive inputs. It quickly became evident, however, that the scientists being asked for substantive input needed more time allocated. Secondly, we reviewed an attempt at writing a SOTA by a limited number of authors and concluded that we wanted a manuscript with thorough peer input and peer review. Thirdly, we learned that some institutions

were considering publishing their SOTA as books. This concept was presented to and approved by the bean scientists, plus some cowpea scientists, that attended the Western Region-150 bean project regional meeting on December 14-15, 1978 in Berkeley.

Following the decision to publish the SOTA as a book, the outline was modified and extended. It was concluded that the SOTA should emphasize the state of the art of growing beans/cowpeas in LDCs, and this should be compared with the state of the art of growing beans/cowpeas in developed countries. The state of knowledge of all relevant scientific disciplines should also be given with comparisons and contrasts given as needed for beans vs. cowpeas and LDCs vs. developed countries.

The first SOTA outline developed with intention of publication as a book was distributed to all scientists with manifest interest as part of the December, 1978 update to institutions with manifest interest (Appendix IX.1). The previous outline version is attached as Appendix VII.

IV. DETERMINATION OF CONSTRAINTS

A. Deviations from Original Plan for Determining Constraints.

As requested by USAID, BIFAD and JRC as planning began, a near-first assignment was to delineate the constraints to bean/cowpea production and consumption. A list of constraints was to be developed from preliminary visits to the LDCs. The listing was then to be reviewed at a workshop in the LDCs and priorities applied to the constraints as recommended by LDC scientists and administrators. The LDC-approved list of constraints and established priorities was to be used as the problem areas around which proposals would be requested.

We have deviated from following that procedure of constraint identification/constraint prioritization/request for CRSP proposals for the reasons disclosed in sections IV.B, C, and D which follow.

B. Contributions of the Questionnaire Development and SOTA Development to Constraint Determination.

Developing the questionnaire in combination with the intention of using it on the first trips, required time and delayed planning of the first trips. It was felt that the first trips should include CIAT AND IITA, to ascertain their interest, solicit their input into the planning process, and to attain agreement with them relative to the ultimate goals and objectives of the bean/cowpea CRSP.

Development of the questionnaire and simultaneous development of the SOTA outline made major contributions toward delineating the constraints that the CRSP should work to solve. In retrospect, it is well that we did not go to CIAT, IITA and some LDCs in the first weeks of the planning effort.

Had we done so, our approach would have had to be: Please help us orient the planning and establish its goals. Because we developed both the questionnaire and the SOTA before our first trips, we were able to use the approach: The questionnaire on constraints and the SOTA outline represent a tentative plan--Can you suggest improvements, modifications or major alterations? Are you supportive of our thinking to date, of our planning? Can you improve on the plan?

With respect to the constraint to bean/cowpea production and consumption, the questionnaire provided excellent orientation prior to visiting LDC institutions. It focused in on small farmers' problems. Scientists' problems, except deficiency of scientific manpower in LDCs, were considered as related to achieving solutions, not as the real problem. The questionnaire approached a near-total listing of all problems relating to beans and cowpeas. The categorization of these about 52 problems into six groupings provided general focus relative to the problems and indicated the discipline(s) that might be most involved in solving a problem. The groupings were as listed on page 4.

The major benefit of the questionnaire was the broad outlook and focus that it provided for scientists that visited LDCs or discussed the bean/cowpea CRSP with other scientists. The questionnaire attempted to list all possible constraints. It asked for ranking of the relative importance or priority of constraints, but did not suggest any such ranking. Almost all scientists who attempted a direct response to the questionnaire replied in effect, I can't speak for all of these relevant areas of scientific disciplines, but for my specialty the rankings are as follows. Because of the numerous relevant disciplines and their interactions, few if any people felt comfortable about answering the entire questionnaire. Also, because answering it would generally have required too much time, the questionnaire was used by those of us visiting as our guide to questions that should be asked of LDC scientists and administrators. It was never administered as a formal questionnaire. It was an essential guide for those charged with the responsibility of determining and prioritizing constraints. A copy of the questionnaire was previously presented as Appendix III. It was translated to both Spanish and French for use in Latin America and West Africa, respectively.

C. Constraint Determination Using the Questionnaire.

The listing of about 52 possible constraints to bean/cowpea production and consumption, and their general categorization, as included in the questionnaire is given on page 3 of Appendix III. For the discussions in LDCs the number of 52 possible constraints was enlarged to about 80, which are given on pages 8-10 of the Guide to Proposal Preparation (Appendix VIII.1). In addition to the six constraint-area groupings listed on page 4 (App. III), the 25 problems added as constraints to bean/cowpea production and consumption resulted in the broad groupings of:

VII. Research Capability in LDCs
VIII. Extension Capacility in LDCs.

The 80 listed possible constraints are considered as a near-total listing of constraints to bean/cowpea production and consumption. Those constraints that are generally prevalent in most LDC areas are designated as being of general concern in all LDCs (pages 8-10 of Appendix VIII.1), this being the only indication of prioritization that has as yet been assigned to the many possible constraints.

D. Workshop on Constraints.

The major reason the workshops on constraints were not held before requesting proposals are as follows (see also Appendix IX.4):

1. FAO held a workshop on the constraints to legume-grain production in Latin America during February, 1979 at Santo Domingo, Dominican Republic. Papers on constraints were given at this workshop by a representative from most Latin American countries. It did not seem appropriate to hold a quickly scheduled meeting on constraints, immediately after this one. Dr. Adams attended this meeting (see III.D and Appendix V).

2. It quickly became evident that an effective workshop in Africa could not be brought together with a few weeks' notice. IITA indicated at least six months and preferably a year advance notice is needed to facilitate required visas, airline scheduling, etc. for African scientists.

3. It seemed more profitable to accept the CIAT and IITA invitations to schedule our workshops in conjunction with bean and cowpea meetings already scheduled (see X.C and Appendix IX.4).

V. DETERMINATION OF TRAINING NEEDS

Both research capability and extension capability in LDCs are general constraints to bean/cowpea production and consumption (IV.C and page 10 of Appendix VIII.1). Since trained scientists for research, extension, and also teaching, are limiting, the Bean/Cowpea CRSP must include research-training as a major component of its activities. Training of personnel for research will assist in strengthening the extension and teaching capabilities.

VI. GUIDE FOR PROPOSAL PREPARATION

A Guide for Proposal Preparation was considered essential for the purposes of:

1. Facilitating a uniform format of proposal preparation, so that the proposals can be easily evaluated and compared.

2. Informing principal investigators and reviewers of the criteria by which the proposals are to be judged.

3. Informing prospective principal investigators of the constraints to bean/cowpea production and consumption that should be researched.

4. Informing scientists from the disciplines of plant and soil sciences and also from the disciplines of socio-economics that there is a role for all in achieving the goals of the bean/cowpea CRSP.

5. Alerting biological and socio-economic scientists that they should plan interdisciplinary collaboration in achieving the CRSP goals.

6. Informing these scientists that the ultimate objective is improvement of the human dignity and welfare of the small farmers and poor people of the LDCs. The Guide for Proposal Preparation is presented as Appendices VIII.1, VIII.2 and VIII.3. Appendix VIII.1 presents the constraint considerations, evaluation criteria and format requirements for proposal preparation.

VII. RELATIONSHIPS OF FARMING SYSTEMS AND SOCIO-ECONOMICS TO BEANS AND COWPEAS

Descriptions of decision making considerations, life-style and farming as practiced onthe small farms of LDCs, as described by research at CATIE, Turrialba, Costa Rica, were included with the Guide to Proposal Preparation. They are also included herein as Appendices VIII.2 and VIII.3. It is emphasized that about 85% of beans and cowpeas produced in LDCs are grown in association with one or more crops. Beans and cowpeas are mostly subsistence foods. These crops are not grown to maximize yields. They usually get less than their share of fertilizer and other costly inputs. When such inputs are available, beans and cowpeas may be relegated to even less productive land and to reduced area. As an illustration of the human judgment involved, experience has demonstrated that the tall stalks of sorghum may have more value to small farmers for building fences than does improved yield of dwarf sorghum plants.

It is apparent that improving the human dignity and satisfaction of small farmers of the LDCs, and simultaneously improving availability of high protein plant foods, such as beans and cowpeas, require improved understanding of the small farmer as a rational individual, of the values and aspirations upon which he bases his decisions, and of the human and judgmental basis for his complex farming systems The biological scientist must learn from the farmer. He must learn to understand the farming system as a procedure selected to maximize human satisfaction under existing conditions. He must have help from socio-economists in order to acquire the needed understanding of the farmer he intends to help, and of his wife and children and their aspirations.

VIII. INTEGRATING THE SOCIO-ECONOMIC DISCIPLINES

Necessity to incorporate socio-economics into the final bean/cowpea CRSP was strongly emphasized from the beginning by USAID, AID and JAC, as was need for collaboration between these very diverse disciplines. These disciplines have

not generally functioned jointly in the past, so the number of scientists is limited that have insight as to how they can collaborate in support of the bean/cowpea CRSP objectives.

Our first efforts to get guidance in this area suggested that most people with joint biological-socio-economic interests are currently graduate students. Some attempts resulted in the biologists and socio-economists explaining their disciplines to each other over an extended time, with neither comprehending the viewpoint of the other. Since our first contacts at Michigan State University with Dr. George Axinn, Assistant Dean of the International Studies Programs, and with Dr. Carl Eicher of the Department of Agricultural Economics, both have worked vigorously to inform the Bean/Cowpea Planning Office of their interest, and to involve other socio-economists. Both have much LDC experience relative to small farmers.

Dr. Stillman Bradfield, an economic anthropologist from Kalamazoo College, Kalamazoo, Michigan, who previously worked with small farmers at CIAT, was the first socio-economist to effect good communication with us. He has linked his economic-anthropology interest with interest in small LDC farmers acquired as a consequence of his father's (Richard Bradfield) initiation of international agriculture work in Mexico and his post-retirement work with multiple cropping at IRRI. As a consequence he was invited to be one of the editors of the SOTA.

IX. TEAM VISITS TO DEVELOPING COUNTRIES

As part of the orientation (section III), Adams and Wallace visited Guatemala, Costa Rica, Panama and Colombia, and Adams visited Chile. Adams visited the Dominican Republic while attending an FAO meeting on constraints to legume grain production, and Adams and Harpstead (III.D) visited Honduras while attending the bean sessions of the Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alementicios (Appendix VI).

Four additional three-person teams were also established as listed below. Reports of these four visits to developing countries are not included here because one has just returned, two are currently in progress, and one will depart next week. The four locations, the respective countries and the team members follow:

South America	Team Members
Colombia Ecuador Peru Brazil	Dora Lodwick - Sociologist Michigan State University David Yoemans - Community Development Washington State University Donald R. Wood - Agronomist Colorado State University

These travels were made April 21 - May 8, 1979.

Caribbean and Mexico	Team Members
Dominican Republic	Stillman Bradfield - Economic Anthropologist
Haiti	Kalamazoo College (Michigan)
Jamaica	Lawrence Copeland, Seed Programs
Barbados	Michigan State University
Guyana	
Trinidad	Vicky Marcarian, Breeder
Mexico	University of Arizona

West Africa	Team Members
IITA	C. Jack de Mooy - Agronomist
Nigeria	Colorado State University
Senegal	Richard L. Fery - Cowpea Researcher
Upper Volta	USDA/SEA (Charleston, S.C.)
Niger	
Cameron	Edouard Tapsoba - Agricultural Economist
France	Upper Volta, Michigan State University Ph.D. candidate

East Africa	Team Members
Kenya	Glen Cannell - Soil Scientist
Tanzania	University of California-Riverside
Malawi	Wilfred M'Wangi - Agriculture Economics
Botswana	Kabete Campus, Nairobi, Nigeria
Zaire	
IITA	Matt Silbernagel - Pathologist-Breeder
	USDA/SEA (Prosser, Washington)

The major objectives of these teams are as follows:

1. To identify the institutions that may become collaborators in the Bean/Cowpea CRSP, and to provide a description of these institutions, their personnel and their activities.

2. To explore further all possible constraints to bean/cowpea production and use and to discern possible LDC prioritization of such constraints and recommendations for solutions.

X. COMMUNICATING WITH BEAN/COWPEA INSTITUTIONS

A. U.S. Institutions.

The request for statements of manifest interest was sent to all institutions that are eligible to participate in Title XII activities (see section II). All subsequent communications were sent only to the responding office from those U.S. institutions that indicated manifest interest. For the first two such mailings only, a copy was labeled and sent for each scientist with manifest interest.

To fulfill the request (III.F) for a newsletter, an update of past, current and future planning activities and changes of plans were simultaneously sent to all these institutions when any general communication was mailed. Updates were mailed December 22, 1978, and January 20, March 14, and April 1, 1979. These updates are attached, respectively, as Appendices IX.1, IX.2, IX.3, and IX.4.

B. LDC Institutions.

All communications with LDC institutions were through USAID. Copies of two general telegrams to LDC institutions, through USAID Missions, are all attached as Appendices X.1 and X.2.

A copy of the entire April 1 mailing to U.S. institutions, including the update (Appendix IX.4) and Guide for Proposal Preparation (Appendices VIII.1, VIII.2, and VIII.3) was sent from the planning office on April 5 to LDC institutions through USAID. A telegram (Appendix X.2) was simultaneously sent out requesting a broad statement of the subject-matter areas that the LDC institutions are interested in for collaboration. It is planned that summaries of all Bean/Cowpea CRSP proposals will be forwarded to the LDCs for their feedback (see page 18 of Appendix VIII.1).

C. Building Acquaintances between LDC and U.S. Scientists.

It is apparent that person to person and institutional acquaintances between LDC scientists, particularly those of the national bean/cowpea programs, and U.S. scientists are limited. This should be remedied as quickly as possible.

As discussed briefly in section IV.D, both CIAT and IITA have invited us to hold a seminar relative to the Bean/Cowpea CRSP, either before or after their fall of 1979 workshops, which are scheduled at the respective international centers on November 12-15 and October 22-26. The workshop at IITA is on insect problems of cowpeas, and the one at CIAT is on disease problems of beans.

As many LDC scientists and U.S. scientists as appropriate and fundable will be invited to the IITA and CIAT workshops and to the attached bean/cowpea seminars. U.S. scientists will be able to meet potential LDC collaborating scientists at the workshop and seminar, and will also be encouraged to visit the institutions of such potential collaborators. We have yet to determine how best to incorporate cowpea interests in Latin America and bean interests in Eastern Africa into the two seminars. An alternatively located seminar could benefit East Africa. The tentative agenda for the seminar is as follows:

1. Review of research support/collaboration requested by developing country institutions.

2. Review of research support/collaboration requested by international and regional institutions.

3. Introduction to the: Plan for the Bean/Cowpea CRSP.

   a. Discussion and approval of constraint listings and priorities.
   b. Review of research proposals received from U.S.

4. Interface between planning and implementing the Bean/Cowpea CRSP (Growing pains and objectives of the next 1, 2 or 3 years.

XI. REMAINING PLANNING ACTIVITIES

Activities of the planning office that are yet to be completed as of May, but which should be completed before January 1, 1980 are as follows:

		To be done by
Before May 15, 1979	Obtain final commitments of reviewers and advisors.	D. H. Wallace
	Seek a publisher for the SOTA book.	D. H. Wallace
	Get commitments of peer reviewers and panel advisors.	D. H. Wallace
Beginning May 15	Continue effort to integrate socio-economic disciplines.	P. Barnes-McConnell
	Develop efficient procedures for reviewing proposals.	
	Receive proposals and assign a number.	
	Acknowledge receipt of proposals.	
	Disburse proposals to peer reviewers, peer review panel advisors, other specialists.	
	Obtain final commitments of reviewers and advisors.	
	Finalize arrangements for reviewer participation and reimbursements.	
	Finalize arrangements for reviewer transportation.	
	Receive expense statements of travel teams and arrange for reimbursement.	
	Receive expense statements of reviewers and advisors and arrange for reimbursement.	
	Incorporate more socio-economics into SOTA.	P. Barnes-McConnell

		To be done by
Beginning May 15 (cont'd)	Incorporate more cowpea input into SOTA.	D. H. Wallace
	Receive input from LDC institutions re their interest in Bean/Cowpea CRSP.	
	Examine budget - Determine adequacy of funding and project future needs.	
	Assess publisher options for SOTA book.	D. H. Wallace
	Set up first peer review meeting.	
	Assemble peer review summary for use by panel.	?
June 25-26	First peer review meeting - conducted by BIFAD. !!!	BIFAD Representative
	Assemble minutes from peer review session.	
Beginning June 27	Notify all respondents of status of their proposals.	
	Request proposal modifications.	
	Request additional proposals and involvement as needed. Socio-economic Cowpea Bean	P. Barnes-McConnell
	Receive modified proposals.	
	Provide proposal summaries to LDCs via USAID.	
	Provide updated proposal summaries to LDCs via USAID.	
	Distribute modified proposals to reviewers.	
	Make final arrangements for commitment of reviewers and advisors and for their reimbursement.	
	Finalize publishing arrangements for SOTA book.	D. H. Wallace
	Develop tentative plan at each of 3 levels of financing.	
	Examine budget. Determine adequacy of funding.	
	Distribute a draft-description of the Bean/Cowpea CRSP management functions.	
	Invite LDC participants to workshops.	

		To be done by
Beginning June 27 (cont'd)	Request additional funding for workshops-seminars, if needed.	
	Receive LDC responses re interest in proposals.	
August 27-28	Set up second peer-review panel meeting.	?
	Second peer-review panel meeting.	BIFAD Representative
	Guide peer-review panel to development of plan.	
Beginning August 29	Assemble and distribute minutes of peer-review meeting.	
	Notify all proposal respondents of status of their proposal.	
	Complete and distribute draft of Bean/Cowpea CRSP plan, including description of responsibilities of the management entity.	
	Request institutional statements re interest in serving as management entity.	
	Arrange for Institutional Board and Technical Committee meetings.	
	Set up U.S. scientist-LDC scientist visits before or after workshop-seminars.	
	Set up Institutional Board meeting to consider draft of plan and selection of management entity.	
	Set up Technical Committee meeting to consider plan, priorities, coordination, balance. Technical Committee meeting conducted by	?
October 8	Institutional Board and Technical Committee meetings - conducted by BIFAD. No!!	BIFAD Representatives
Beginning October 9	Assemble and publish minutes of Institutional Board and Technical Committee meetings.	
	Finalize arrangements for participation and travel to IITA workshop and bean/	

		To be done by
Beginning October 9 (cont'd)	Finalize arrangements for participation and travel to CIAT workshop and bean/cowpea seminar.	
	Finalize agendas for seminars.	
	Encourage, finalize, and coordinate all appropriate travel to LDC institutions - in conjunction with seminars.	
October 19 or 25	Seminar at IITA - Conducted by	These should be designated as someone's specific responsibility!!
November 16, 17	Seminar at CIAT - Conducted by	
Beginning November 18	Set up Board of Directors and Technical Committee meetings if necessary.	
	Assemble information and finalize and distribute the final Bean/Cowpea CRSP plan.	
December	Receive expense statements and arrange reimbursement.	
	Assemble final report of the Planning Office.	

STATE-OF-THE-ART MANUSCRIPT

By May 15	Seek publisher for SOTA.	D. H. Wallace
June 1	Receipt of outlines of substantive inputs.	D. H. Wallace
September 1-30	Receipt of substantive inputs for SOTA.	D. H. Wallace
March 31, 1980	Completion of first draft of SOTA.	D. H. Wallace M. W. Adams S. Bradfield
June 30, 1980	Reviews of first draft of SOTA completed.	D. H. Wallace
March 31, 1981	Revised draft of SOTA ready for publication.	D. H. Wallace

XII. STATE-OF-THE-ART BOOK

The outline as it currently stands for the SOTA is attached as Appendix XI.1. In reverse order of their development, earlier SOTA outline versions are attached as part of Appendices IX.1 and VII.

The current version presents four distinct sections for most of the 21 chapters. These sections are always: A. Beans in LDCs, B. Beans in Developed Countries, C. Cowpeas in LDCs, and D. Cowpeas in Developed Countries. The outline is segmented to this extent to facilitate receiving substantive input from bean and cowpea workers who are almost always different individuals from different locations. The final writing of the book will amplify and blend these aspects to the extent that current knowledge and importance dictate. Also, each biological chapter will conclude with a summary statement that briefly presents the socio-economic concepts that relate to or impact upon that plant biology component, and each socio-economic chapter will end with a summary statement of the relevant and impacting plant biology or farming system considerations.

Using the form letter attached as Appendix XI.2 plus the USAID provided Guidelines on a Methodology for Preparing State-of-the-Art Analyses attached as Appendix XI.3, Dr. Wallace has requested written substantive input with pro and con arguments and citations for essentially all outline aspects for beans. Many requests for substantive input relative to cowpeas remain to be finalized. Assistance in finalizing these requests will be provided to Dr. Wallace by the three SOTA co-editors having cowpea expertise. Except for the overlap into socio-economics that will come from written substantive input on farming systems, the socio-economic input has as yet been poorly developed.

Progress is being made toward obtaining ample input into the SOTA from socio-economists. This progress was accellerated with a meeting held April 18 and attended by Drs. Adams and Wallace, Drs. George Axinn, Carl Eicher, Linda Nelson and Pat Barnes-McConnell of MSU sociology and economic departments, and by Dr. Stillman Bradfield of Kalamazoo College, Kalamazoo, Michigan. Drs. Barnes-McConnell and Bradfield will function as co-editors of the SOTA.

Eight co-editors have been enlisted to write the SOTA, with the following overall responsibilities:

Co-editor	Institutional Represented	Crop or Discipline Represented	Responsibility
D. H. Wallace	Cornell U. & Michigan State U.	Bean breeding/ physiology	Coordination of CRSP planning, Master co-editor of SOTA
M. W. Adams	Michigan State U.	Bean breeding	Principal investigator of CRSP planning, Co-editor of SOTA
P. Barnes-McConnell	Michigan State U.	Urban development & family life	Asst. coordinator of CRSP planning, Co-editor of SOTA for socio-economics
S. Bradfield	Kalamazoo College	Economic anthropology	Co-editor of SOTA for socio-economics
P. Graham	CIAT	Beans/ microbiology	Co-editor for beans and LDCs.
P. Goldsworthy	IITA	Cowpeas/ physiology	Co-editor for cowpeas and LDCs.
W. W. Hare	Mississippi State U.	Cowpeas/ pathology	Co-editor for cowpeas
C. R. Miller	Texas A&M College	Cowpeas/breeding/ physiology	Co-editor for cowpeas

It is expected that the SOTA, which should be finished in 1981 (see Appendix IX.4) will serve as the benchmark from which the realized progress of the Bean/Cowpea CRSP will be measured. The primary reason for the extensive substantive input by peers, followed by extensive peer review, is to guarantee acceptance of the SOTA as the best available benchmark relative to beans and cowpeas. It is recommended that an update SOTA be developed after about 10 years.

XIII. COORDINATION OF PLANNING

Dr. D. H. Wallace has functioned as full-time coordinator from the beginning of planning activities in October until submission of this interim report. He did attend to his bean research duties at Cornell during early October, has been at Cornell on a near monthly basis for one or two days, and will spend two to four weeks during April-June attending to planning and planting his crops for the 1979 growing season. Thereafter, he will continue as Master Co-editor of the SOTA.

Dr. Pat Barnes-McConnell, while taking a sabbatical leave from duties in the Department of Urban Development at MSU, will be employed to function on a half-time basis as Assistant Coordinator of Planning. With her expertise

being in the socio-economic area, she will work to bring more socio-economic input into both the planning for the CRSP and writing of the SOTA. Dr. M. W. Adams has assisted Dr. Wallace, functioning as the Principal Investigator for planning of the Bean/Cowpea CRSP, and as such he will continue to assist Dr. Barnes-McConnell.

XIV. NEED FOR LANGUAGE CAPABILITY

As the planning has proceeded, we have become increasingly aware that U.S. scientists that participate in the CRSP and the CRSP management should achieve a capability to communicate with their LDC collaborators in their language. We must maximize in all possible ways our learning from LDC counterparts and LDC farmers.

MICHIGAN STATE UNIVERSITY

AGRICULTURAL EXPERIMENT STATION
OFFICE OF THE DIRECTOR
AGRICULTURE HALL

EAST LANSING • MICHIGAN • 48824

Appendix I

October 24, 1978

Dr. James H. Anderson, Dean
College of Agriculture and Natural Resources
Agriculture Hall
Campus

Dear Dean Anderson:

The Board for International Food and Agricultural Development (BIFAD) and the Agency for International Development (AID), under provisions of Title XII of the International Development and Food Assistance Act of 1975 and in accordance with recommendations made by the Joint Research Committee, have given priority to dry beans/cowpeas for a Collaborative Research Support Program (CRSP). Michigan State University (MSU) has contracted to plan and submit a Collaborative Research Support Proposal.

Representatives of eleven Experiment Stations concerned with dry beans/cowpeas research met in Chicago August 7, 1978. These representatives authorized MSU, acting on behalf of all interested Agricultural Experiment Stations, to submit a planning grant proposal to AID. The proposal was submitted August 28, and the planning grant was awarded to MSU, effective October 1, 1978. Dr. Donald H. Wallace, now at MSU and on leave from Cornell University, has been appointed until June 30, 1979 as the coordinator. Dr. Wallace and Dr. Wayne Adams, MSU bean breeder, will implement the Dry Beans/Cowpeas planning effort.

The major components of the planning process follow:

I. Identify the research institutions with a manifest interest in research on dry beans/cowpeas.

II. Identify the principle constraints in the production, marketing, transportation, storage, processing, nutritional value, and utilization of dry beans/cowpeas in the developing countries.

III. Prepare a state-of-the-arts report and a summary of the most urgent research needs in developing countries pertaining to dry beans/cowpeas. Distribute the report and the summary to the research institutions identified as having a manifest interest in this research, and invite an expression of their interest in participating in such research.

IV. Recommend to the Joint Research Committee of BIFAD the areas of research to be supported by the CRSP, and the institutions appropriate to conduct that research, within the areas mentioned above.

We ask that you respond on behalf of your institution as follows:

A. Does your institution have a "manifest interest" in the research program? Specifically, is this research interest in the areas mentioned in II. above? Is there an intent to continue such research?

If the answer to A. is yes:

1. Will you identify the scientist(s) in your institution in each area mentioned in II. above that relate(s) to your interest? Please provide both mailing address and phone number. Our first contact with these scientists will be a request for their assistance in identifying problems or constraints.

2. Please provide us with tangible evidence of your "manifest interest". We cannot manage large volumes of materials. We do not want to place limits by specifications. A listing of research projects by title, giving objectives; reports of research completed; the names of scientists involved are appropriate.

B. For each scientist, and/or for your Station, cite activities in developing countries.

C. Does your institution have social scientists (Agricultural Economists, Rural Sociologists, or Human Nutritionists) with academic or research and international experience constituting expertise that is particularly applicable to the Title XII Dry Beans/Cowpeas Collaborative Research Program? Please identify social scientists and nutritionists, and document their experience, with expertise applicable to determining the social and cultural constraints and economic and transportation constraints that would restrict increasing the production and usage of dry beans and cowpeas in the developing countries.

We have agreed to accomplish this mission in the shortest possible time, and have a tight schedule. A reply within 10 days of the date of this letter will be appreciated. To accommodate the schedule with which we are working, a no response by November 20 will be treated as a negative response.

Your help in this project will be greatly appreciated. If there are any questions, please call me or Dr. Wallace, (517)355-4693.

Your responses should be addressed to:

Dr. D. H. Wallace
Dry Beans/Cowpeas Planning Coordinator
Department of Crop and Soil Sciences
Michigan State University
East Lansing, Michigan 48824

Sincerely,

S. H. Wittwer, Director
Assistant Dean, College of Agriculture
and Natural Resources

SHW:ns

PLEASE BRING THIS LETTER TO THE IMMEDIATE ATTENTION OF ALL APPROPRIATE DEPARTMENTS AND/OR POTENTIAL RESEARCH PARTICIPANTS REQUESTING THEIR IMMEDIATE RESPONSE.

VISIT TO THE UNIVERSITY OF MISSOURI

DATE: October 23, 1978

VISITORS: Wayne Adams, Don Wallace

MISSOURI STAFF VISITED: Dr. Wendell McKinsey Agricultural Economics, Associate Dean Fred Mann, Agricultural Economics International Agricultural Development, Rex Campbell Rural Sociologist with international experience, Homer Kiehl, Dean, Dave Sleeper, Plant Breeder, Ed Runge, Chairman Department of Agronomy, Herb Lineburger Rural Sociologist, A. Keaster Entomologist, Marion Fields Nutrition, Milton Boehlman Plant Breeder with much international experience, Ed Vaughan Sociology Department Chairman.

Communication with Participating Scientists

The term "Participating Scientist" is now preferred over Principal Investigator. We were advised to send communications to home economics, nutrition and other units. In fact, all communications should be sent to the participating scientists as much as possible, Department Chairmen should receive the early communications. This is because the communications often fail to get from the Dean's office or the Director of Research office to the participating scientists. Communication to as many as possible should eliminate the comments: I didn't hear about this. Communications should also be entered into monthly and weekly bulletins of various groups.

International Centers

All international centers working on the crops involved with the CRSP should have a liaison representative who attends all of the major meetings of the program planning effort. Preferably, this should be one person with continuing participation. Opinions vary as to the degree of independence between the international centers and the CRSP program. The thought predominates, however, that the CRSP program should be independent, or largely independent of the center program. Clearly, the CRSP should have opportunity to independently develop its own linkages with programs in the national countries.

Pass Through Moneys

This is money which will be given to the U.S. institution to be passed on to the collaborating national institutions. It is designed to facilitate active effort and research by the collaborating national institutions. This is so that they can uphold their end of the collaborative effort. Flow through money ties in very closely with the collaborative research support program concept.

The Collaborative Research Support Program Concept

Title 12 is intended to give an international dimension to the programs of U.S. universities. It is intended to do so on a continuing basis, so long as a

program is productive in an international way. Title 12 funding is not intended as a substitute for moneys lost, or for doing more of the same things that institutions are doing for their state or U.S. objectives. The building of linkages between the participating U.S. institutions and national institutions in developing countries is basic to the concept. The pass through money is to facilitate such linkages. One of our major tasks is to inform the potential participating scientists and institutions of the CRSP concept. Most of the research proposals received for the sorghum millet program did not adequately consider the international activity component. This indicated that they did not understand the CRSP concept. Selling the concept, defining it thoroughly and assisting potential scientists and institutions to understand it must be a major objective of the planning. This defining and selling effort must begin with the first communications.

US/AID Technical Regional Bureaus

There is a Latin American bureau headed by John Balis. There is an African bureau headed by Bill Johnson. It is important that we develop contact with these bureau heads at the beginning of the planning effort. They do want an involvement in determining the program and, in particular, the participating national agencies. There are also regional bureaus for Asia and the Near East, but we may not be involved with these.

Crop Production vs. Sociology Aspects

Most of the responses will be by institutions with programs for the agronomic side. ICRISAT has a strong social science program built into its activities. Any group must recognize the human limitations to achieving research and extending the implementation to the farmers. This is particularly true for peasant farmers.

Democratization

One to three good knowledgeable persons plus an advisory group seems better than the committee approach. Missouri's approach was too democratized. Latent benefits from the democratic procedure, on the other hand, were one. It started much dialogue and interdisciplinary interaction on the Missouri campus. Creditability of the planning comes in the long run.

Interactions with US/AID

John Yohe was the liaison for AID doing 80% of the planning effort at Missouri. In working with AID it becomes necessary to work with sliding deadlines.

The Questionnaire

Everyone agreed that the questionnaire could undergo some improvement. They also agreed that it does not really give the desired quantitization when all of the

scores are added and averaged. However, the questionnaire did have real merit. It provided a unity of approach at each location and by each visiting team. The questionnaire could be left with respondents overnight. Probably the best results were obtained through informal discussion, using the questionnaire format as a procedure. After each such session the answers acquired were transcribed onto tape that evening. The best information relative to constraints was obtained from a few well experienced people. There is much merit in making the site visits because what you hear is different from what you see. Observation of facilities, ongoing activities and departmental leadership provides considerable insight of institutional capability and support for the potential participating scientist. All institutions have pride, which adds to the merit of seeing rather than only hearing. The team members would not go without using the questionnaire. There should be an agronomist and a social scientist on each team. Two or three should visit all locations. Some institutions put on, show many graduate students, and otherwise put forth snow jobs. Comparison among institutions is the major thing to look for. Also, look for people, determine the kind of department head and the facilities and equipment available.

Administrative Entity

The Administrative Entity must have power to control the budgets. Budgets should be reviewed on an annual basis. This means that there should be an annual review of each program by a constant group other than the advisory committee. Such groups might consist of three people including one from an LDC, one from international centers, ETC. A primary function of the Administrative Entity is to strive for integration complementation among the participating scientists and their activities.

More Relative to Questionnaire and Site Visits

It was considered meritorious to have an administrator or department chairman on each visiting team.

Criteria for Judging Responses

More effort should be made at informing respondees of the criteria that will be used in judging their responses. This would be particularly true for judging the proposals for research that will ultimately be included in CRSP.

Advisory Groups

Try to get a good advisory group to stay through the whole process.

Basic vs. Applied Research

There should be some basic research. However, it is more difficult to get LDC cooperators. Nitrogen fixation was such a basic research consideration for the sorghum millet program.

The State of the Arts

It is to be sure that the scientist will not deal with an esoteric unworkable solution. It is to determine what changes can be brought about. It is to determine the package of foods that go together in the diet, and to determine what is the complete diet of the people. It is to determine the social and class views and attitudes of the people, and to determine if they will feed the sorghum, millet, beans or cowpeas to the chickens.

2. The role of the social scientist is to determine the role of beans in the larger social system. What are the roles of women vs. men vs. children in the production, utilization, marketing, ETC of the crop. The role is to define and classify the agricultural economy. Does it include a marketing and monetary system? The role is to determine the factors that must be considered for bringing about change within a given time frame.

3. A role for the social scientist is to consider the constraints of change. To consider the availability of inputs that will be required for a given change mechanism. To list these inputs.

A list of rural sociology sections or departments, with the relative ranking of international activities is as follows: Cornell, Missouri, Wisconsin, Iowa State, Texas A & M, Ohio State, Michigan State, Kentucky, and Penn State. Programs in rural sociology must be developed. We must start with the people currently available who do not have ongoing international programs.

Funding

For every dollar fed into the program by the Title 12--US/AID source, the state must feed 33¢ into international agriculture development.

Question

Can pass through money go to Brazil, ETC that is, to LDC's? Are the 1890 institutions on our list?

Travel for Site Visits

As a benefit to the scientists that traveled, they were permitted to visit institutions and locations of their choice, provided it could easily be worked

into the airline ticket required for the sight visit, or achieved with minimum additional expense. This provided a number of young staff members with the opportunity to get acquainted with their peers at other institutions. It provided them with the opportunity for foriegn travel. It brought them to the attention of other staff members on the campus. The young staff members who had these experiences were most pleased with this opportunity.

Additional Recommendations

1. Put someone in charge and keep them until the task is finished.

2. Get a meaningful set of guidelines. Get input from all possible sources. Get the state of the art statement completed early. Get proposals from all institutions anywhere in the world where work may be done--this was the original guideline but it was not followed through totally. Look at all aspects of the crop. The sight visits gave mostly negative responses to the questionnaire, but the sight visitors could not get along without it.

Training by the International Centers

They train at the technical level. They get good workers but who don't know what to do next when the data are collected.

Training by the CRSP Program

This should be an important component of the program. There is much opportunity for training graduate students. Emphasis should be on academic training at U.S. institutions with opportunity for research at the country and institution of the student. This is the proper role for our universities. The view was expressed that the foundations are looking for a new mode of operation, that the international centers have inserted themselves too much into the work rather than letting the people of the countries do it themselves. We should definitely encourage the development of the national programs. Provided consultants should be used for short periods of time.

The view was expressed that nutrition and sociology were very much inundated by the agronomic and crop production groups. It is important that surveys be conducted to find out what people do and what they will do. The old philosophy was "I know nothing, you know it all." The new, Title 12 philosophy is "We have a problem." Fermentation and related procedures should be used to develop better nutrition from the available foods.

Development of Linkages

The development of linkages with the international centers was delayed by Missouri. This should be done earlier in the future. The delay of developing linkages also delayed the planning for the use of flow through money.

Insect Problems

Sorghum and millet did not have a large number of insect problems. Those that did exist were usually interconected with plant pathological problems.

Some General Impressions

1. AID missions are very anxious that money not be spent in the U.S. for U.S. objectives.

2. The developing countries are saying please don't send graduate students and/or incompetent staff.

3. The developing countries have much interest in bringing students here to the United States for training: they prefer the research to be done in the home country.

4. Developing countries are not anxious for basic research, it is developing the application that is needed. More demonstrations are needed.

5. The developing countries are tending to bypass the illiterate populations, so the country as a whole is not profiting.

6. Senigol and Nigeria have much resources. Niger, Chad, and Sudan are the least organized with the most need.

7. There is concern in Washington of the unity of AID regional programs vs. the Title 12 program. The developing countries don't have this concern. They are looking for comradery, fellowship, colleagueship.

8. It is unfortunate that the proposals, including those accepted for the sorghum millet act are either production or sociology. It should be that the sociologists and the production people are working together on the same projects.

9. Everyone has ignored the marketing problems necessary for benefiting the poorest of the poor. The people do not live in a money market economy. The governments maintain low prices for the benefit of their city people (government workers).

10. The people are suspicious of the extension officers, because extension has been the enforcer of government policies.

11. Constraints exist on a local basis. They do not exist across the entire geographic region. We should concentrate on the constraints as they actually occur.

12. There is excessive turnover in the AID missions which results in relatively unstable policy eliminating from these sources.

MISSOURI VISIT, TITLE 12 DISCUSSIONS

These discussions took place at the University of Missouri on Monday and Tuesday, October 23 and 24. The following individuals were present: Dr. Wendell McKinsey, Dr. Fred Mann, Dr. Ed Runge, Dr. Herb Lineburger, Dr. Rex Campbell, Dr. Dave Sleeper, Dr. J. M. Poehlman, Dr. Marion Fields, Dr. A. Keaster.

The following specific points were raised and discussions held concerning them.

1. It was emphasized that the International centers should maintain a liaison with the CRSP at all times. It was pointed out, however, that it was also very important to the CRSP to maintain a separate identity and a separate initiative from the international centers. That is, it was felt that the CRSP should not be the handmaiden of the international centers but should have compatible goals and a compatible and perhaps comlementary program with that of the international centers.

2. It was emphasized to us that the Missouri team found it very difficult to communicate to potential participating scientists that the CRSP was not a source of funds for continuing their present research activities. Rather, the CRSP would call for a commitment on the part of participating scientists to a new dimension to their current activities.

3. Again, it was emphasized that the collaborative research support programs included a very strong emphasis upon building and supporting research linkages between american scientists and scientists in some of the developing countries. These linkages are to include an item called pass through funding. That is as much as 50% of the research budget in a particular line item could well be expended within the developing country. This, of course, implies the necessity of actually doing a significant portion of the research in these countries.

4. We were advised to place the planning program in the hands of two or three knowledgeable persons who have available to them an advisory group with whom the two or three most active individuals will be expected to check for advice periodically, but certainly the job does not lie with the advisory group, it lies with the coordinator and his immediate aids and when advice is properly given and evaluated the recommendation of the Missouri group was to go ahead. In this connection it was pointed out clearly that communication is very important, not only with the participating scientists but with their department heads who need to be kept informed.

5. It is important to establish a high level of credibility to the planning effort. This may be done through the use of well known and highly accepted professionals in the various disciplines encouraging interaction between members of different disciplines and through continual checking with the local policy advisory committee.

6. Dr. Mann pointed out that in the beginning the Missouri group had not done a very good job in keeping the agricultural representatives and the bureau chiefs in the AID hierarchy properly informed as to their activities, and names were given to us of individuals, namely Bill Johnson in the African program and John Balis in the Latin American program. These two individuals were felt by the Missouri group to have been rather anti-CRSP in their initial stance vis-a-vis the planning effort undertaken by Missouri. Dr. Mann felt that it would be well for us to establish at least a communicative relationship early on to avoid embarrassment and possible program difficulties at a later time.

Comments on the Questionnaire

The questionnaire was perceived to have had some value particularly in the case of people whom you could not get to visit. That is, it allows an input from such individuals that is organized in a way by which the answers can be compared with other individuals whom you have seen. It was felt, however, that the best source of information really lay outside the questionnaire itself where one could simply use the questionnaire as a way of initiating and maintaining a discussion on the issues. It was felt that if the site teams were to sit down on a one on one situation, taking notes, perhaps using a tape recorder, and using the questionnaire as a guide, that a great deal more information could be obtained.

It was pointed out that in the site visits what you see and what you hear may be two different things.

It was felt that the questionnaire is no better than the people with whom discussions are held, and, in fact, the Missouri people feel that the questionnaire was perceived by some of those with whom they talked to be a kind of straight jacket that tended to keep the questions and answers on a very formal level rather than on an informal and often, therefore, more informative level.

It was also pointed out that many people tend to respond to the questions in a unidimensional way and it falls then to the person interpreting these answers to make value judgements concerning the answers when, in fact, there is very little basis for making value judgements.

Site Visits

The job of a team who makes site visits is to assess the comparative capabilities at each site, and this includes not only the scientist or scientists that might be involved at that site but their facilities, their interactions as respects their abilities to work productively in teams.

It was advised that the teams aught always to have rather constant composition. That is, there always aught to be at least one production scientist and one socio-economic scientist on the team.

You will find that at some locations the individuals welcoming the team will have done a great deal of homework and, in fact, over organized for the site visit thinking in this way to really impress the visiting scientists. Other universities will behave in a more relaxed fashion and conduct the entire visit on a very informal basis. It seems a good idea to have a departmental chairman on the site team to evaluate personnel factors and administrative factors at the site.

ADMINISTRATIVE ENTITY

The administrative entity has to have budget control over all activities of the project.

Decisions relative to budgeting aught to be under review on an annual basis.

PROGRAM INTEGRATION

The planning program is charged with making some recommendations that would enable the overall program to function in an integrated fashion. This may be accomplished through the setting up of a review and evaluation committee which consists of an external group, that is, a group of reputable scientists and/or administrators who are not directly involved in the conduct of the research of the program. It is possible to have some rotation of individuals on this review and evaluation committee, but it should be set up in such a way that certain individuals serve continuously or that there is an overlapping before they go off of the board. In addition there should be, probably, a technical committee which consists of at least one individual for representing each technical field with which the project is concerned and probably also only one individual from each institution receiving a substantial portion of the research funds. The technical committee should also include one or more individuals representing the lesser developed countries.

The criteria of evaluation should be disseminated to all individuals involved in the program so that they know how they are going to be evaluated and/or reviewed.

It is also important that when individual proposals are invited from potential participating scientists that they understand as well as they can be made to understand the bases upon which their proposal will be evaluated and included or rejected for inclusion within the overall project.

It is entirely possible that there could be a different mix of projects each year. That is, anticipating that some projects will have longer life than others, and it must be clearly understood by participating scientists that so far as the program is concerned and the budgeting it is expected that each line project must be conceived as having a particular problem to solve or mission to execute and that at some time after a year or two or three this task will have been completed. Thus, the money released for being applied to another line project, whether it is by the original investigator or by a new scientist at the same or at a different institution.

It was felt by the Missouri group that funding in any case ought to be on an annual basis only where each project would be subject to review. It does not nec-

essarily mean that every project will be terminated after a year or even that the project would have to be reoriented, but it is incumbent upon every line project to be able to show some definite progress during the year, and it is for this reason that an evaluation and review procedure be established and that this procedure be understood by everyone involved.

The evaluation panel must be expected to keep the matter of problem solving uppermost in their judgements with respect to research proposals. This consideration, however, should not exclude conducting a certain amount of "basic" research within the framework of these CRSP's. One example that was given of basic research that would ultimately have great problem solving impact would be work on nitrogen fixation.

Role of the Rural Sociologist

The rural sociologist should be in the position of being able to tell the agronomist: 1. What is the "art of the possible"? That is, what are the changes that are possible, what is the range of possible changes within a given time frame (this comment is predicated on the idea that if the CRSP has any impact at all upon food habits, availability of food, economic status of small farmers, that it will result in some change in the living conditions of these farmers, and it is perceived as the job of the rural sociologist rather than that of the agronomist to perceive in advance what they might expect these changes to be and how dramatic they might be expected to be within a given time frame such as five years or a decade, etc.)

The rural sociologist should be able to tell the agronomist something about the nature of the "preferred" food.

The team should take a long hard look at the larger social system in which beans and cowpeas play a role as a basic food staple. (It seems to me as I hear this comment that what is meant here by the larger social system is not going to be very clear to production oriented scientists and we are definitely going to have to have some advice and counsel and more importantly participation from rural sociologists to make this concept meaningful.)

Dr. Rex Campbell, chairman of the rural sociology department at Missouri, when asked which universities in his judgement had international expertise in rural sociology replied as follows and in the following order: Cornell University, University of Wisconsin, University of Missouri, Iowa State University, Texas A & M University, Ohio State University, Michigan State University, University of Kentucky, and lastly Penn State University.

Comments by Dr. Poehlman

1. Put someone in charge and keep that person in charge until the job is done.

2. Work under a meaningful set of guidelines. The original guidelines were felt to be far too broad and this made a completely comprehensive state of the arts paper quite unrealistic. Parenthetically Dr. Poehlman pointed out that in his judgement the questionnaire was useful in getting some continuity but many people do not like it.

3. The Missouri group held a staff workshop and evaluated the answers that showed up on the questionnaire.

4. Missouri group also held a workshop with a limited number of outside consultants to evaluate the proposals. This workshop included a representative from, in their case, ICRISAT.

5. Dr. Poehlman had some apprehension concerning relationships with the international centers. He pointed out that it was important to express to them that the work of the project would be to supplement or complement but in no case was it meant to duplicate the work of the international centers.

6. The chosen principle investigators were called in before they had written their final proposal.

7. Dr. Poehlman thinks the universities should carry the basic research and the graduate education and the actual problem solving research and extension demonstration activities should be carried on in the LDC.

8. He felt that the Missouri representatives evaluating the proposals should have been allowed to vote along with the outside consultants on the merits of the proposals. Finally he suggests two names of individuals who were former students at Missouri working with the cowpea program: 1. Dr. Vas, Aggaral, who is working in Upper Volta on a cowpea project as an outreach activity from the international center, IITA. 2. Dr. Richard Swindell, presently at VPI, however, he had worked on dry beans at CIAT.

Comments from Dr. Marion Fields, Nutrition Department

1. Dr. Fields would urge us to reserve a place in our program for nutrition.

2. Disciplines represented on the teams--Dr. Fields felt overpowered by the production point of view and felt that it was important for other disciplines to be represented on the evaluation teams in addition to just a production person. He thought, in fact, that economists, an anthropologist or a sociologist as well as a food scientist and/or home economist, certainly aught to be considered on these teams.

3. Dr. Fields thinks we need a "mixed bag" so far as improving nutrition is concerned, (I think he is referring here to numerous alternatives in terms of diet improvement, for example: Fields himself is working on getting a better yeast for fermentation purposes so as to make for better availability of the protein of a legume. He recognizes, however, that fermentation will not solve all the problems, and, in fact, it may introduce problems that we do not now have.

4. Food acceptance surveys need to be made, patterns of food useage by age groups and by working versus nonworking members of the family, etc.

5. So far as nutrition was concerned in the planning program, he does not feel that they have got the training component adequately resolved. Nor did they establish or come to solutions on establishing useful linkages.

6. He suggests that the representatives, acting as consultants, from the international centers and from the LDC's need more time than they were given by the Missouri group.

VISIT AND DISCUSSIONS WITH US/AID PERSONNEL
IN WASHINGTON, D.C., THURSDAY AND FRIDAY
OCTOBER 26-27

1. We commenced our discussions with Dr. John Yohe of US/AID who has been our contact person with respect to this program and who will be, if the program is funded, our linkage to AID. Dr. Yohe emphasized that we should build our international linkages early in the planning process. That is, we should identify the individuals and institutions in the LDC's quite early on, with whom we expect to be working.

2. He recommends that we develop the criteria of evaluation also early on, and he would be willing to help with this.

3. We will need a set of AID Research Proposal Guidelines. We should send these guidelines to each potential participant before he prepares his proposal. We should also advise that individual of the evaluation criteria.

4. We should send the announcement letter (he is referring here to Dr. Wittwer's letter announcing the beginning of the planning process at Michigan State University) for all USDA personnel to Dr. Quentin West who is the liaison between USDA and BIFAD with a copy to Dr. David Dougherty who is the AID person acting in liaison capacity with USDA.

5. It is important that either Dr. Wallace or myself attend the JRC meeting on November 8 and periodically thereafter to present progress reports so that JRC will know how we are doing.

6. Dr. Yohe will send cables to mission AID offices to clear the way for us before we go into the various foreign countries.

7. We need to get LDC opinions--perceptions--of constraints and priorities, and then we should, as we develop the constraints document, we must use that information in the solicitation of proposals.

8. Dr. Yohe discussed, rather informally, with us his feeling and perceptions gained from the experience of the Missouri group that it would be well to establish early a compatible relationship with each agriculture representative in the various regional US/AID bureaus, and he mentioned first of all Mr. Don Mitchell from the Asian bureau. Later in the morning Don Mitchell came down and we visited with him. The Asian region is a broad one spreading from Pakistan on the west down through South Asia across India, Bangladesh into Southeast Asia, Thailand, Burma, Indonesia, Malaysia, Taiwan, the Philippines, and on up to Korea. He did say that the AID mission in Korea was being phased-out and that we aught to spend four to five days in each country and travel on the weekends. He did indicate that we should probably spend more time in fewer countries and be sure to send out letters so that the LDC mission people know our intentions when we come into a country and can give us better help. If we were to go to Thailand we should contact Khon Kaen at Cheing Mai. Presently in the Philippines thirty days advance notice is required before the mission is willing to accept visitors. He indicated that he, Mitchell, was going to Thailand and the Philippines on November 15 thru December 8 and could make some initial contacts relative to their interest in this program. Mr. Everett Hedrick was Ag. missions officer in Pakistan. (It was felt by

ourselves and we communicated this to Yohe and Mitchell that we did not at present have major interest in the Asian area and that if we went into Asia at all it would be on a very limited basis. Actually, decisions on this will await other developments.

Next we met with Mr. John Balis and Mr. Blair Allen of the South American bureau. Mr. Balis is a member of the JRC and he spoke at length and with some feeling about these CRSP programs and the relationship that they would have to his bureau. He seemed to have a certain measure of antipathy toward the CRSP, and I am not sure why he has such feelings. Apparently he feels that AID has not previously gotten its money's worth on previous research, and here he is talking about contract research with various universities on an individual basis and he doesn't see much promise in the CRSP for any improvement. One of the major criteria that he would apply to all such programs would be "can the research information be used in the development process." Apparently he feels that if it cannot be used clearly in solving problems then it shouldn't even be undertaken. He really questions whether new research information coming out of AID sponsored research in American universities has any utilities at all in terms of country development.

Our judgement on manipulative problems, that is problems that can be tackled, must be placed in a relevant perspective vis-a-vis the LDC. Balis is concerned that there is no check in the system or has been no check in the system in the past. He raises the question, can a U.S. scientist really come to grips with the significant and real on-farm problems in a developing country.

Mr. Balis while projecting an image of almost complete negativism relative to these projects may have been simply warning us that he was going to be very critical as a member of the JRC on any or all projects that did not appear realistic, that did not have reasonable chances of solving or at least addressing itself toward the solution of fundamental production or utilization problems on small farms. He implied that if he wanted he could really make it very difficult for us to function in Latin America. I asked him rather plainly of what value was the mission in a country such as, for example, Venezuela or Chile, of what use could the mission be to us since we had personal contacts with which we could establish productive research linkages in those countries without mission help. He very frankly said, yes, of course you can, but if money is going to be spent in those countries it is well to have an independent monitoring of the way the money is being spent. We can also help in smoothing the way when problems arise in administration in such countries. We can also help in obtaining visas not only for yourself and other possible visitors but the exchange of graduate students and their travel, their passport arrangements, etc.

My personal feeling is that Balis will probably be very outspoken and at times abrasive and highly questioning of everything that we do but that he will not close doors to us.

Balis then ticked off country by country for Latin America giving us his impression of which countries had possibilities for collaboration and which countries did not. These countries are as follows: Bolivia: in Bolivia the AID mission is very critical of U.S. universities and he would not recommend that we go into Bolivia unless we had a very well conceived and staffed project, and then we should be very communicative to the AID people before we undertook to function in Bolivia.

Peru: Peru is now engaged in a re-evaluation of their research programs and their research organization. New baseline studies are being conducted. The AID mission suggests we stay out of Peru, at least for the next several months. In as much as we are not likely to have research funding anyway for another year or year and a half the situation may improve by the time. Ecuador: Ecuador is now engaged also in baseline studies. They have limited capacity in terms of being able to respond to our need for linkages, but Ecuador is a country that certainly needs help and it would be okay to go into Ecuador. Brazil: Brazil is a middle income country vant to the problems that small farmers face elsewhere in Latin America, and it should be benficial and expedient to U.S. universities to operate to Brazil as the best way to get the technology implemented for all of Latin America. What he is saying is that it is okay to work in Brazil if these criteria can be established. It would be necessary to make contact both with EMBRAPA and various univeristyies in Brazil. He recommends that we should not expect to work in a country where the Ag. officer is uncooperative or where, in fact, the local administrative people are uncooperative. Certainly this makes sense to us as well. The man power absorptive capacity in many Latin American countries is limited, and he pointed out that beans and cowpeas may not be getting very high priority in many national programs and, therefore, there wouldn't be very many people assigned to it or many facilities available to work out very large programs. Moving on into Central America and the Caribbean he points out that CARDI and the University of the West Indies and Trinidad would be an appropriate contact to make. In Guatemala there is ICTA and ROCAP with which contacts could be made. Mexico falls in the same category as Brazil in that it is a middle income country, but nevertheless a large bean producing and consuming country and one which might be a suitable place to do certain kinds of things. As regards Chile, he says that the equation is not favorable but if program needs are such that, as in Brazil, some necessary work can be done better in Chile that anyplace else there is no reason why we couldn't go there. The same situation applies to Venezuela.

The Near East Bureau and Discussions with Mr. Worth Fitzgerald, Mr. Victor Latiffe, and Mr. Bob Morrow

Our discussions here were very low-key and very informal because, for the most part, we do not anticipate that we will have many linkages in the Near East. Should point out that the Near East includes countries from Afganistan, East of the Mediterranean and North African countries including Morocco. Possibly we should make contact with ICARDA to some extent simply to communicate to them our interest and to make sure that they have an opportunity to respond but for the most part ICARDA and the countries in the Near East region are concerned with other grain legumes that with beans or cowpeas. It was pointed out that possibly Morocco has a potential for bean production and that, if we check with ICARDA this question could be clarified.

They did point out that once a constraint has been identified it would be well to ask the question, does it take new research to solve the problem or will a transferral of known research information or factors suffice to eliminate the constraint, and I think this is sound advice.

MEETING IN WASHINGTON ON OCTOBER 26-27

Attending: Wayne Adams and Don Wallace

Those Visited: John Yohe, Don Mitchell (Asia Bureau), Don Balis (Latin American Bureau; participant in JRC), Clare Adams (Latin American Bureau), Russell Oldson (Near East Bureau; BIFAD Board), Worth Fitzgerald (Near East Bureau; JRC participant), Fred Marty, Victor Latiffe, Bob Morrow

We are to work early at developing an interest and knowledge on behalf of the LDC's in the dry bean/cowpea program. It is directed by page 3A of the revised planning grant proposal, we are to meet with some scientists and some administrators of research from LDC's, after the statements of constraints has been drafted. We are to seek the approval of the list of constraints. The interum report should come after this meeting. It should show that the proposals received for research have been evaluated.

Liaison with BIFAD

Glen Beck will be our liaison representative with BIFAD.

Travel Arrangements

AID must send cable and make arrangements for each trip we make to an LDC. The missions will want policy and decision makers involved. Th. , should be acheived before asking for proposals.

Visit with the Asia Bureau

This Bureau includes Pakistan, Burma (possible AID mission), Thailand, Philippines, Korea, etc. Thailand and the Philippines grow some cowpeas. Dry beans will not grow well in these areas. Vasayn Agricultural College has been designated as the legume station of the Philippines. Bernardo is head of this College. Bill McClusky is the US/AID research advisor for legumes in the Philippines. The Philippines already has a full platter of programs. If top administrators are not contacted, the contact with the scientists will not be effective. Extension personnel should be contacted as well as research personnel. It is probably best to spend more time in fewer countries. A minimum of two to three days per country is needed, with a week being really essential. For Thailand, the Northeast Agricultural Center at Khan Kaen and the vegetable station at Ching Mai are places that should be visited. Don Mitchell is going to Thailand and the Philippines from November 15 through December 8. Korea is second in world production of dry beans, including chickpeas, pigeonpeas, and mung beans. Everett Hedrick is the food officer in Pakistan.

Pass Through Money

The question arose as to overhead, or the pass through money used in developing countries. Will all of the budgeted money be used for research, or will much of it be siphoned off for overhead expenses?

Meeting with Latin American Bureau

The feeling was expressed that the agency needs more return for the money spent. In many countries they probably should not have invested in research in the first place. It was suggested that we should save for a later day the things that are relevant at later times; do today that which will give a return today. The okay of development administrators is needed. The science of the CRSP to date is questioned. Can't see that the countries can use the sophisticated information. The intuitive judgement of scientists is not especially valuable for LDC's. Many LDC colleagues were trained in the U.S. and don't think differently than we do. Our interests should be the small farmer subset of the national farming community. A difficulty occurs in layering the culture and local attitudes on top of the scientist to scientist communications and interests. We should ask the scientist first and then the administrators. The capacity to generate and work the concept through this system is important. The missions will assist with the identification of administrators.

Some countries of interest are Bolivia, Peru, Ecuador Colombia. Peru is doing a baseline study and does not want anyone visiting before April or June. Ecuador has a baseline study that will be finished in November.

Human rights issues are of concern in Chile, Argentina, Brazil.

If we do work in Brazil or Mexico, that is in the more developed countries, the work must be transferable to the LDC's. It must also be demonstrable that the work can best be done in the developed country.

Some other countries with good research resources are Colombia (ICA), Panama, Honduras, Guatemala, El Salvador. El Salvador has excessive capability.

In Costa Rica, CATIE is an institution that the US/AID is very much interested in. They do have a core budget of only $50,000.

ROCAP (Research Office Central American Programs), in Guatemala City is a capable institution. We should visit it. IICA is another capable Guatemalan institution.

Venezuela has too much money to be an AID country.

Chile can't be an AID country for at least two years. Work done in Chile must be because of an advantage as a technology base.

US/AID wants Mexico to develop a middle income strategy. There are some suggestions that a subnational program should be developed. This would look at the problems of small farmers.

Institutional and personnel resources are very very low for the Guianas.

The Caribbean Agricultural Research Development Institute, Adjacent to the University of West Indies, with an office in Barbados, is an institution that we should visit.

Visit with the Near East Bureau

The Near East is assigned one half of the US/AID budget. There is a small staff in most Near East countries.

Egypt provides good academic training, but the research after the training is poorly supported so the capability diminishes over time. Syria and Damascus have a similar situation.

Senegal has about the best research organization in West Africa. Senegal Institute of Research Agronomy is in Rambey, Senegal. Tim Hall of Riverside, California has done some work on cowpeas in the Senegal area under a 211 D grant. This research was on water stress.

We expressed the view that a crop should represent the staple food of an area to be of high interest for a collaborative research support program. The question should also be asked as to whether it requires research to solve the constraint. Associated cropping, that is intercropping, is important in this part of the world. A visit to the Near East was urged.

Visit with the African Bureau

Many of the problems are consumption and transportation problems. We should try to establish linkages with the African institutions. The Scientific and Technical Research Commission (STRC) should be contacted. It is necessary to establish linkage with them. Mr. Obelolla will be in Washington in the next month or two. He may be attended by the deputy director of IITA. The suggested option number 1 was to wait until after these people had visited Washington, before we visit Africa. A second option is earlier visits.

In Kenya the horticulture station is the site for bean research. They are being assisted by donor assistants from the Dutch government. Universities in Africa do very little research. Sudan is grappling with development of a research system. The University of Nairobi has been sent extensive documents regarding Title 12 programs. In Kenya, many scientists have resigned and moved into the private sector. Tanzania has a good program. AID is one of the biggest donors. We should see the mission first. IITA has an outreach program in Tanzania and in the Camerouns. It is not certain that beans are included.

The African Bureau recently had a special meeting with BIFAD. A cable is going to the missions to inform them of their roles and the potential of Title 12.

STRC has connections with many countries, and the capability to coordinate, promote, and solicit funds and deal with a whole range of research. (The thought was expressed by others that STRC is an instrument favored by AID but is not well established in the African countries.)

A consortium of Utah and Colorado is operating in Northern Africa to increase production. In Africa, there is much concern about increased production of beans, but not about navy beans. The chief disadvantage of navy beans is the time and cost required for cooking. Local production levels are very low and there is much potential for increased production. We should be thinking about intercropping systems. From the ministries of agriculture we should learn how important beans are relative to other crops and the national stations and substations that are working on the grass roots problems. Mallawi has a small bean program. They are doing excellent work in research and education, much of the education has an agricultural base.

Other countries are the Camaroons, Liberia, Ghana, Niger, Senegal, Mauritania, Botswana, Zaire. Zaire has no research program, there is an IITA outreach program. Botswana has a program with basic food grains. Mauritania has a project approved for vegetables. An attempt was made to direct the latter toward beans (by Jones).

In all African countries there are always shortages of beans for school feeding supplies and similar projects. Bean prices fluctuate widely.

The AID program in Ethiopia is on hold. This is pending the reimbursement for nationalized industries. (Markarian has been working here.)

MEETING WITH THE DIRECTOR OF TITLE 12 PROGRAMS

Attending: Wayne Adams and Don Wallace

Visited With: Erving Long, Fred--or William--Johnson, Don Plucknet, Mr. Peterson
John Yohe

Don Plucknet is deputy director of BIFAD.

Orvill Bently has visited CIAT. They have 19 specific problems that need attack. BIFAD assured CIAT that we would work with them.

The two CRSP programs already started are about $3,000,000 per year, plus %40 from the universities. The president has committed to doubling US/AID funding in five years and also he is committed to reducing world hunger. The White House singled out the CRSP program last year. These programs were new so they had to be stated separately. The funding was cut in half. OMB cut them specifically, which gets at internal decisions by US/AID.

Yesterday's BIFAD meeting opened by discussing the concern of real world hunger and finances related to CRSP. How should the money resources be divided among the various CRSP's? There is a need to determine the benefits derivable from CRSP's of different size. The planning must be against some constraints.

The CRSP has drifted from its original conception. The original idea was that for some problem areas for which linkages would give benefit--US/AID would pay for the away from home part of the university expenses. The university would pay for its own research. US/AID would finance the opportunity to link up with national LDC programs, to travel, etc.

The problems to be researched should be reduced to the few with breakthrough potential. Would like a proposal for one million and another for three to four million. Not sure whether the few large or many small CRSP's should prevail. Also involved--how many universities can participate effectively? The impression of congress was that too many universities were involved. The first guideline is what is the program. We should come in with two to three levels of programming. Provide an analysis of the expected payoffs for each of three to four levels of funding. Consider all activities in the whole world. The activities might all be centered at one location. Another mode would be simply a nerve center kind of consortion.

A part of the funding problem is that too little of the money flows to LDC's to do research. Research and development is being under funded. It is important to indicate what we could do with more money. Be certain that all institutions have opportunity to express manifest interests and capability. The number of institutions should flow from the best plan of research. Long is not tied to favor of smaller or of larger numbers of institutions.

A lower level of funding may focus on communications, increased yields may be the major objective, missions are wanting to distribute funding among their constituencies, the opportunities for major gains are there. The best opportunity for major gains may be by tissue culture in one lab, or by organizing fifty on-going programs.

If the U.S. institutions do not get a benefit from the effort it is not a CRSP.

Contracts show arrangements with US/AID should still be possible. The original concept was that contracts would predominate. We should look for the benefit to LDC and to U.S. institutions. CRSP is to support research by universities, when that research has merit in LDC's.

The JRC guidelines are being revised. We will be provided a copy.

Basic Principles for Relationships with Universities

1. A broad announcement regarding manifest interest should be made to all.

2. There is no guarantee of participation. The legitimate interest will far exceed the actual number of participants. We are to be sure to keep a record of the number of institutions expressing interest.

The Unites States is spending much on research that is almost but not quite applicable to LDC's. The LDC's don't tap our resources adequately. CRSP is to fit these pieces together. It is also to fill up the chinks. The goal is to find

out what goes on around the world. Put these pieces together and add the critical elements to complete a program. European programs, etc., can make it unnecessary for the CRSP program to do certain bits of research. The tough part is to find out what is being done in LDC's, and how to improve it.

John Yohe is the project manager for the dry bean/cowpea CRSP.

We are to find out what LDC research is being done. We are then to work from the problem to the research resources, rather than from the research institutions back to the program. Relating the program to what is already being done is very important.

The question arose as to whether LDC research efforts had increased or decreased as a consequence of the existence of the international centers. We have the challenge of activating and motivating the LDC scientists.

Cost Sharing by LDC

We should be guided carefully by the missions. Pass through money will not be so important if missions support activities also. Funding of the missions requires an advanced time of three years. The CRSP must be solid without mission support.

During the Tours

The objective is to find the attitudes and working conditions of the scientists and administrators. It is to get an inventory of research, to relate to it and to add to it. We should get the problem well stated and have alternatives. We should check on the ability of administrators.

The research should be designed so as to carry through and demonstrate efficacy under farm conditions. An example was sited of a millet that had been developed by Canadian researchers thirty or forty years previously in India. This millet over this thirty to forty year period had consistently out yielded the local varieties by sixty to seventy percent, but it always failed in dry years. A couple years of fertilizer trials demonstrated that it would yield even in dry years with minimum fertilizer added. Then, it replaced all varieties within three years.

MEETING ON OCTOBER 27 WITH JOHN YOHE

Attending: Wayne Adams and Don Wallace

John Yohe will send us a schedule of JRC meetings. To send things to JRC, we should supply Yohe with 40-45 copies.

Cost Sharing

A minimum of 25% must come from the U.S. participating institutions. The small ruminant CRSP is planned such that about 55% of the expense is in the LDC countries. The BS/SM CRSP is planned with about 45% of the expense in LDC's.

Reports. 1. State of the arts. We are to develop a handbook statement to be used by LDC's. This should be discussed with JRC. This handbook need not be a science type document. A science type document would also be useful. 2. A listing of constraints. Reports 1 and 2 are working papers that should be used for the meeting with LDC representatives. 3. Final report of constraints. This is to be developed after the meeting with the LDC's. The final report of constraints is the document that should be used in requesting proposals from the U.S. universities. 4. The interum report. This is the preliminary plan. 5. The final report, this is the approved and accepted final plan.

Schedule of Goal Deadlines

The following were established:

BEAN/COWPEA COLLABORATIVE RESEARCH PROGRAM PLANNING
Identification of Constraints—Questionnaire and Interview

INSTRUCTION: Please evaluate the constraints using Steps A through D on page 1. Undoubtedly, this listing is not complete. You may add constraints in accordance with the questionnaire objectives on page 1.

BACKGROUND:

In July of 1978, the Board of International Food and Agricultural Development (BIFAD), which is appointed by the President of the United States, authorized planning of a Collaborative Research Support Program (CRSP) for beans and cowpeas. The intent of this CRSP is that the research of U.S. scientists working on beans and cowpeas is to be linked with the similar research of scientists at the international centers and particularly with research of the bean/cowpea scientists of the developing countries. The planning is to aim toward world-wide coordination and collaboration on bean/cowpea research. The objective is to achieve higher yields from the bean and cowpea plantings of small farmers of the less developed countries (LDC's). This should make these protein-rich grains more available for use by both rural and urban people. In turn, it should help achieve a nutritionally balanced diet for the increasing populations of the world.

OBJECTIVES:

The objectives of this questionnaire are to obtain: (i) Your assessment of the physical, biological and socio-economic constraints to higher bean/cowpea yields on small farms of the LDC's. (ii) Your suggestions of potential solutions for eliminating these constraints. (iii) Your recommendations for research directed toward developing the solutions and achieving higher yields. (iv) Your assessments of constraints to human consumption of beans/cowpeas and of potential solutions and research for solving these constraints. You can answer i, ii, iii and iv by completing Steps A, B, C and D below. Each step originates with the problems which limit production (constraints to production) or use of beans/cowpeas as given on the PROBLEMS (CONSTRAINTS) listing (page 3). Note that the listed constraints are problems that limit bean/cowpea production and use AS SEEN ON THE SMALL FARM. Please write in any important constraints that you do not find listed, and then treat these as you do the already listed constraints. Also, please try not to add to the list of constraints any problems that researchers encounter as they work to develop solutions. —Concentrate on constraints to production by small farmers and on constraints to consumption by poor people.

STEPS A, B, AND C ARE FOR YOUR IDENTIFICATION AND DESCRIPTION OF THE CONSTRAINTS THAT MOST LIMIT HIGHER BEAN/COWPEA YIELDS AND MORE CONSUMPTION OF BEANS/COWPEAS.

STEP A: Within each of the groupings of constraints (I, II, III, IV, V and VI), identify the two or three (or four) constraints that you consider to be most limiting to bean/cowpea yields or consumption. Designate these by pencilling a square (☐) around each number, for example ☐ and ☐, that corresponds to a most limiting constraint within a grouping. Skip groupings for which you lack competence.

STEP B: Identify from among all of the listed constraints, including additions by you, the 12 that most limit yield and/or limit consumption of beans/cowpeas overall. Designate these 12 by pencilling a circle (○) around each number, for example (13) and (29) that corresponds to a most limiting overall constraint.

STEP C: To the extent that you can, identify the most and least limiting of the 12 most important overall constraints. Do so by placing a plus sign (+) in front of several of the most limiting, as for example + (13) and + (29), and a minus sign (-) in front of the least limiting of these 12, as for example - (29).

STEP D IS FOR ELUCIDATION OF THE CONSTRAINT, POSSIBLE SOLUTIONS AND FOR RECOMMENDING RELEVANT RESEARCH.

STEP D: For each of the 12 most important constraints overall, as identified by you, regardless of the relevant scientific disciplines, complete a problem elucidation sheet (pages 9-20).

STEP E: Please indicate your experience, etc. as requested on page 2.

Appendix III

INFORMATION ABOUT YOURSELF AND YOUR EXPERIENCE

1. Respondent_____ Institution_____

2. Present Assignment_____

3. Mailing Address_____

_____ Phone_____

4. Major Discipline(s)_____

5. International Development Experience:

Countries	Type of Experience	Approx. Dates

6. Other Scientists, Engineers, Government Officials, Extension Workers and Farmers that Should be Contacted:

7. Answers are applicable to the following country(ies).

1. _____ 2. _____ 3. _____ 4. _____

8. Comments:_____

9. Interviewer:_____ Date_____

PROBLEMS (CONSTRAINTS) PREVENTING HIGHER PRODUCTION AND USE OF BEANS/COWPEAS

(As Perceived on the Small Farm--By the Farmer, Scientist or Extension Specialist)

INSTRUCTIONS: Please evaluate these constraints using Steps A through D on page 1. This listing is not complete. You may add additional constraints in accordance with the questionnaire objectives on page 1.

PROBLEMS

I. Fertility, Plant Nutrition, Environment
1. Fertilizer not available.
2. Low fertilizer response.
3. Chemical or physical properties of soil are limiting.
4. Deteriorating land quality (erosion, etc.).
5. Economics of fertilizer use and response.
6. Water inadequate.
7. Water excessive.
8. Land is not available.
9. Livestock waste used for other than fertilizer.
10. Yields strongly affected by weather.
11. Temperatures too high or too low.
12.
13.
14.
15.
16.

II. Farming Practices and Management
17. Low stand establishment.
18. Yield losses during growing season.
19. Harvest losses.
20. Modern inputs are too costly.
21. Equipment not available or too costly.
22.
23.
24.
25.
26.
27.
28.

III. Genetic Limitations
29. Other crops are more productive.
30. Cultivars not adapted. (Daylength, temperature, etc.)
31. Poor competitiveness in intercropping.
32. Inherent yield potential too low.
33.
34.
35.
36.
37.
38.
39.
40.

IV. Plant Pests
41. Insects in soil.
42. Insects on seedlings.
43. Insects eat foliage.
44. Insects - Stem boring.

PROBLEMS

Plant Pests - cont.
45. Insects - Pod boring.
46. Controlling insects is uneconomic.
47. Animals or birds destroy the crop.
48. Pesticides unavailable or can't afford them.
49. Fungal diseases.
50. Bacterial diseases.
51. Viral diseases.
52. Nematodes.
53. Air pollution.
54. Farmers do not use modern measures to control diseases.
55. Weeds inadequately controlled.
56.
57.
58.
59.
60.
61.
62.

V. Utilization and Storage
63. Home processing difficulties.
64. Beans are not a preferred crop/food
65. Dietary habits are inadequate.
66. Post-harvest losses.
67. Beans are not a satisfactory food for young children.
68. Seeds become too hard when kept a long time.
69.
70.
71.
72.
73.
74.
75.

VI. Socio-Cultural and Socio-Economic
76. Color and size of seed are not acceptable.
77. Flavor and texture are not acceptable.
78. Risks are inherent in trying new technology.
79. New techniques are not financially feasible.
80. Developed technologies are inappropriate.
81. Roads, education, institutions are inadequate.
82. Socio-Politico-Economic systems limit the small farmer.
83. Labor requirements are not met.
84. Farmers aspire to occupations other than farming.
85. Gastro-intestinal or other diseases limit human activity.
86. Inadequate availability of credit.
87.
88.
89.
90.

POSSIBLE "SOLUTIONS" TO PROBLEMS (CONSTRAINTS) TO HIGHER PRODUCTION & USE OF BEANS/COWPEAS BY SMALL FARMERS

Appendix III

INSTRUCTIONS: There are many more possible solutions than problems. This listing is not complete. Most problems have multiple components; for example, both a biological and sociological "solution" may be required. You may add to these possible solutions. But, needed most is your self-reasoned suggested solutions to the major constraints--as requested on pages 9 through 20. Therefore, a quick review of the possible solutions presented here may be sufficient.

I. Farming system adjustments - involving primarily the farmer(s)' input and relatively quick returns.

1. Farming systems which utilize animal manure, mulch, compost, ash or other locally available sources of soil amendments.
2. Develop village or household composting systems.
3. Develop techniques to maximize effectiveness of fertilizer (chemical) used - i.e., "mudball" techniques used in rice culture, etc.
4. Alter soil pH by liming/improved cropping sequences.
5. Farming systems utilizing crop residues/mulch/fallowing to conserve moisture.
6. Improved water management: irrigation times, tillage, etc.
7. Improved seed bed preparation.
8. Improved seed germination and emergence.
9. Plant disease-free or certified seed.
10. Improve rate, depth of planting practices.
11. Monocropping to maximize bean/cowpea yields.
12. Multiple cropping and intercropping to reduce risk of total crop loss, to decrease insect and disease damage, to minimize weed problem.
13. Better weed control through tillage practices/herbicides.
14. Control animals/birds.
15. Control insects through better use of pesticides.
16. Adjust planting times to avoid insect infestation.
17. Control insect disease vectors.
18. Eliminate wild plant hosts of disease.
19. Change harvest times/methods.
20. Protect drying seed from weather.
21. Seed treatments/better containers for storage.
22. Cropping systems to minimize soil erosion--multiple/rotational/maximizing ground cover.
23.
24.
25.
26.
27.
28.

II. Socio-economic/policy/infrastructure adjustments.

1. Increase national manufacture of fertilizer.
2. Import fertilizer.
3. Subsidize (lower) fertilizer prices to small farmers.
4. Subsidize (lower) pesticide prices to small farmers.
5. Make certified disease free seed available at low cost.
6. Improve bean and cowpea prices relative to other food crops.
7. Improve food-crop prices or programs relative to export crops.
8. Direct extension and research programs toward small farmer.
9. Subsidize or establish upper limits to credit rates.
10. Form government policies to ensure availability of credit to small farmers.
11. Extend small farmer loans over entire year to allow him flexibility in marketing.
12. Form cooperatives for buying inputs/selling crops/credit.
13. Increase small farmers' power through collective organizations.
14. Public works programs to build infrastructures: roads, irrigation, drainage, erosion control, etc.
15. Utilize available human resources in public work programs.
16. Use draft animals or mechanize to solve labor/time bottlenecks.
17. Change rent/tenure practices to make land available at reasonable costs, land reform programs.
18. Develop long range plans to protect region from environmental degradation, deteriorating soil quality (reforestation, cropping systems for marginal lands, etc.).
19. Develop education priorities to promote science and agriculture.
20. Develop a barter system to improve crop utilization and seed distribution.
21.
22.
23.
24.

III. Short term research - science and technology.

1. Develop and use simple soil analysis procedures.
2. Characterize and map soils of the regions.
3. Test soils for deficiencies and correlate with crop responses to generate fertilizer recommendations.
4. Develop cropping systems with crops/varieties which are tolerant to alkali/salt/acidity, etc.
5. Develop tillage implements adapted to small farmers economics and needs (intercropping/tropical soils).
6. Develop cropping systems to avoid compaction/erosion/soil depletion/ for marginal areas (areas which traditionally were fallowed in shifting cultivation, hillsides, overgrazed areas, etc.).
7. Work on increasing role of beans/cowpeas in locally adapted multiple cropping systems.
8. Develop methods to produce disease/insect free seed locally.
9. Develop inexpensive sprayers/dusters with low volume.
10. Develop local monitoring of insect populations in conjunction with biological pest control systems.
11. Develop small-scale harvest/threshing/drying equipment.
12. Develop improved inexpensive seed storage containers.
13. Develop alternative/inexpensive cooking fuels.
14. Develop improved cooking methods/new processing methods/infant foods, etc. for home preparation of beans/cowpeas.
15.
16.
17.
18.
19.
20.
21.

IV. Longer term research - science and technology.

1. Research rhizobium and N-fixation.
2. Research into physiology/biochemistry of yield.
3. Research in tissue culture, wide hybrids, gene transfer: future breeding tools.
4. Research mechanisms of daylength and temperature responses.
5. Expand research on ecology of insects, natural predators, etc.
6. Research bean/cowpea diseases.
7. Research nutritional merit of beans/cowpeas.
8. Breed for cultivars which yield well at low NPK.
9. Breed for improved response to NPK.
10. Breed for tolerance to tropical soils problems.
11. Breed for increased photosynthetic ability.
12. Breed for photoperiod insensitivity.
13. Breed for reliable (if relatively lower) yield under a variety of conditions.
14. Breed for adaptability.
15. Breed for appropriate number of days to maturity.
16. Breed for drought resistance.
17. Breed for tolerance of excess water.
18. Breed for disease resistance.
19. Breed for adaptability to multiple cropping.
20. Breed for faster cooking time.
21. Breed for insect resistance.
22. Breed for improved palatability, flavor.
23. Breed for low antinutritional factors, flatulence.
24. Breed for improved protein, digestibility.
25. Breed for higher yield potential, per se.
26. Breed for seed coats/cotyledons that take up water and cook readily.
27.
28.
29.
30.
31.

V. Socio-Economic Research

1. Identify constraints limiting delivery of improved inputs to small farmers. (Specify: obstacles in the private market, public delivery mechanisms, allocation at the village level, etc.).
2. Identify need for and optimum form of credit assistance to small farmers.
3. Evaluate the profitability of available improved technology under farmer's conditions and assess compatibility with current farming systems.
4. Determine the multiple roles of legumes in sustained cropping systems in the tropics.
5. Identify previous government programs attempting to improve bean/cowpea production and assess their success or failure.
6. Characterize existing farming systems in order to provide guidance to technical researchers and to assist in design of improved production package.
7. Identify patterns of adoption of improved bean/cowpea technical packages and assess factors affecting adoption.
8. Identify socio-cultural aspects of bean/cowpea consumption (preferred varieties, cooking methods, etc.).
9. Identify nutritional status of the population and the importance of bean/cowpea in providing calories, protein, etc.
10. Assess the responsiveness of bean/cowpea supply to changes in relative prices.
11. Achieve understanding of the production and distributional effects of current government crop price policies.
12. Research the marketing of bean/cowpea output at the farm level (timing, form, nature of buyers, seasonal farm gate price movements, etc.).
13. Research the marketing of bean/cowpea beyond the farm gate (structure, performance, etc.- specify focus).
14. Research crop storage losses to estimate magnitude of the problems in quantity and value terms and to assess the economics of alternative storage systems.
15. Identify the methods of bean/cowpea processing and cooking and assess their relative economic profitability.
16. Gain understanding of small farmers' familiy activities, living patterns, and perceptions of their problems.
17. Determine economic returns on investment in research.
18.
19.
20.
21.

Respondent:_____
Your Name

PROBLEM ELUCIDATION, SUGGESTED SOLUTIONS, AND RECOMMENDED RESEARCH

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Comments on the problem_____

Applicable Country or Area (If not fully indicated previously.)_____

This problem is severe:

- ☐ 7-10 years in 10
- ☐ 4-6 years in 10
- ☐ 1-3 years in 10

This problem extends to:

- ☐ a few local production areas
- ☐ 1/2 of the production areas
- ☐ virtually all production areas

The level of knowledge about this problem is: (Circle one)

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REPORT OF VISIT TO GUATEMALA, PANAMA, COSTA RICA, COLOMBIA, CIAT, CHILE

M. W. Adams and D. H. Wallace

January 24 - February 3, 1979

A. Guatemala

1. USAID - Guatemala

Visited: Carl Koons
Clemson Weber

2. ROCAP - Regional Office, Central America and Panama

Visited: Don Fiester, Director, Guatemala City
Dr. James Murphrey

ROCAP coordinates all regional projects of US/AID in Latin America, including Guatemala, Costa Rica, Honduras, El Salvador, and recently Panama is participating. ROCAP is a US/AID organization; it is not an organization of the Central American countries. ROCAP programs would include many crops in addition to beans.

3. INCAP - Institute of Nutrition of Central America and Panama (A regional center)

Visited: Riccardo Bressani, Nutritionist (Bean Investigations).

Level of Collaboration requested: Primary

INCAP conducts nutritional studies. INCAP is basically concerned with human nutrition and human health. They conduct extensive nutritional studies in conjunction with hospital facilities.

4. ICTA - Institute of Science and Agricultural Technology

Visited: Dr. Porfirio Masaya, Bean Program Leader
Dr. Kazuhiro Yoshii, assigned to ICTA from CIAT, supported by an AID contract with CIAT --Pathologist
Dr. Pete Hildebrand, Economics-Rural Sociology from the Rockefeller Foundation and assigned to ICTA

Level of Collaboration requested: Primary

ICTA is the semi-autonomous national research organization for Guatemala. It represents a reorganization for research activity that occurred about 10 years ago. This organization is concerned with basic food crop and livestock production for Guatemala. The bean program is one component. The scientists of the bean team include (1) a physiology-breeding and production-trained man, (2) a pathologist, (3) a socio-economist, and (4) a man assigned by ROCAP to the small farms of the highlands. The bean program is all conducted in the field. There are no basic laboratories. The research is in two regions; the first is for the lower elevations in the Oriente, with headquarters at Jutiapa. The second region is the highlands with headquarters at Chimaltenango. The highland activities are with Indian small farmers. Dr. Kass, an economist, studying small farm systems in the highlands, was not visited. He is assigned by ROCAP to ICTA.

B. Costa Rica

1. US/AID - Costa Rica

Visited: Dr. Robert Mowbray, Rural Development Officer

2. Ministry of Agriculture and Livestock

Visited: Dr. Eduardo Jimenez, Bean Program Coordinator
Dr. Evaristo Morales, Entomologist
Dr. Horacio Lieniga, Director, Division Fomenta, CNP
Dr. Lazaro Vargas, Director of Planning, Ministry of Agriculture

Level of Collaboration requested: Primary

Although Dr. Jimenez has been designated as Bean Program Coordinator, the national bean program has not as yet been activated.

3. CITA - Center of Investigations in Food Technology

Visited: Dr. Luis Fernando Arias, Director
Dr. Wilhelm Heinlich
Ing. Horacio Varges, who is in charge of the CARE project.

Level of Collaboration requested: Primary

CITA is located at the University of Costa Rica and is jointly sponsored by the Ministry of Agriculture and Livestock. With respect to beans, CITA has a storage program that is primarily related to weevils. They also have studies of cooking time and of the development of pre-cooked bean products. They are thinking about developing a post-harvest program. They indicated that this would require the development of standardized grading for the marketing of beans, which does not currently exist. They are working closely with school feeding programs in which beans are a major component, this being supported by CARE. CITA is under the joint sponsorship of the University of Costa Rica and the Costa Rican Ministry of Agriculture and cooperates with the CNP.

4. Department of Seed Technology, University of Costa Rica

Visited: Dr. Ronald Echandi, Head of Seed Technology

Level of Collaboration requested: Primary

Interested in dry seed problems of beans. Some work on weevil damage. Hardness of beans is also a consideration. About 27% of the planted seed cannot be traced to a known source. About 50% of the farmers add a chlorinated insecticide to their edible beans to reduce weevil damage. Beans are usually kept at the foot of the bed or hung on the wall. About 300 interviews of farmers have been conducted. The Extension services in the Central American countries just have not worked. There is a major gap between experimentalists and extensionists.

5. CATIE - Tropical Agronomic Center for Research and Teaching, at Turrialba

Visited: Dr. Hector Munoz, Director
Dr. Pedro Onoro, Leader of Small Farming Systems Research
Dr. Robert Hart, one of the agronomists working on the project

Level of Collaboration requested: No request; this is a regional center.

CATIE is a Central American institution, located at Turrialba, Costa Rica. It functions in conjunction with ROCAP. The agricultural section of CATIE is concerned with farming systems. The effort is currently directed toward obtaining on-the-farm descriptions of the systems used by small farmers. The intent is to use the described system as a basis from which small changes in the system can be implemented as a basis for improving the system. The concept is that the farming system has been developed over generations of farming practice in the environment provided on the farm and/or in that locality. It is recognized that because of the effects of altitude and other geographical factors, there are many systems that have developed. It is assumed that most are realistic for the climatic and social environments in which they are used. Small changes can be highly effective in improving yields, whereas "modern technology" is often unsuccessful. Dr. Luis Navarro, an agricultural economist who is studying farming systems from the socio-economics point of view, is in charge of obtaining these descriptions of the farming system. He also emphasizes understanding the lifestyle of all family members. (Dr. Navarro was not visited.) The other staff members are concerned with researching the possible modifications of the systems. CATIE has some staff at Turrialba, and staff members located in the individual Central American countries. In the countries the support is in behalf of the national program. The efforts at Turrialba are also basically in support of the country programs. The staff travels extensively to the countries. CATIE receives funding from other agencies in addition to ROCAP.

6. IICA - Inter-American Institute of Agricultural Sciences

Visited: Dr. James Murphrey

Level of Collaboration requested: No request; not a research institution.

IICA has no working scientists of its own. Its function is coordination of the Central American Agricultural activities. It is supported by the Organization of the American States. One of the principal activities now centered in IICA is gathering and distributing information. ROCAP has financed a special project on information entitled PIADIC (Program of Agricultural Information of the Isthmus of Central America). PIADIC is an information statistics program for the generation of area-specific profiles of information, and this body of data is computer-based. The purpose of PIADIC is to provide a comprehensive data base on specific geographic sites to aid researchers in those areas, one example being CATIE. The basic data base is distributed, i.e., it is found among all of the various data gathering agencies in the Central American countries, such as census bureaus, climatology sections, marketing boards, etc.; and the data are held in various forms, some in computer files, books, pamphlets, cards, etc. Each country will eventually have an information center, which will hold reduced data summaries, i.e., summaries which compile data on a weekly or a monthly basis rather than a daily basis. These data summaries are available for agricultural planning and research design activities in the respective countries.

PIADIC also has, as one of its activities, the capability of extracting from the information center an area-specific profile for any given community such as Turrialba and Guanecasta, covering all of the subject areas which an agricultural planning service or a research design activity may wish to have available. This includes information in the profile such as data on climate, soils, marketing, family income, family size, age distribution, research results for the area, highways, marketing patterns, etc., all of which would be extremely useful in a tech-pack. A tech-pack is a description of current recommended technology for, for example, a small farm. As for CATIE, the objective is to describe the current situation so that slight modifications (the tech-pack) can be tried by the researchers.

Another activity that is centered in IICA is the position filled by Dr. Guillermo Galvez who is a plant pathologist on the CIAT staff. He is fielded in the Central American region and headquartered at IICA. His job is to serve as liaison between CIAT and the Central American agricultural programs. He is to provide outreach of the research information developed at CIAT, and to provide feedback from the Central American and the Caribbean countries to CIAT.

7. ROCAP - Regional Office for Central America and Panama

Visited: Dr. James Murphrey

Level of Collaboration requested: No request - a USAID institution.

Dr. Murphrey is the project administrator for ROCAP. His main office is in downtown San Jose, Costa Rica. However, he has offices at IICA, CATIE, in Guatemala, and in other of the developing countries. He travels into all of these countries every week or two. Clearly, he is an administrator of administrators.

Dr. Murphrey explained that ROCAP has no research or other programs of its own. ROCAP is an organization of USAID. Its function is to coordinate all AID activities in Central America. Its intent is to develop capabilities for these countries in the areas of agricultural science, and related information. Dr. Murphrey spends his time in making short visits to the country administrators of the various projects. He emphasized strongly, that any program the bean/cowpea CRSP develops should include the capability of "finding our tracks" on repeat visits. In other words, the visits must be close enough together that the collaborating LDC scientist has not shifted to other activities, changed jobs, or moved from that location.

Dr. Murphrey also emphasized the need for the bean/cowpea CRSP to use CATIE or another regional organization as a means of maintaining contact with the LDC components of the CRSP. He indicates that because the staff of such regional organizations are in more or less constant contact with the national programs, they are in a key position to provide liaison between the U.S. management entity and the national scientists and world centers such as CIAT.

Dr. Murphrey also strongly emphasized the need for participating U.S. scientists to learn the language of the developing country. He emphasized that when we require a translator, we are a burden rather than providing as much assistance as possible. Many scientists in the developing countries will not speak English, even when capable, and others cannot speak English.

C. Panama

1. IDIAP

Visited: Dr. Gaspar Silvera, Legume Programs Leader

Level of Collaboration requested: Tertiary

Dr. Silvera was one of Dr. Adams's students. We visited him during lay-over time in Panama while waiting for the flight to Colombia. He is working with beans, cowpeas, and soybeans. This was an unofficial visit. Silvera's office is in Panama City. The nearest research fields are about sixty miles away. Most of the bean research requires a flight to the experiment station. The people of Panama prefer large red kidney sized and preferably red kidney colored beans, but yellow and red-mottled beans are acceptable. This is distinctly different from the preferences of most other South American countries.

D. Colombia

1. ICA - Investigaciones Ciencias Agropecuaria

Visited: Gilberto Bastidas, Program Leader of Grain Legumes, Palmira

Level of Collaboration requested: Primary

Mr. Bastidas has a Master's Degree from ICA's graduate school program in Bogota. He is in charge of bean research, cowpea research, and soybean research. He has a staff of four technicians at Palmira. There are breeders with a B.S. Degree at Pasto, Bogota, and Medellin. One additional man works with cowpeas on the lowland north coast of Colombia. They work cooperatively with CIAT for beans and IITA for cowpeas. Only variety testing is done with cowpeas. They also work cooperatively with INTSOY with soybeans. Because inflation is reducing his program effort, he is working very closely with CIAT and receiving, as other Latin American countries do, CIAT's breeding lines. He is interested in nutritional research but does not have an organized program. Colombia has 100,000 hectares of beans, 10,000 of cowpeas, and 70,000 of soybeans. He believes there is a potential for increased hectareage of cowpeas on the north coast, but this would be primarily for export and there is no known international market for cowpeas. ICA has a Socio-economic Department in Bogota. It is a large program with some activities on beans and should be visited at a future time.

Bastidas divided beans areas into hot (0 to 1500 meters altitude), intermediate (15 to 2200 meters), and cool (above 2200).

2. US/AID - Colombia

Visited: Dr. Dave Schaer, Agricultural Development Officer, Missions Office.

Level of Collaboration requested: Primary

Dr. Schaer volunteered to have our questionnaire translated into Spanish. Inasmuch as we did not visit in Bogota at the ICA headquarters, he strongly advised us to do so at the next opportunity. This could include a visit with the Socio-economic Department.

3. CIAT - Centro Internacional de Agricultura Tropical

Visited: Dr. Art Van Schoonhoven, Bean Program Leader
Dr. Peter Graham, Bean/Cowpea CRSP Liaison Designate, a Microbiologist
Dr. E. Drijfhout, Pathologist (Visiting)
Dr. Steve Temple, Breeder
Dr. Jeremy Davis, Breeder of Climbing Beans
Dr. Shree Singh, Breeder
Dr. Howard Schwartz, Pathologist
Dr. Francisco Morales, Virologist
Dr. Douglas Laing, Physiologist
Dr. John Sanders, Agro-Economist
Dr. Michael Thung, Early Generation Yield Trials and Phosphorus Nutrition Studies
Dr. Oswaldo Voysest, Coordinator of International Bean Yield Adaptation Nurseries

Level of Collaboration requested: Basic research in areas supportive of CIAT's mandate.

CIAT describes their activities as a very large breeding program for beans. In other words, all disciplines support the breeding of improved bean varieties for use in Central and South America and elsewhere in the tropical world where beans are grown. CIAT does not aim to develop varieties. They will make crosses for any national program that requests them. They then provide the segregating material at a generation between F-2 and F-6 or F-7 that is appropriate to the capability of the scientists in the national country programs.

With this mandate, their research leans heavily toward the applied rather than toward basic research. CIAT's mandate is to increase bean production in the tropics as rapidly as possible. They welcome the opportunity to have interaction with the national programs on one hand and with the basic sciences on the other.

CIAT conducts an extensive training program in bean production, breeding and selection procedures, and trains bean extension personnel.

The agro-economist is working closely with the rest of the team. He is testing the economic merit of changes in the current farming system of small farmers. He does this by changing fertilizer application, or time of application, or variety, or a curative spray for diseases and insects, a preventative spray (applied before the disease or insects are seen), or nematocides. His objective is to determine in monetary (economic) terms what these changes will mean to the farmer.

A Post-Doctorate is currently doing meteorological research to define the characteristics of bean growing areas.

CIAT has outreach programs in Guatemala, Honduras and perhaps other countries. The man in Guatemala is working on diseases, the man in Honduras is working on agro-economics.

A seed technology component is being planned. The major germ plasm collection in the world for beans is located at CIAT.

We had extensive discussion with Graham regarding the SOTA. The discussions dealt primarily with the reorganization of the outline and with potential authors. The CIAT team had reviewed the SOTA outline. They felt it advisable that the bean and cowpea components be as thoroughly integrated as possible, rather than in separate but otherwise duplicative chapters. One item not previously entered in the outline was meteorological considerations. We concluded that the socio-economic section needs further work on the outline by socio-economists. It was also deemed necessary that the final section on constraints be sufficiently balanced with statements of research-imperative needs. Also, physiology should stand in a section by itself. Within the section on fertilization, Graham felt that the interaction of mycorrhiza merits as much consideration as the Rhizobium-nitrogen relationships; this is especially true for cowpeas.

E. Chile (Visited only by Adams)

1. INIA - Instituto Nacional Investigaciones Agropecuaria

Visited: Dr. Alfredo Madrid, Director, Instituto Nacional Investigaciones Agropecuaria
Dr. Hiram Grove, Coordinator of Technical Relations
Sr. Gabriel Bascur, Bean Program
Sr. Jorge Aeschlimann
(The latter two are both stationed at La Platina, the INIA station near Santiago.)

Level of Collaboration requested: Primary, unofficially

Dr. Madrid is very interested in a Title XII CRSP that would involve Chile.

About 40% of irrigated land is in the hands of small farmers; a "small" farm in Chile may range in size from 5-40 hectares. Most beans (some 110,000 hectares) are grown in mono-culture in Chile.

Mr. Engel, President, Engel & Co. (an import-export firm in Santiago) would like to give money and encouragement to INIA to hire an entomologist to work on the weevil problem, if we can get a Title XII CRSP approved for Chile.

2. US/AID - Chile

Visited: Mr. Richard Apodaca
Mr. Ault Nathanial, Consulado, U.S.A., Merced 230 - 2nd floor

Mr. Apodaca and Mr. Nathanial are AID officials in Chile. They are not personally against Title XII but indicated that for the moment the human rights issue prevents collaboration with Chile. I pointed out the double standard that exists and the apolitical character of CRSPs. They insist the ambassador can/will not approve Title XII activities in Chile at this time. I made them aware of INIA's interest and the interest of the Universidad Catolica; the latter they knew about.

Since visiting Chile, we have received a letter from Dr. Alonzo Bravo of the Pontificia Universidad Catolica de Chile which outlines several problem areas in beans where collaboration with a Title XII CRSP would be welcome.

12

3. U. S. Embassy

Visited: Mr. Max Bowser, Agricultural Attache, U.S. Embassy, Agustinas 1343.

Mr. Bowser is concerned with commercial interest almost exclusively. He personally thinks tying technical assistance to political affairs is wrong.

The objective in seeing Mr. Bowser was to see if the State Department policy, as indicated by AID people, was really exclusive of Title XII. Bowser hadn't more than heard about Title XII and didn't know the answer to my question. He seemed like a nice man that wished politics was out of the picture—that is, the politics of human rights. He pointed out that the government of Colombia was a much more repressive government than Chile and yet we can't do enough for Colombia, because the government is ostensibly democratic.

CONCLUSIONS AND RECOMMENDATIONS

1. The LDC institutions are divisible into three categories. First is the international center (CIAT). The second grouping is the regional centers (CATIE and INCAP). The third and largest grouping is the national programs of the individual countries of Central America. Most of the highly trained and skilled workers with Ph.D. training are at CIAT, CATIE and INCAP. These institutions have teams of scientists with overlapping efforts in numerous disciplines. On the contrary, the national programs have only a few people trained at the Ph.D. level. With only one or two highly trained people, these programs cannot be effective multidisciplinary efforts. The limited personnel must handle all disciplinary areas to the extent that their limited training and division of time among numerous responsibilities permits. An additional feature of the personnel of national programs is frequent change of personnel and leadership.

It should be remembered that the international center (CIAT) has highly trained scientists doing relatively applied work. Their goal is an increase in bean production. CIAT scientists are anxious to have collaboration with U.S. scientists. They want us to do basic research that will facilitate their applied efforts. The regional center (CATIE) does some research, but most of its research is done through cooperation with the national institutions. CATIE's objective is to support and build the national agricultural research programs with an emphasis on small farms and their farming systems. INCAP's nutritional studies are excellent.

The opportunities for U.S. scientists to collaborate with scientists in the LDC institutions are (a.) with CIAT, CATIE and INCAP (b.) with the national programs which have very applied bean efforts. There should probably also be opportunity to collaborate with some of the stronger programs in graduate countries such as Brazil and Mexico, provided the research results are transferrable to the developing countries.

2. U.S. scientists will generally find it easier to communicate on a peer basis with the scientists of CIAT, CATIE, INCAP or the stronger bean programs in graduate countries. It would seem appropriate that some collaboration be developed with these institutions. The true objective of the bean/cowpea CRSP is to support and develop the national programs, and pass-through money cannot be transferred from U.S. institutions funded by the CRSP to the international, regional or perhaps graduate programs. Therefore, it would seem appropriate that the bean/cowpea CRSP be planned so that opportunities are provided for collaboration at the more basic levels with the international, regional and graduate country programs, and that an effort be made to link one or more of the U.S. scientists with each of the national programs in the developing countries. Whenever a U.S. scientist visits Latin America, he should definitely visit with the national program. In general, it will take longer to develop true collaboration and peer-to-peer communication with these national programs. However, we must begin where these programs are currently and build their capability, this being of the CRSP.

3. In collaborating with the national programs, we must accept that there will be constant "disappointing" turnover of personnel. This occurs primarily because when these scientists have received training at the Master's and Ph.D. level, they become one of the very few people with such skills in their country. Very frequently, after two to five years on the job, good people are offered salaries by commercial institutions that are three times those they earn from the national programs. Therefore, the better and more successful personnel are pulled into the commercial stream of agricultural activities. For those of us trying to build these institutions, this is disappointing. But, these individuals make genuine contributions in the commercial area; their services are desired by their countries and their contributions can be great. Thus, we must be prepared to continue to train and re-train people until the pipelines for highly trained personnel within these countries have been adequately filled.

4. Because of the need to fill and re-fill the trained-scientist positions within the national bean programs, there will be an indefinite need for training as a major part of the CRSP. Training for research at the Master's and Ph.D. level will continue as a need for many years. The training of LDC students by U.S. institutions will strengthen the potential for establishing permanent linkages with the national programs.

5. Those of us who function in the Collaborative Research Support Program should maximize our capability of injecting knowledge and training into the LDC situation for small farmers. Achieving maximization requires that we learn the language of the LDC country(s) that we participate in. It also requires that we view the needs for injected information from the viewpoint of the small LDC farmer. Obviously this must come from experience with such farmers and with the national bean programs.

6. In general, extension programs within the developing countries are even weaker and less well supported than the research effort. There is a large and weak gap between the research knowledge available and its adoption by the farmers.

7. There has been considerable research on beans, but no major advances in production have occurred. Production per hectare may have decreased in many instances with the introduction of major break-throughs in other crops. This is because these crops have taken over the better land and bean production has been relegated to the poorer soils.

8. A primary goal of the bean/cowpea CRSP should be to support the extension of research training, research results, and research methodologies that are developed at CIAT and CATIE. These are the objectives of these international and regional institutions, and our collaborative efforts should also be supportive of their objectives.

9. The definition of "small farm" is not constant. In some countries it may refer to farms that are one to five hectares while in other countries it refers to a size up to twenty hectares. It is probably correct to say that about 85 percent of the beans are grown on small farms, and that 85 percent of these beans are grown in association with other crops.

10. The Central American countries visited usually have some cowpea research, but this is conducted as a subsidiary component to the legume program which concentrates on beans. Therefore, it will be difficult and will require time to establish a cowpea linkage between U.S. scientists and these LDC scientists.

RECOMMENDED PROCEDURES FOR PLANNING THE BEAN/COWPEA CRSP

1. FAO, the Food and Agricultural Organization of the United States, is conducting a meeting at Santo Domingo in the Dominican Republic on February 19-24. Statements from most Latin American countries have already been collected, which present that country's listing of constraints and problems relative to bean production. Also, the PCCMCA (Central American Cooperative Program for Improvement of Food Crops) is meeting at Tegucigalpa, Honduras on March 14-23. Further, CIAT is inviting many of the bean program personnel to CIAT for a November workshop meeting. It would seem appropriate that these meetings be utilized to the fullest possible extent in the planning effort. This seems especially pertinent because all of these meetings tend to invite leading scientists or administrators and because the February meeting is specifically aimed at defining constraints to bean production.

2. At the time that U.S. institutions are requested to submit proposals for the bean/cowpea CRSP, it is suggested that the LDC institutions also be asked to submit, probably in much less detail, a statement indicating how their own program and desires for assistance relate to the constraints that are outlined. They should indicate which constraints they are working on, and to the extent they are prepared, suggest the U.S. institutions that they would like to cooperate with on research relative to these constraints. The LDC replies to this should be available before the first peer review meeting to evaluate the bean/cowpea proposals and CRSP planning effort.

3. Each proposal received from a U.S. scientist should, in addition to defining the problem and goals, indicate the LDC institutions with which it would seem appropriate to establish linkages, or with which that institution would like to establish linkages, and with which that institution has a natural basis for linkage such as former students or other contacts. Each proposal received from a U.S. institution should also have a one- or two-page summary. After the first peer review meeting, the summary for proposals that are to this point accepted, or are suggested for modification, should be sent to the appropriate LDC institutions. The LDC institutions should be requested to comment on the acceptability, applicability and/or suggested modifications in order to make the proposal meet their needs. These responses should be available from the LDC institutions for the second meeting of the peer review panel. Subsequent to the first peer review panel, but before the proposal summaries are sent to the LDCs, an updated summary may be requested from those institutions for which modified proposals are requested, or for proposals where the peer panel thinks the summary could be improved.

4. We suggest that rather than implementing the February workshop that has been announced, that the FAO, PCCMCA, and the November CIAT meeting be utilized in developing the linkages required by the CRSP. The travel monies required for the workshop could be used to bring U.S. scientists to a bean/cowpea CRSP meeting at CIAT just before, or just prior, to the November CIAT meeting. This meeting should be used to facilitate contacts between U.S. scientists and LDC scientists that are likely to be collaborating in the ultimate bean/cowpea CRSP. It should also be used to facilitate opportunities for U.S. scientists to visit with their potential counterparts at the base of the LDC counterpart.

CONSTRAINTS TO BEAN/COWPEA PRODUCTION AND USE

A separate statement is being prepared regarding these findings.

REPORT OF VISIT TO
International Institute of Tropical Agriculture
at Ibadan, Nigeria
February 13-15, 1979
D. H. Wallace

Visited:

Dr. W. K. Gambel, Director General
Dr. B. N. Okigbo, Deputy Director General
Dr. S. V. S. Shastry, Director of Research
Dr. P. R. Goldsworthy, Leader of Grain Legume Improvement Program

Dr. M. Lukefahr, visiting entomologist
Dr. L. Jakai, entomologist
Dr. D. Allen, virologist
Dr. G. Thottappilly, virologist
Dr. H. W. Rossel, virologist
Dr. H. C. Wien, physiologist
Dr. E. Pulver, physiologist
Dr. A. Redden, cowpea breeder
Dr. B. Smithson, cowpea breeder
Dr. A. A. Ayanabe, microbiologist
Dr. Rao, microbiologist
Dr. B. T. Kang, soils and farming systems
Dr. G. F. Wilson, agronomist and farming systems
Dr. F. Winch, agricultural economist

Mandate: IITA was originally given the mandate to work with cowpeas in the lowland tropics. Experience has demonstrated that cowpeas are not well adapted to the humid lowland tropics. Cowpeas are an important crop in association with other crops in the dry areas between the Sahara Desert and the wet lowlands. One objective is to develop cowpea production in the lowland tropics. The effort is also shifting toward work with cowpeas in the dry tropical areas where cowpeas are used most prominently. IITA collaborates with ICRASAT and with national institutions. There is an IITA man at Goiania, Brazil, the country with the most cowpea production in Latin America.

Level of Collaboration requested. IITA is an international institute. It is interested in basic research that is supportive of its applied efforts on cowpeas.

Insects: IITA considers insects to be the major constraint to higher yields of cowpeas. Yields can easily be doubled or increased several fold by insect control. Current control is totally dependent on insecticide application. Thrips are probably the most damaging insect and about eight lines have been found to have resistance. Insects that damage the pods are also serious. Storage weevil is serious, and some resistance has been found. The supportive research which IITA desires include: defining of economic thresholds of insect damage; developing methods for sampling insect populations; developing methods for rearing insects for screening purposes; studies of the mechanisms of resistance. Recognized sources of resistance need to be compared for nutritional acceptability of the bean. Abu Bella University and Ife University are the only national programs with entomology efforts. Cowpea curculio is not a problem in Africa, as it is in the United States.

Diseases: Viruses are numerous and serious. The symptoms are not well known, but at least twelve viruses are recognized. The viruses are genetically variable and resistance breaks down. The virology group is very anxious to have basic research support. Most support to date has come from Wageningen, Netherlands. Help is needed to extend the ELISA technique, which permits typing viruses without transferring the virus across international borders. Seed-borne bacterial diseases are a problem.

Nitrogen-fixation: Cowpeas are never nitrogen deficient; they are always nodulated in Africa. Cowpeas are promiscuous with respect to accepting the indigenous rhizobial strains. There is need to understand the diversity of rhizobium strains, and the basis for any cowpea genotype-rhizobium genotype specificities. Cowpeas use the rhizobium of beans, groundnuts, etc., but the reverse does not occur. Why are cowpeas universal acceptors of rhizobium? Soybeans are very rhizobium-strain specific. Cowpeas do not respond to inoculation, but might if superior rhizobial strains were identified and matched with the appropriate cowpea genotypes. Boyce Thompson Institute and Cornell University have just received support from the UN for work on these projects. There is need to determine the effects of stress on rhizobial fixation. What is the soil temperature effect? What is the water effect?

Adaptation: IITA has collaborated extensively with Reading University on studies of temperature and photoperiod effects. It has been demonstrated that certain regions must have photoperiod sensitive cultivars, so that they can be planted when weather permits but will flower and then mature just as the rainy season has sufficiently ended. Other areas can use photoperiod insensitive lines. It is intended that a post-doctorate capable of growth simulation modeling will attempt in the near future to integrate the acquired knowledge.

Yield Physiology: Cultivars with a longer pod-filling period would presumably give less senescence. Variation does exist for this characteristic. Would like to determine the effect of pod temperature on rate of development. More information is needed on the flow of photosynthate to nodules in relation to nitrogen fixation. This could be obtained by C^{14} dosing of lower leaves. More extensive meteorological data are needed.

Drought resistance: Because cowpeas are grown in the dryer tropics, improvement of drought resistance would be very beneficial.

Farming systems: Cowpea will never be the main crop; this will usually be maize or sorghum and millet. Cowpea does help maintain soil fertility: 60 to 70 percent of the nitrogen is left with the cowpea refuse. The main crop may also be cassava. When cowpeas is given the advantage over cassava for three weeks the yields of cowpeas and cassava are hardly affected. The cassava has nine months in which to recover. Most of the agricultural economics work has been done with main crops, rather than cowpeas. Most of the useful socio-economic work has been done at Ahamadu Bello University. IITA has started work with cowpea and will be doing more. Palatability and cooking qualities should be better understood, with respect to usage in different countries.

Conclusions relative to planning the Bean/Cowpea CRSP:

IITA indicates that it takes six months or more to plan workshops and bring people together in Africa. The Director of Research invited us to attached any meetings we may wish to hold to their annual workshop. The 1979 workshop will be the week of October 22. He suggested that we have our meeting before or after this workshop, which will be on insect resistance.

Brief Report of the F.A.O. meeting on Limitations to Production of Pulses in the Caribbean and Central America--Panama, in Santo Domingo, D.R., held February 19-23, 1979. Attended and reported by M. W. Adams

The meeting was held in the facilities of the Central Bank of the Republic, and sponsored jointly by F.A.O. and the Dominican Ministry of Agriculture. In addition to production limitations a major objective was to find a consensus on a plan for bringing about a better coordination of pulse research and development in the region.

For both objectives representation was desired from all countries of the region and from the various organizations and centers with an interest in or program of research in any one of the grain or food legumes, including peanuts and soybeans, grown in the region. The list of participants included 63 names, representing almost every country and/or commonwealth (American, British, French, Dutch) island in the region, plus F.A.O. personnel, and 2 individuals from the U.S.

Documents on production constraints prepared by country representatives were distributed to all participants. Copies are on file in the Bean/Cowpea CRSP Planning Center at Michigan State University. In addition CARDI (Caribbean Agricultural Research Development Institute), having previously been requested (commissioned) by F.A.O. to do so, had prepared an extensive document which served as a suggested plan of organizing and proceeding so as to achieve coordination and integration.

Following two days of verbal presentations on these problems by most country spokesmen, the participants were asked to assort themselves into three commissions (working groups) to consider an assigned task and bring recommendations back to the full Consultation for discussion and adoption. The commissions were to consider the following tasks:

Commission No. 1: Production

1. Natural factors affecting production
2. Economic and social factors affecting production
3. Potential for increasing production
4. Seed production
5. Common elements at the regional level
6. Development of a program

Commission No. 2: Investigation and Technology Transfer

1. Present situation
2. Possibilities of regional cooperation and integration
3. Development of a program

Commission No. 3: Coordination, complementation, and collaboration between countries and between national institutions and regional and international centers.

1. Present situation

2. Possibilities in the short, medium, and long run

3. Development of a program

4. Assignment of resources

The three commission reports were presented on Friday morning to the full Consultation and received considerable review.

The report of Commission No. 1 is given here in the form of 6 points (appended). I need add only that the constraints as listed under item 1 of the report are to be interpreted broadly; for example, "high quality seeds" means high quality in the physical, biological, and genetic senses. In addition, inoculation and nodulation technology, soil and land preparation, and farming systems research were approved by the Consultation as constraints.

Commission No. 2 report (appended) approved most of the suggestions in the CARDI document, except for section 25, in place of which an alternative hierarchy of multiple coordinators was proposed. This was both attacked and defended by various participants. Eventually it was agreed that this alternative was not acceptable, and it was decided that provision #25 in the CARDI report represented the most practic l approach to a modus operandi for achieving coordination.

Commission No. 3 had also, by assignment, dealt with the coordination problem. This group supported a more informal voluntary arrangement or structure for coordination, with only 2 full-time coordinators for the region. This proposal was opposed by the zealots of group #2 with their desire to impose a very formal coercive structure involving a corps or coordinators.

As noted previously, neither this proposal or the proposal of group 3 received endorsement.

As the matter rested at the conclusion of the day, the FAO is authorized to proceed as per the CARDI plan, but making no final decisions on numbers of coordinators necessary to carry out the functions until after the various Ministries of Agriculture have given approval that they will participate in a region-wide coordinated research and development program for the food legumes.

My personal opinion is that this will take time but that eventually agreement to participate will be forthcoming. FAO will then approach funding agencies for financial support. If and when the program of coordination gets underway, the Bean/Cowpea CRSP will and must be a partner, if we are to work in the member national programs. We will have to ingegrate our activities with the coordinated program of the region.

I explained the Bean/Cowpea CRSP to Dr. Villanueva, Director of Research of the Dominican Ministry of Agriculture, and gave him some of our prepared papers on participation. He is very receptive but would like to study the material left with him, and receive any additional information we have.

ORIGINAL EN ESPAÑOL
TRADUCCION PROVISORIA

WORKING GROUP No. 1

Production

Following the guidelines for the formulation of a draft project proposal for the desing of a cooperative program on food legume production in the Caribbean, Central America and Panama, and in what is related to short-term objectives, this group resolves:

1. With reference to the identification of different intermediate level technological components, with a wide geographic distribution, that they are the following:
   a) High quality seeds
   b) Herbicides and pesticides
   c) Chemical fertilizers
   d) Adequate machinery
   e) Irrigation and drainage

2. The following factors were identified as constraints to dissemination of technology:
   a) Inadequate credit, both in opportunity and amount
   b) Lack of agricultural insurance
   c) Failures in the marketing systems

3. In relation to formulating specifics programs for overcoming the al - ready identified limiting factors, it is decided that the different de legates suggest their respective government, to develop those programs that, according to there own characteristics, are considered the most adequate for rapidly increasing production and productivity of food le gumes.

4. Strengthen extension services, promoting training of national tech - nicians in improved production systems, requesting the neccessary tech nical assistance from the specialized international institutions. This assistance could be short-term training of national technicians at the

international institutions, the contracting of highly qualify technicians to train local experts, or both posibilities.

5. Study the technical and economic feasility of introducing intermediate level agricultural mecanization, with the purpose of increasing labor efficiency in the agricultural interprises.

6. Evaluate the need of transfering experience and knowledge among countries with similars ecologic conditions.

Another short-term objective is to obtain a decided and solid support from governments for the formulation and execution of specifics projects in order to disseminate already proven technological peckages. This support will require the appointment of adequate personal in sufficient numbers to do research, extension and production work.

Finally, it is considered that a primary short-term objective, is to have an operative seed legislation. All this, to guarentee an adequate supply of certified seed of national and introduced varieties, that experimentaly would have shown ebility to produce acceptable yields in the different countries in the area.

- 3 -

Suggestions to Working Groups No. 2 and No. 3

1. That in the future, attention is given to seed inoculation, in view of the increasing cost of nitrogen fertilizers.

2. That attention should be given to the storage capacity for food legumes since this type of infrastructure is required in a policy designed to increasing production and productivity.

3. Request the support of the other working groups for the propcsal made by Mr. J. Jackman, of Caymen Islands in the sense that this group of experts recognises and thanks FAO's iniciative in organizing the present Consultation.

WORKING GROUP No. 2

Research and Transfer of Technology

The working group on Research and Transfer of Technology, has resolved: that we agree with the observations made in the FAO document TLAT/78/Cons/801/5, paragraphs 1 through 29, with exception of number 25, in place of which we are suggesting the structural organization and methodology that are explained in the following annex.

In food legumes, we propose the integration and cooperation at the regional level, among national and regional institutions, countries and FAO, as is suggested in the attached chart.

I. The role and function of the different groups mentioned in the chart are the following:

1. Direction of the Food Legume Programme

   - The FAO Regional Representative will convey the Committee, which will be integrated by high level personnel from international, regional and national cooperation agencies.

   - We suggest that the committee be formed by a limited number of members.

2. The Committee will be the link with FAO and other international agencies that channel funds.

3. The Committee will list, revise and approve all the programmes and will search and allocate the funds.

4. The Committee will maintain a link with the governments in the region.

II. FAO Coordinator and local counterpart

1. The Coordinator will be an expert in the corresponding crop (one for each).

2. Will maintain a link with international and other high level institutions, specially in order to obtain information and updated material related with the specific crop.

3. Will maintain a link with the national directors of the different crops in order to obtain reports on the problems and achievements and to deliver the necessary information and material on specific crops.

4. Will act as keeper of all the information stemming from within as well as from outside the region on the specific crop. This will determine the present level of information for preparation of technological packages.

5. Will prepare practical technological packages for different zones in the region, based on the information obtained from them and available knowledge.

6. With the purpose of adequately training local personnel, the FAO Regional Coordinator will work with the local counterpart for each crop.

7. Will perform other function as requested by the directive committee.

III. Working Groups

1. Membership
   a) All the coordinators
   b) National directors and other high level specialists and agricultural workers of the region.

2. Will receive project proposals from the national directors and will review and formulate regional projects.

3. Will examine the results of research, formulate recommendations to be used in production programmes and will deliver them to the national crop directors.

4. Will deliver proyects to the directive committee in order to get financing.

5. Will perform other dutius as requested by the directive committee.

IV National integrated legume production programmes will be established depending on the available rescurces in each country. The regional coordinators will assist national governments in structuring their own programmes.

The present level of research and transfer of technology will be determined by the regional coordinators on the basis of existing information.

V Possibilities for regional integration and cooperation

1. In the short-term
Practical technological packages for the different zones mentioned above, based on existing knowledge, should be developed by the regional coordinators.

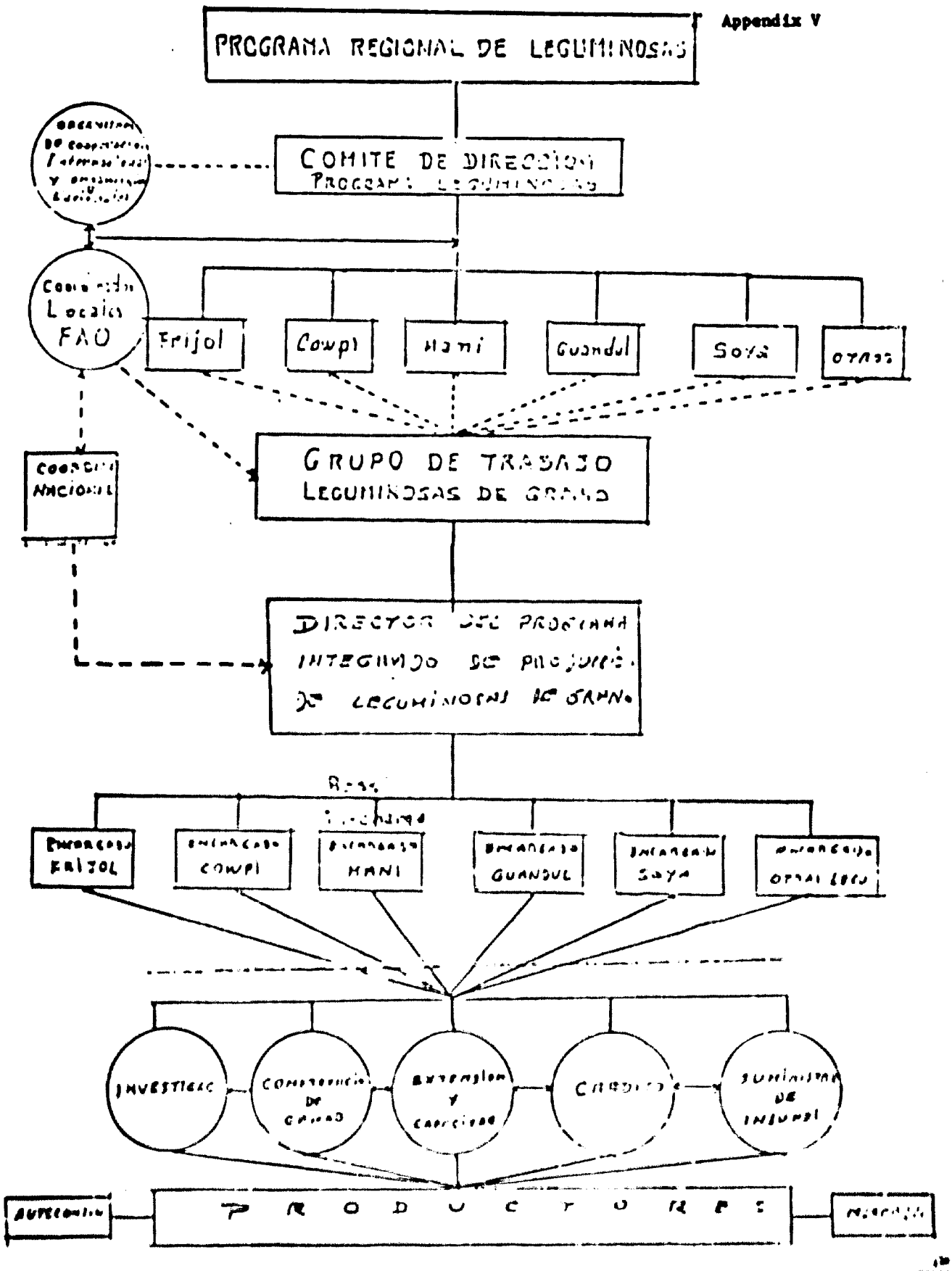
2. Medium-term:
The projects will be developed by the food legume working groups.

3. Long-term:
Long-term projects will be developed according to the indicated system, in order to have a continous development of the programme.

VI Development of a Programme

The suggested research system must be closely linked with the production system developed by Working Group No. 1 and the coordination developed by Working Group No. 3. This would ensure the achievment of the proposed objectives.

Appendix V



WORKING GROUP N° 3

COORDINATION, COMPLEMENTATION AND COLLABORATION AMONG COUNTRIES AND NATIONAL, REGIONAL AND INTERNATIONAL ORGANIZATIONS

The Committee met and considered many models for achieving the three goals stated in the assigned task. Formal and informal, vertical and horizontal, and legal and voluntary models were discussed thoroughly. The Committee recommends that any organization model for promoting food legume production in the Caribbean, Central America and Panama be informal in nature and further that linkages be established between scientists directly on a subject matter basis. The government of each country should support participation by its scientists in such informal relationships.

Scientists should be encouraged to develop relationships with their colleagues in relevant national, regional and international organizations. A coordinator can act to facilitate improved communication of research results, help prevent duplication of efforts and encourage adoption of research results through establishment of an effective network.

Concern was expressed by the Committee that any staff, programs of activity should be clearly focused on adoption of improved varieties, crop husbandry techniques, and methods of utilizing food legumes by the farmers. The Committee especially recommends models like ICTA 1/ in

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1/ Instituto de Ciencias y Tecnología Agrícola

Guatemala and PROMIF 2/ (now PROMIFSA) in Honduras as effective systems for achieving adoption of research by farmers.

The Committee identified relevant Caribbean regional organizations as INRA 3/, IICA 4/, CARDI 5/ and CFCS 6/. Relevant national organizations with regional responsibilities should also be involved. These organizations include UPRM 7/, U I 8/ and CFNI 9/. Liaison should be established with other regional organizations such as CATIE 10/, INCAP 11/ and PCCMCA 12/ in Central America.

2/ Proyecto Maíz y Frijol

3/ Institut National Recherches Agronomique

4/ Instituto Interamericano de Ciencias Agrícolas de la OEA

5/ Caribbean Research and Development Institute

6/ Caribbean Food Crops Society

7/ University of Puerto Rico of Mayaguez

8/ University of the West Indies

9/ Caribbean Food Nutrition Institute

10/ Centro Agronómico Tropical de Investigación y Enseñanza

11/ Instituto de Nutrición para Centroamérica y Panamá

12/ Programa Cooperativo de América Central para el Mejoramiento de Alimentos

The Committee stated that the coordinator system for the bean programme in Central America should not change, but considered as possible mode for a second coordinator. Of special note is the relationship among the CIAT 13/ Bean Coordinator, IICA and PCCMCA.

The Committee agreed that the coordinator should serve as a facilitator to encourage joint research and sharing of results and to reduce duplication of effort. This would be accomplished through personal contacts, conferences and promotion of joint research activities.

Activities of the coordinator might include, but not be limited to the following:

1. Development of simple technical "packages", to increase productivity, without the need for immediate introduction of sophisticated technologies.

2. Establish programmes to produce adequate supplies of good quality seeds, and to promote effective distribution to the farmer.

3. Design effective programmes to achieve prompt dissemination of the most suitable techniques.

4. Encourage action at the country level to avoid duplication of efforts and to make the best use of the countries' ecologic conditions and available technical and financial resources.

5. Coordinate research activities, aimed at selecting high yielding varieties adapted to the region's different ecologic zones and best cultural practices.

13/ Centro Internacional de Agricultura Tropical

6. Coordinate trials on fertilization, resistance to diseases and pests, cultivation techniques and prevention of post-harvest losses.

7. Encourage utilization of legumes to improve nutrition of the people in the country.

8. Promote the exchange of information on technical and methodological aspects and genetic material.

9. Organize workshops with the participation of national technicians, both at the country and the multinational levels, whenever necessary.

10. Formulate training programmes for intermediate and professional level staff. The fundamental element of these programmes should be in-service training.

11. Dissemination at the regional level, of technical information (information sheets, publications).

12. Organize at least one yearly meeting, with the participation of representatives from the different countries involved to maintain a permanent evaluation of the programme's progress and to adjust, and if necessary reformulate, programmes of work accordingly.

Recommendations

1. That, initially, two coordinators be founded to develop a cooperative programme on production of food legumes in Central America, Caribbean and Panama.

2. That the second coordinator be located within a Caribbean institute, such as CARDI, or IICA which would provide logistic support and a research and training base.

Report of Attendance at the PCCMCA (Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alemenicios) XXV Annual Reunion held 19-23 of March, 1979 in Tegucigalpa, Honduras - By M. W. Adams

Meeting attended by D. D. Harpstead and M. W. Adams.
Purpose of meeting was the presentation of plenary papers (1 day) on such subjects as:

1. Twenty five years of agricultural research in Central America and Panama.

2. Participation of international centers in regional agricultural development. Dr. Robert Osler, CIMMYT, Mexico.

3. Agricultural development in Latin America.
   Dr. Jose Araujo, Director General of IICA, Costa Rica.

4. Strategies of mechanisms of development and technology transfer.
   Dr. Edgardo Moscardi, CIMMYT (Andean Zone) Ecuador.

5. The role of agriculture and food technology on nutritional problems in Central America.
   Dr. Ricardo Bressani, INCAP, Guatemala

On the second day, more specialized papers were presented, covering experiences in various Central American countries.

Three papers were as follows:

1. Analysis of the situation in seeds of basic grain crops in Central America and Panama.
   Dr. Ronald Echandi, University of Costa Rica

2. Strategies for increased production of seeds in Central America.
   Dr. Alexander Grobman, CIAT, Colombia

3. New Ideas for improving efficiency of maize varieties.
   Dr. Elmo Johnson, Dr. Ken Fisher; CIMMYT, Mexico

On the third day, Wednesday, the participants were divided into commodity sections for crop-specific papers. I attended the Bean section where 28 papers were presented, each of approximately 15 minutes in length, on a range of subjects from genetics to nutritional aspects.

On Thursday morning we presented a paper describing the Title XII Bean/Cowpea CRSP, and distributed 24 copies of the questionnaire on limitations to members of the audience. Dr. G. Galvez has agreed to collect these when they are turned in on Friday, March 23, and send them back to us at Michigan State.

Thursday afternoon we were bused to the Pan American School of Agriculture at Zamorano. Upon the recommendation of Dr. Jack Robinson, AID Mission Director, we met the Director of the school, Dr. Simon Malo, and explained briefly the Title XII program. Dr. Malo asked us to visit the school at a greater length and expressed his very strong interest in being considered as a research collaborator.

Dr. Harpstead and I also spent 2 hours on Wednesday afternoon with the AID Honduran Mission, discussing the Title XII concept and planning program. Present were Mission Chief Jack Robinson, Agricultural Officer Dr. Bill Jansen, and Mr. J. Lovaas, Program Officer and Sub-director of the Mission. Although at first very critical and challenging in their attitude towards Title XII, these men subsequently moderated this position, and in closing, assured us of their interest and the interest of the Honduran Ministry of Natural Resources (which includes agriculture), and offered their assistance as needed. In particular, they requested we keep them informed of activities of the planning process, and of any teams of Bean/Cowpea reviewers that plan to come to Honduras. We were supplied with some Sector Analysis documents that will be helpful in the planning process.

I was unable to see Dr. Contrera, Research Director of the Ministry but it would be appropriate to send him copies of documents we send to AID Missions on the Bean/Cowpea CRSP.

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Appendix VII

A PROPOSED OUTLINE FOR THE STATE OF THE ARTS (SOTA) ANALYSES FOR PLANNING A BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM

This was the SOTA outline being considered during late November to Mid December, 1978

Assignment to review literature and to prepare a statement for use in writing a first draft of The State of The Art for:

Subject Matter Area, Constraint, or Need	Beans	Cowpeas
I. Introduction		
A. Role of bean/cowpeas		
B. Need for more production of beans		
C. Subsistence Farmer - The Target Audience		
II. Production Statistics		
A. Hectarages and Yields/ha		
1. Latin America - By Country		
2. Africa - By Country		
3. Asia - By Country		
4. Australia		
5. Europe		
6. Oceania		
7. North America		
B. World Averages and Considerations		
III. Cultural Practices of beans/cowpeas		
A. Soil and Fertility Considerations and Practices		
1. Soil selection		
2. Soil preparation procedures		
3. Planting Methods, Procedures, Dates		
4. Tillage Practices		
5. Fertilization Practices		
6. Fertilizer Needs		
Macro elements		
Micro elements		
Mineral toxicities		
7. Soil acidity and liming		
8. Moisture stress		
9. Excess Water		
10. The role of nitrogen in bean/cowpea production		
a. Growing beans with fertilizer-N		
b. Growing beans without fertilizer-N		
(1.) Growing without Rhizobium inoculation		
(2.) Growing with Rhizobium inoculation		
(3.) Rhizobium strains		
11. Harvesting procedures, threshing		

Appendix VII

Assignment to review literature and to prepare a statement for use in writing a first draft of The State of The Art for:

Subject Matter Area, Constraint, or Need	Beans	Cowpeas
B. Cultural Procedures for:		
1. Weed Control		
2. Disease Control		
3. Insect Control		
C. Intercropping and Multiple Cropping		
IV. The Problems of Diseases and Pests		
A. Diseases		
1. Fungi		
2. Bacterial		
3. Virus		
B. Insects		
C. Nematodes		
D. Weeds		
V. Breeding to Overcome Production Constraints		
A. Breeding for Disease Resistance		
Fungi caused		
Bacteria caused		
Virus caused		
B. Breeding for Insect Resistance		
C. Breeding for Nematode Resistance		
D. Breeding for Higher Yield Potential		
1. Physiological and Morphological characteristics		
2. Adaptation to Environment		
a. Daylength - temperature		
b. Drought		
c. Excess water		
d. Soil compaction		
e. Salt and saline conditions		

Appendix VII

Assignment to review literature and to prepare a statement for use in writing a first draft of The State of The Art for:

Subject Matter Area, Constraint, or Need	Beans	Cowpeas
E. Breeding for Protein and Cooking Quality Quality Quantity Availability		
F. Improving Bean/Cowpea Breeding Methods		
G. Antimetabolites		
H. Organoleptic Factors		
I. Application of Modern Genetic Techniques 1. Mutagenic alteration of genetic variability 2. Tissue culture, protoplast fusion 3. Interspecific gene transfer		
J. Ongoing Yield Trials and Breeding Programs		
VI. Seed Certification and Technology		
A. Freedom from disease		
B. Freedom from genetic impurity		
C. Seed storage and handling		
D. Seed Distribution		
VII. Supportive Basic Research		
III. Traditional Utilization and New Product Development		
A. Commercial--Cooking quality, color preferences, nutritional quality		
B. Small farmer--Cooking quality, color preferences, nutritional quality		
IX. Storage of Edible Beans/Cowpeas		
A. Commercial		
B. In the home		

Appendix VII

Assignment to review literature and to prepare a statement for use in writing a first draft of The State of The Art for:

Subject Matter Area, Constraint, or Need	Beans	Cowpeas
X. Institutional Infrastructures		
A. Marketing System		
B. Transportation		
C. Credit		
D. Education		
E. Extension		
F. Industrial Development & Availability of Inputs		
G. Labor & employment situation		
H. Political stability		
XI. Values and Policies		
A. Governmental		
1. General-development policies		
2. In relation to small farmers		
3. Public works		
B. Sociological		
1. Regional or community practices—dietary preferences, customs, beliefs		
2. Small farmers' specific needs—risk evaluation, willingness to adopt new technologies.		
3. Individuals—educational goals, status		
C. Technological		
1. Energy vs. labor		
2. Self-sufficiency		
3. Capital intensity		
D. Environmental Management		

Appendix VII

Assignment to review literature and to prepare a statement for use in writing a first draft of The State of The Art for:

Subject Matter Area, Constraint, or Need	Beans	Cowpeas
XII. Prioritized Listing of Constraints		
A. Production		
B. Economic		
C. Socio-cultural		
D. Research constraints		
E. Extension		
XIII. Recommended Research Priorities		
A. Production		
B. Economic		
C. Socio-cultural		
D. Interface with extension		
E. Collaboration and networks		

XIV. List of Institutions Conducting Bean/Cowpea Research

Institution	Project	Scientist(s)

GUIDE TO PROPOSAL PREPARATION FOR THE BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM

Bean/Cowpea Planning Office
Crop and Soil Sciences Department
Michigan State University
East Lansing, Michigan 48824

TABLE OF CONTENTS

I. PLANNING VERSUS IMPLEMENTATION

In July, 1978, the Board for International Food and Agricultural Development (BIFAD) and the Agency for International Development (AID), under provisions of Title XII of the International Development and Food Assistance Act of 1975 and in accordance with recommendations made by the Joint Research Committee, gave priority to planning a dry bean/cowpea Collaborative Research Support Program (CRSP). Michigan State University (MSU) has contracted with USAID to plan and submit a Collaborative Research Support Proposal.

BIFAD invited representatives from eleven Experiment Stations concerned with dry bean/cowpea research to meet in Chicago on August 7, 1978. These representatives authorized MSU, acting on behalf of all interested Agricultural Experiment Stations, to submit a planning grant proposal to USAID. The proposal was submitted August 28; the planning grant was awarded to MSU under contract from USAID, effective October 1, 1978. Dr. Donald H. Wallace, now at MSU and on leave from Cornell University, is currently the planning coordinator.

The current USAID grant to MSU calls for the planning to be completed before March 31, 1980. This includes the State of The Art (SOTA) manuscript which is being prepared more or less independently of planning of the actual CRSP. Obviously, the first year or two of operation of the CRSP must blend together: (1) continuation of the CRSP planning, and (2) beginning implementation of the CRSP. Thoroughly planned collaboration of LDC scientists and their institutions with U.S. scientists and institutions is not possible, for instance, until the bean/cowpea CRSP is a known and quantifiably funded reality.

Persons preparing proposals must fully consider:

(1) There is current inability to be precise as to collaborative linkages, best allocation of funds, etc.

(2) The planning effort must extend into the first two-three years of funded implementation of the bean/cowpea CRSP.

(3) The proposal budget should be presented on a yearly basis. It is the intent of CRSPs (from Guidelines of the Joint Research Committee) that each proposal that is funded can anticipate at least three-five years of forward funding. Continued funding can be anticipated as long as the CRSP-directed annual review finds: (a) that progress is adequate and (b) that continued work is appropriate to the bean/cowpea CRSP needs, objectives and balance.

II. BACKGROUND INFORMATION

1. Objectives of the bean/cowpea CRSP. The overall objectives of the CRSP, which should also be the overall goals of each research or research-training proposal, are: (1) to develop that technology which can maximize production and use of beans/cowpeas in those LDCs where beans or cowpeas are the major protein supplying staple of the diet. (2) to place this technology with those LDC scientists and administrators who can and will extend it to the small farmers (3) to train LDC scientist(s) and improve the scientific capability of the LDCs. (4) to, over many years, link U.S. scientists and U.S. scientific output with the needs of LDCs. (5) to provide U.S. institutions with that program improvement derivable from combining an international component with their state- or regional-directed bean/cowpea research.

2. Definition of research within the bean/cowpea CRSP. The CRSP will support collaborative research and/or training for research. Research may range from laboratory to field work, from basic to very applied. The research may, and ultimately should, include field trials conducted by scientist(s) on the small farms of LDCs. The research may also, and ultimately should, include field trials conducted by the small farmer on his farm—with supervision provided by the scientist(s). This continuum from basic through applied field research is to provide for full development of that technology which can give increased bean/cowpea yield and/or use. Extension, or information transfer, which will not be directly supported by the CRSP, becomes a full-scale effort only after full development and testing of the technology (see Fig. 1).

   Probably 85% of all beans and cowpeas in the LDCs are grown in multiple-cropping associations. Therefore, the on-going farming system is the focal point from which all improvements of bean/cowpea production and use must begin, as illustrated by Figure 1. It can be assumed that the current farming system of a given locality has been derived through many generations of farming experience. Therefore, this farming system probably represents a near optimum procedure for the specific climatic, topographical, soil, sociological, family and economic environment in which it is employed. In other words, the farming system has developed to maximize human satisfaction, under existing conditions. It follows, that improvement must come from full biological and socio-economic understanding of the farming system, followed by devising and testing step-wise improvements of the currently used system. Major changes could be disruptive and counterproductive. Figure 2 indicates the important but relatively small function of the bean/cowpea CRSP in providing input toward improvement of the farming system(s) of the small farmer(s) of a developing country. Before preparing your bean/cowpea CRSP proposal, reading of the following papers is suggested: Dealing with Risk and Uncertainty in Crop Production, A Lesson From Small Farmers (Appendix VIII) and Don Victor: A Small Farmer in Costa Rica (Appendix IX). Both papers are by Dr. Luis Nararro, of Centro Agronomico Tropical de Investigacion y Ensenanza, Turrialba, Costa Rica.

3. Collaborative linkages with LDC institutions and scientists. Three levels of LDC collaboration with U.S. institutions are envisioned: (1) Primary LDC sites for collaboration will be institutions with on-going bean/cowpea research, with host-governments that have a strong interest in increasing bean/cowpea production and use. LDC scientists will work directly with U.S. scientists in the CRSP program. (2) Secondary LDC collaboration sites are where beans/cowpeas are somewhat less important crops, institutional capability is less adequate, and/or where the LDC government designates beans and cowpeas at a lower priority. Small scale trials or programs will be conducted with cooperation between the LDC scientist and U.S. scientists. (3) Tertiary level collaboration will provide only for receipt of research information by the LDC institution.

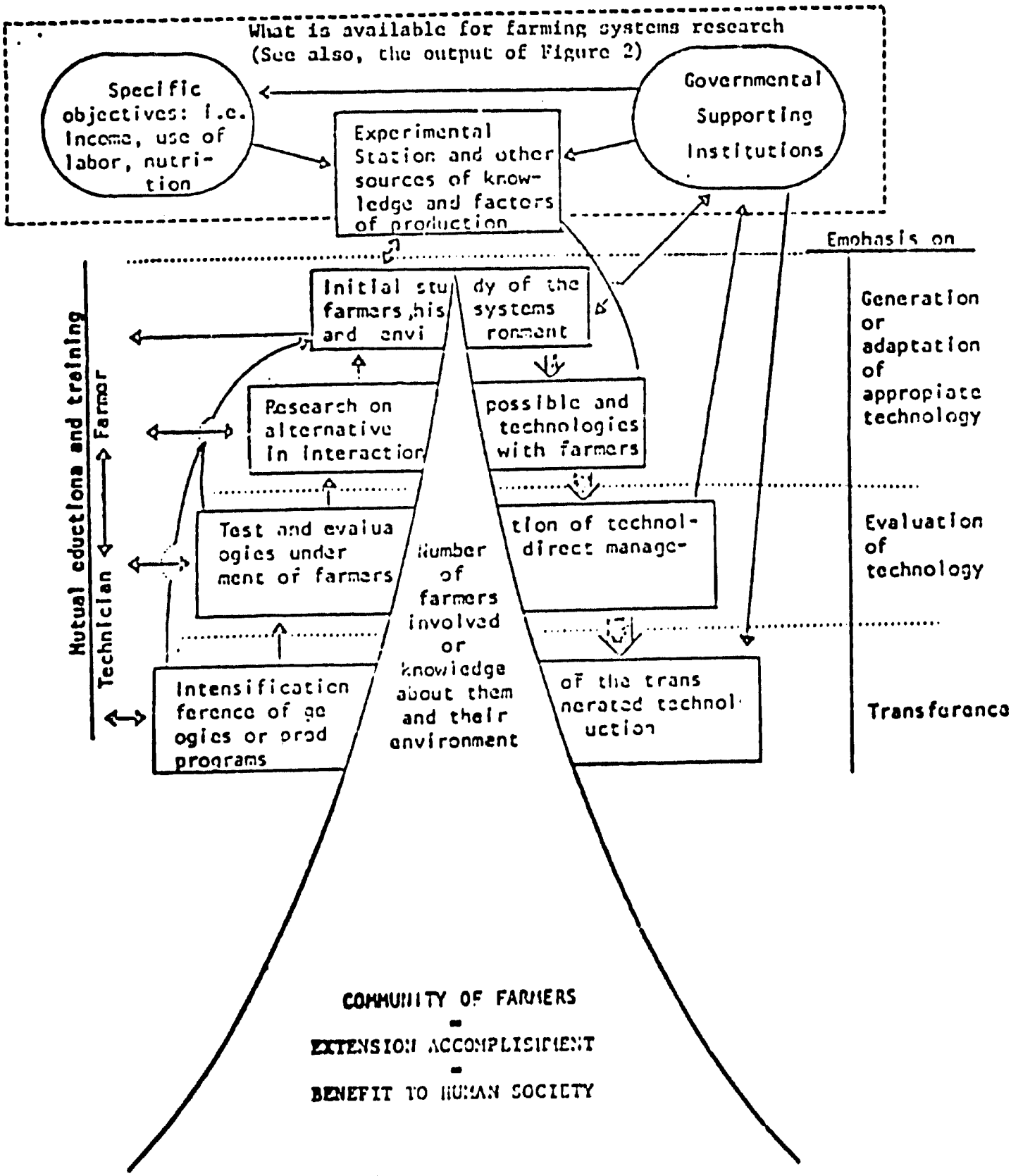

FIG. 1. INVOLVEMENT OF A RESEARCH TEAM IN AN AREA OF SMALL FARMS CONCENTRATION

Adapted From: Navarro, L.A. 1977. Dealing With Risk And Uncertainty In Crop Production, A Lesson From Small Farmers. Centro Agronomico Tropical De Investigacion y Ensenanza. Turrialba, Costa Rica.

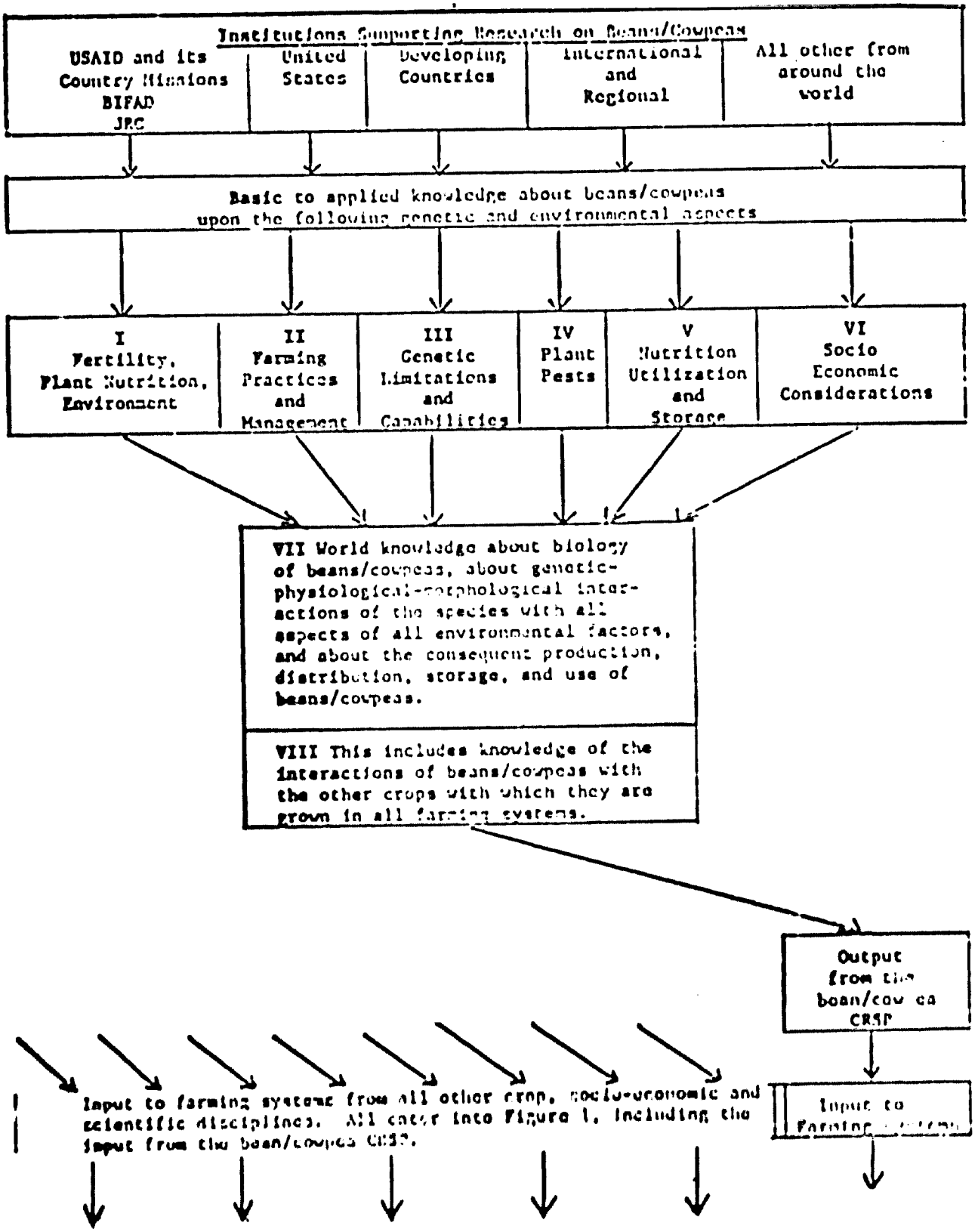

FIG. 2. ROLE OF THE BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM IN RELATION TO SMALL FARMERS OF DEVELOPING COUNTRIES.

For primary and secondary collaboration sites, it is expected that the LDC host governments would provide their facilities and local staff time as their share of contributions. The CRSP would fund U.S. personnel, and can fund other costs in the LDCs, including some LDC staff, facilities and equipment as needed, project related training, and some commodities. The extent of such U.S. pass-through funding would have to be worked out in each case. Pass-through funds are to be requested by U.S. institutions, in your proposal, but are to be spent by the LDC institution in support of your CRSP project.

4. Training activities that may be supported by the bean/cowpea CRSP. Training falls within four categories: (1) Short training courses and workshops which are of a non-degree type designed to increase capability in bean and cowpea production, field plot design, and other appropriate study areas. (2) Degree training activities for LDC personnel will be supported as appropriate for B.S., M.S., Ph.D. studies in relevant programs in the CRSP. The degree activities should be consistent and complementary to host country training plans. (3) Post-doctoral programs may be developed to refine a collaborating scientist's capability in working in pertinent specialized areas of research. (4) Professional exchange activities where the U.S. scientist and LDC scientist may exchange responsibilities in order to add depth to their programs.

III. WHO MAY SUBMIT PROPOSALS?

Requests for research or research-training proposals will be sent from the bean/cowpea planning office at Michigan State University to the Title XII representatives of selected educational and research institutions. Receiving institutions will be those that have indicated a manifest interest in the bean/cowpea CRSP, in response to the October, 1978 letter from Director Sylvan H. Wittwer of the Michigan State Agricultural Experiment Station. Each Title XII officer is responsible at his institution for distributing the request for proposals to all scientists that may have interest in preparing a proposal for the bean/cowpea CRSP.

IV. HOW MANY PROPOSALS SHOULD AN INSTITUTION SUBMIT?

The CRSP intent is a balance of interacting disciplinary activities on beans/cowpeas at the national (U.S.) and international levels. Each scientist or small group of scientists representing highly-interactive disciplines should submit a separate proposal. Proposals representing interaction between disciplines are encouraged. Integration of all disciplines represented at an institution for submission of one intra-institutionally integrated proposal is definitely discouraged. Priority for acceptance into the CRSP will depend on the proposed effort being complementary to the total needs and balance of the CRSP. The peer review panel should be able to clearly visualize individual disciplinary components of a proposal. They may select only one component from one institution and another from a second as a means of achieving balance for the CRSP. At the same time, the panel will want to understand the extent to which at each institution all possible relevant disciplines, as discussed in Section VII - CONSTRAINT TO BEAN/COWPEA PRODUCTION AND USE, can and will be focused specificially on beans and cowpeas.

V. WHEN AND WHERE TO SUBMIT PROPOSALS

This request for bean/cowpea CRSP proposals was mailed from the planning office on April 1, 1979. Proposals are due May 15, 1979. The administrative office of your institution should forward 20 copies of each proposal to:

Dr. Donald H. Wallace

Bean/Cowpea Planning Coordinator

Crop and Soil Sciences Department

Michigan State University

East Lansing, Michigan 48824

If copies of the proposal are mailed in more than one package, the number of packages should be marked on the outside of each. Proposals must be sent prepaid, not collect. The acknowledgement of receipt of the proposal will contain a proposal number. Later inquiries, addenda, revised budgets, etc. should be addressed to the Bean/Cowpea Planning Office and be identified with the assigned proposal number.

VI. CRITERIA FOR ACCEPTANCE OF RESEARCH AND RESEARCH-TRAINING PROPOSALS

1. Mechanics for Judging the Proposals

a. Peer review panel and advisors.
Recommendation of acceptance, suggested modification, or rejection of proposals will be by a peer review panel. Panel members will not be from programs or departments with participatory interest, as indicated by the submitted proposals for the bean/cowpea CRSP. In addition to the Michigan State University and Cornell University personnel who are implementing the planning, a representative from 3 institutions with participatory interest in cowpeas and 1 institution with participatory interest in beans will attend the panel meetings as advisors. Membership of the seven-member review panel, and of the advisors with participatory interest, shall represent a range of institutions and of scientific and social disciplines. IITA and CIAT will each have one representative as advisors to the review panel.

b. First and second meetings of the review panel.
The peer panel and its advisory members will meet the end of June, about six weeks after the due date for receipt of the bean/cowpea CRSP proposals. This first panel meeting will make preliminary recommendations of acceptance, suggested modification or rejection of proposals. It will also indicate any additional proposals needed for completing a balanced CRSP. After the suggested proposal modifications and any requested additional proposals have been received, the panel will meet a second time (late August, 1979) to make its final recommendations.

c. Acceptance of the peer panel's recommendations.
Approval or rejection of the peer review panel's recommendations lies, in the following respective order: (1) The Joint Research Committee (JRC), (2) The Board for International Food and Agricultural Development (BIFAD), and (3) The United States Agency for International Development (USAID).

2. Criteria for Accepting or Rejecting Proposals

a. Objective: Solving constraints to production or use of beans/cowpeas in LDCs. For acceptance the proposed research and/or research-training must be directed toward solving one or more of the problems on the attached list (Section VII) of LDC-endorsed constraints to small-farmer production of beans or cowpeas in LDCs, or directed toward solving constraints to more usage of beans or cowpeas by rural and urban poor people in LDCs, or directed toward solving socio-economic constraints to acceptance and adoption of appropriate solutions.

b. Priority of constraints and research or research-training.
For acceptance, proposed research or research-training must be a desirable to an essential component of an integrated and balanced bean/cowpea Collaborative Research Support Program (CRSP). Acceptance, recommended proposal revision, and rejection of proposals by the peer review panel will all be based largely on the extent that the proposed effort meets: (1) the priority implied by "must be a desirable to an essential component of the CRSP". (2) estimates of the sponsoring institution's and principal investigator's demonstrated (past) and/or current capabilities for successful implementation of the proposed research or research training. (3) estimates of the short and/or long range potential of the proposed research or research-training for solving the constraints. (4) evidence that funding of the proposed research or research-training will lead to effective linkages between the U.S. institution(s) and scientist(s) and counterparts in the LDCs. (5) evidence that appropriate work will be done in the LDCs.

c. Effect of ultimate level of CRSP funding on acceptance.
JRC, BIFAD and USAID have asked that three CRSP bean/cowpea plans be developed and defended, one each for high-, medium- and low-level funding. Essentiality of the proposed research or research-training may be modified by the ultimate level of funding, so final funding level may significantly affect the recommendation that a proposal be accepted, recommended for modification, or rejected.

VII. CONSTRAINTS TO BEAN/COWPEA PRODUCTION AND USE

1. Sources of the listing of constraints.

The following listing of about 80 constraints to improving bean/cowpea production and use was derived from two sources. Most of them were perceived by scientists asking: What are the constraints — as perceived on the small farm by the farmer, scientist or extension specialist? These were listed in the questionnaire which most of you received. During interviews in the LDCs constraints were suggested which the original list did not precisely present. These are included in the list included herein, so it is a listing of virtually all possible perceived constraints. Those of the individual constraints that apply to most bean/cowpea production areas are indicated as general, as a means of indicating higher constraint priority. Constraints not generally applicable to LDCs have also been so identified.

The approximately 80 constraints listed have been categorized into seven groupings on the listing. Each grouping plus two viewpoints of the utilization and storage viewpoint are each discussed separately in the pages directly following the listing. Each discussion of a grouping emphasizes the constraints that should receive highest priority by the bean/cowpea CRSP. All constraints have some degree of merit for consideration by the CRSP.

2. A Summary Of Constraints As Perceived By Responses To The Questionnaire

No.	The Problem/Constraint	Extent of Problem
	Fertility, Plant Nutrition, Environment	
1.	Fertilizer not available.	
2.	Low fertilizer response.	
3.	Chemical or physical properties of soil are limiting.	
4.	Deteriorating land quality (erosion, etc.)	
5.	Economics of fertilizer use and response.	
6.	Water inadequate	General
7.	Water excessive	General
8.	Land is not available	
9.	Livestock waste used for other than fertilizer.	
10.	Yields strongly affected by wind and weather.	
11.	Temperatures too high or too low.	
12.	Non-nodulation at the farm level.	
13.	Symbiosis of nitrogen and phosphorous use	General
14.		
15.		
16.		
	Farming Practices and Management	
17.	Low stand establishment.	
18.	Yield losses during growing season.	
19.	Harvest losses.	
20.	Modern inputs are too costly.	
21.	Equipment not available or too costly.	
22.	Multiplicity of farming systems, too primitive	General
23.	Seed quality (pathogens, saprophytes, physical.)	General
24.	Lack of intermediate technology and appropriate equipment.	
25.	Seed industry not well developed	General
26.		
27.		
28.		
	Genetic Limitations	
29.	Other crops are more productive	General
30.	Cultivars not adapted. (Daylength, temperature, etc.)	
31.	Poor competitiveness in intercropping.	
32.	Inherent yield potential too low	General
33.	Low protein digestibility	General
34.	Maturity.	
35.	Sensitivity to drought and cold	General
36.	Instability of performance	General
37.		
38.		
39.		
40.		
	Plant Pests	
41.	Insects in soil)	Insects
42.	Insects on seedlings)	are a
43.	Insects on foliage)	general
44.	Insects - Stem boring)	problem

No.	The Problem/Constraint	Extent of Problem
	Plant Pests - cont.	
45.	Insects - Pod boring	General
46.	Controlling insects is uneconomic.	
47.	Animals or birds destroy the crops.	
48.	Pesticides unavilable or can't afford them.	
49.	Fungal diseases	Diseases are a general problem.
50.	Bacterial diseases	
51.	Viral diseases	
52.	Nematodes	General
53.	Air pollution	Not problem of most LDCs.
54.	Farmers do not use modern measures to control diseases.	
55.	Weeds inadequately controlled	General
56.	Insects have become resistant to insecticides.	
57.		
58.		
59.		
60.		
61.		
62.		
	Utilization and Storage	
63.	Home processing difficulties	General
64.	Beans are not a preferred crop/food.	
65.	Dietary habits are inadequate.	
66.	Post-harvest losses	General
67.	Beans are not a satisfactory food for young children.	
68.	Seeds become too hard when kept a long time	General
69.	Ease of cooking--takes too much fuel	General
70.	Low protein digestibility	General
71.	Cowpea texture--grittiness.	
72.	Low methionine or methionine availability	General
73.	Tannin content	General
74.		
75.		
	Socio-Cultural and Socio-Economic	
76.	Color and size of seed are not acceptable.	
77.	Flavor and texture are not acceptable.	
78.	Risks are inherent in trying new technology	General
79.	New techniques are not financially feasible.	
80.	Developed technologies are inappropriate	General
81.	Roads, education, institutions are inadequate	General
82.	Socio-Politico-Economic systems limit the small farmer	General
83.	Labor requirements are not met.	
84.	Farmers aspire to occupations other than farming.	
85.	Gastro-intestinal or other diseases limit human activity.	
86.	Inadequate availability of credit.	
87.	Incentives lacking	General
88.	Small farmer family sociology not understood	General

No.	The Problem/Constraint	Extent of Problem
	Socio-Cultural and Socio-Economic - cont.	
89.	Small farmers have no political power—need cooperatives	
90.	No land zonification.	General
91.	Farmers adapt modern technology to other crops but not to beans	
92.	Farmers get only a small share of the retail market price.	General
93.	Marketing	
94.		
95.		
96.		
97.		
98.		
99.		
	Research Capability in LDCs	
100.	Stability and turnover of research personnel	General
101.	Language capability	General
102.	Trained personnel insufficient in number	General
103.	Inefficient or lack of screening procedures.	General
104.		
105.		
106.		
107.		
108.		
109.		
110.		
111.		
112.		
113.		
114.		
	Extension Capability	
115.	Extension inadequate	General
116.		
117.		
118.		
119.		
120.		
121.		
122.		
123.		
124.		
125.		
126.		
127.		
128.		
129.		
130.		

3. Constraint grouping as seen on the small farm: FERTILITY, PLANT NUTRITION, ENVIRONMENT

Yields of beans, and also of cowpeas, probably fluctuate more from planting to planting than yields of most other crops. Growth of beans and cowpeas is strongly influenced by variable intensities and durations of rain, wind and other climatic fluctuations. These effects are direct, as by excessive or deficient water, and indirect as by weather-influence on population development of pathogens, insects and weeds. Both crops are often fully dependent on rainfall for water. Beans are very sensitive to even short duration of water deficiency. On the other hand, cowpeas are commonly grown in the drier tropical areas because, as compared with beans and many other crops, they possess some drought tolerance. Neither crop grows well under the excess water that often accompanies rain.

There is a human need to extend cowpea production into the wetter and hotter tropical lowlands, where temperatures are all right for cowpeas, but insects and diseases, which are also the major constraints in the drier tropics, have not as yet been controlled sufficiently to permit economic production. This need for extension into the wetter and hotter tropics also applies to beans, but extension is more difficult because, in addition to the greater disease and insect occurrence, beans do not grow vigorously or set pods well under the higher tropical lowland temperatures. By contrast, in the tropical highlands beans are grown at their low-temperature growth limit.

Both crops often face low soil pH and mineral toxicities or deficiencies. Nitrogen from fertilizer or rhizobial fixation is always needed for maximum yield, as is phosphorous from either fertilizer or natural soil content. Particularly for cowpeas, assimilation of sufficient phosphorous may require appropriate mycorrhiza-root associations. Maintenance and/or improvement of land quality is essential to continued and particularly increased food production.

Effective procedures are needed for maximizing the environment for all of these factors.

4. Constraint grouping as seen on the small farm: FARMING PRACTICES AND MANAGEMENT

There is a vast multiplicity of farming systems employed in producing beans and cowpeas. The system used varies from country to country, and within countries it varies from this hillside to that, from this valley to that, for this altitude versus that, and for all combinations of these and many more factors. That farming system currently used by each farmer is the starting point from which improvement of bean/cowpea production must commence. A scientist aiming to improve bean/cowpea production must begin, therefore, by maximizing his own understanding of the farming system(s) used by each farmer he aspires to assist. Only by understanding these farming system(s) can the scientist maximize his capability to benefit the small-farmer target audience.

An important management practice is planting good quality seed. Development of an effective seed production industry and an attendant seed distribution system, or of effective farmer-implemented alternatives for farmers with inadquate transportation options, could generally double yield and sometimes increase it many fold. Compared with developed countries, lack of good quality seed is a deficiency that affects almost all LDC farmers. Low seed quality and attendant damping off diseases, plus soil preparation factors and insect attacks, often give suboptimum emergence and stand establishment.

Tools that more efficiently achieve currently used soil preparation and cultivation, and improved procedures for safe and effective applications of insecticides, bacteriacides, fungicides and herbicides are needed. These latter procedures must use little if any water, when water is as scarce as in the semi-arid tropics. More efficient manual procedures for harvesting would be beneficial. Small machines may sometimes be appropriate for these operations, depending on social needs and/or land topography.

Constraint grouping as seen on the small farm: GENETIC LIMITATIONS

Yield increases per unit land area for beans and cowpeas must come from two very basic, complex, and equally important resources: (1) genetic resources and (2) environmental resources. Higher yield can come from improving the genetic resources (cultivars) used by farmers, i.e., by incorporating specific useful characteristics into the bean/cowpea cultivars the farmers prefer and are growing. Added characteristics may include resistance to diseases and insects; adaptation to environmental stresses such as unfavorable pH, water shortage, soil salinity; less than optimal temperature or daylength, etc.; or improved rate of any physiological process of plant growth.

Alternatively, higher yield can come from amending the environmental resources in which the current genetic resource (cultivar) is grown; i.e., by eliminating the pathogen or insect, or altering available mineral nutrients or pH, etc. By adequately altering the plant's environment, theoretically, the optimum genetic potential of the plants can be expressed, because the effects of water, light, nutrients, diseases, insects, etc. can all be optimized to achieve maximum yield.

In actuality, the highest yields will occur when the farmers use those cultivars (genetic resources) that have been selected to give best achievable performance under the farmer's most limiting and non-improvable environmental factors. The resulting balance of adjustable environmental factors and selectable genetic factors is extremely complex. Each genetic and environmental factor interacts with every other factor, and even when a theoretically perfect optimum can be obtained under a static situation, it will not pertain under the always-changing non-controllable aspects of the plant's environment and the changing constraints upon the farmer (i.e., shortages of time, supplies, labor, etc.) which may be unavoidable.

Progress toward higher production depends on increased knowledge of both the genetic resource and of the extent to which it is possible and feasible for farmers to alter the plants' environments. With this increased knowledge, it will be increasingly possible to modify the complex balances among all factors so as to give the highest possible yield for the specified farm or farming area. This optimum yield will apply until either the genetic or environmental resource can be further improved—or until there is an unwanted degradation of one or more resources.

Collection, evaluation and improvement of all aspects of the genetic resources available for beans and cowpeas and used by farmers are all essential to improvement of production of these crops. Crop yields of beans/cowpeas are relatively low as compared to most other grain crops.

6. Constraint grouping as seen on the small farm: PLANT DISEASES AND PESTS

Pathogenic fungi, bacteria and viruses, nematodes or insects that attack roots; insects that injure seedlings, leaves, flowers, fruits, or stems; birds or rodents that ruin the growing plant or eat the maturing seeds; and weeds that compete with the crop plants for environmental resources each constitute a factor (or factors) of the biological environment of the crop. Each will impact on realized yield, so all merit some research. For both beans and cowpeas, insect attack and disease incidence are probably the two major current constraints to higher bean/cowpea production in the tropics. Solving these constraints requires consideration of all environmental impacts on both the crop and biological pest, and simultaneous consideration of the impact of available genetic-resources (cultivars).

Two additional factors of the biological environment of beans/cowpeas merit research emphasis. The first is determination of those crop-plant populations (plants per ha) and crop-plant arrangements that will maximize crop yield. Considering that most beans/cowpeas are grown in multiple-crop associations, the second factor is the effect on the bean/cowpea crop plants of each associated crop /and its population(s) and plant arrangement(s)/ and/or group of associated crops. Most such research to date has been on the far less-complicated monoculture system of farming. For maximizing assistance to small farmers in developing countries, the research objectives of the bean/cowpea CRSP must include acquiring understanding of these little-studied complex interactions between beans/cowpeas and the crops with which they are associated in the farming system(s). Much of this research must begin with small modifications of that system as tested on the small farmer's farm.

7. Constraint grouping as related to rural and urban consumers: UTILIZATION AND STORAGE

Two constraints to the use of beans/cowpeas are most conspicuous. First, post-harvest losses of beans/cowpeas are often extensive. The losses may be due to rodents, but more serious and difficult to control are losses due to insects. As a solution to this problem, beans to be eaten are often treated with chemicals that can endanger human health. Better solutions are needed. The second conspicuous constraint is the time and fuel required to cook beans/cowpeas. In the arid tropics fuel is often scarce, with much human energy utilized to bring it to the home. Bean and cowpea seeds progressively harden and require increasingly longer cooking with duration of storage. These changes are accentuated under high temperature and humidity, and especially with both. These constraints need solutions.

8. Constraint grouping as related to nutrition of rural and urban consumers: NUTRITIONAL-DIETARY MERIT

Beans and cowpeas are the major high-protein foods that are consumed by the rural and poor of developing countries. Animal products are not generally available for such use, or only in limited quantities. It is generally acknowledged that legume proteins complement cereal grain proteins. The balance of amino acids consumed is more nearly what humans need when beans and corn or cowpeas and rice, for example, are eaten together. Therefore, more of the consumed protein can be utilized by a person eating such a mix than when either the legume or cereal is eaten alone. Recently workers in nutrition are pointing out the strong taste preference for beans and cowpeas as compared to the staple foods. Where food is not abundant, the diet available may be almost entirely the local staple (grain or tuber, etc.) with little variation. Beans/cowpeas, then perform a similar function to that of meat in richer countries: enhanced flavor and dietary variation which are highly valued by all populations.

The greatest need for protein enrichment of the diet is for rapidly growing children, particularly at post-weaning, and for pregnant and nursing women. There is need for accurate assessment of the nutritional requirements of these as compared to other people, and for bean/cowpea products that will enhance needed consumption of protein. Beans/cowpeas contain tannins, hemagglutinins and factors affecting food digestion such as antitrypsins. The protein of beans/cowpeas is not as readily digested as protein from meat. Because of this and lower content of essential sulphur-containing amino acids, bean/cowpea protein is not as effectively utilized as animal or fish protein. The problem of gas production in the digestive tract by beans/cowpeas needs improved understanding, particularly as related to the needed feeding of these foods to babies and young children. Environmental amendments that will improve all of these nutritional relationships of beans and cowpeas should be sought. Genetic improvements with the same nutritional gains are also needed. All such advances are dependent on improved understanding of the true nutritional merits of beans and cowpeas.

There are scientists who argue that the commonly accepted essentiality of beans/cowpeas for providing adequate protein in human diets of malnourished areas is an artifact of inadequate understanding of protein and calorie needs of humans. They argue that, with the possible exceptions of rapidly growing children and pregnant or nursing women, all cereals will provide adequate protein if sufficient calories are consumed. People who eat low-protein staples such as cassava would constitute another exception. The viewpoint of such scientists is that the human sensory (gustatory) element is the principal basis for maintaining and possibly increasing human use of beans/cowpeas. No one argues that beans/cowpeas should be allowed to disappear from human diets. The efficacy of these extreme viewpoints merits intensive study.

9. Constraint grouping as seen from the human viewpoint: SOCIO-CULTURAL AND SOCIO-ECONOMIC CONSIDERATIONS

It has been stated frequently that increased production of beans/cowpeas must begin with the small farmer, and that such farmers usually grow beans/cowpeas in association with other crops. The goal of these farmers is not to increase production of beans/cowpeas. If it were, they would grow these crops in monoculture. Rather, their goal is maximized profit from their farming system and simultaneous maximized security for their families and themselves. Therefore, for whatever reasons you and I (scientists and politicians and family people of a very different culture) may have for increasing bean/cowpea production, this will only happen when to do so will add to the farmer's income, his sense of social-security and to other factors that he recognizes but we do not. Thus, as a starting point it is essential to know: Why does the small LDC farmer so frequently grow beans or cowpeas? Why does he usually plant them in association with other crops? Why, when fertilizer or other inputs become available, does he use them on other crops and even increase the hectarage of these crops, while relegating beans/cowpeas to his less productive land and depriving them of the inputs that could increase yields? Why do farmers, their family members and other consumers eat beans or cowpeas? What are the personal concerns and aspirations of the small-farm growers of beans or cowpeas? How do this farmer's concerns differ from those of his wife and family members? What are the roles of women with respect to beans/cowpeas? The bean/cowpea CRSP can achieve its goal of increased bean/cowpea production and use <u>when and if</u> this goal has become compatible with the socio-economic goals which the small LDC farmer considers as he makes his decisions to emphasize, de-emphasize, or to ignore beans and cowpeas.

10. Constraint grouping from the scientific effort viewpoint: RESEARCH AND TRAINING CAPABILITIES

The world-wide infrastructure for research on beans/cowpeas consists of the following juxtapositioning of scientific institutions: (1) institutions of developed countries. (2) international centers, located within developing tropical countries. (3) regional centers, also within developing countries. (4) national institutions of developing countries. Developed country institutions have expertise for very basic research that can with planning be applicable to the needs of all countries. These institutions are located to facilitate applied research that emphasizes needs of their respective geographical locations. The international centers have a crop-specific mandate to do relatively applied research, which can be of world-wide importance but by virtue of location and mandate will have greatest applicability for the developing tropical countries. The regional centers have a mandate and locational advantage similar to that of the international centers, but for a more restricted area. It is research and extension conducted at national institutions of the developing countries which must provide the effective thrust toward realization of increased production and use of beans/cowpeas by the developing countries. This is because achieving this goal depends on the effort of individual small-farmers of the LDCs, who in turn require support from their national research and extension institutions and also from their national governments.

Realization of all possible benefit from the above described infrastructure requires numerous multiple-discipline-team research efforts, and integration and coordination of these into a world-wide collaborative research network. This is doubly so because: (1) where scientific capability is most needed, i.e., in the developing countries, it is most deficient. (2) the well-trained scientists are most distant from and unfamiliar with the small LDC farmer and his farming and social problems. The goal of food and nutritional sufficiency can be achieved if the different experiences and capabilities of scientists of the developing and developed countries, and the similarly different expertise of their research and extension institutions and governments are all collaboratively directed toward assisting the individual small LDC farmer.

A first requirement is organization of the research infrastructure to implement the needed collaborative effort. A second requirement that must be achieved simultaneously with the needed research is the training of scientists to fill the void of scientific capability in the developing and also developed countries. This is a long-term effort because: (1) The best LDC scientists will shortly become administrators, or be hired by commercial companies to fill other needs for trained people within developing countries. Therefore, the need for training of scientific manpower will continue through generations of scientists. (2) It is also long-term because current scientists must both learn how to and adapt to work as members of multiple-discipline-teams of an international collaborative research effort. The training of additional young scientists should deliberately incorporate training to work as teams involving disciplines as diverse as agronomy, biology, chemistry, physics, economics, sociology, politics and anthropology. Input from all these disciplines and more is needed to achieve the food production requirements of the world of future years.

VIII. CONSIDERATIONS IN SUBMITTING PROPOSALS

1. A number of situations frequently encountered in the conduct of research require special information and supporting documentation before funding can be approved for the project. Among these are the following, some mandated by Federal law. THE PRINCIPAL INVESTIGATOR SHOULD CONSIDER:

   a. Research which has an actual and/or potential impact on the environment.

   b. Research at a registered historic or cultural property.

   c. Research involving the use of *in vitro* generated recombinant DNA.

   d. Research involving the use of human subjects, hazardous materials, or laboratory animals.

2. The proposal should address each relevant item and provide information on the status of any special permissions, clearances, or provisions. Further, before submitting a proposal, THE ENDORSING ADMINISTRATIVE OFFICIAL SHOULD ENSURE THAT:

   a. The proposed project is consistent with the policies and goals of the submitting organization.

   b. The organization can make available the necessary facilities, general and special purpose equipment, and services for the conduct of the project.

   c. The organization can make available the necessary personnel for the amounts of time estimated to be required.

   d. The organization has legal authority to accept CRSP funding and the requisite policies, procedures, and personnel to meet the standards.

   e. The total costs estimated to be required for the conduct of the project are reasonable and there is a plan for meeting such costs either from grant funds or from the sponsoring institution's funding.

IX. WHAT TO SUBMIT AS A PROPOSAL

The research proposal should be prepared on standard sized paper (no larger than 8½" x 11") with pages numbered at the bottom, and printed only on one side of each sheet. TWENTY COPIES OF THE PROPOSAL, INCLUDING AN ORIGINAL WITH ALL REQUIRED SIGNATURES, are required for review by peer scientists and the CRSP staff.

Complete proposals, arranged in a standard sequence, are required to expedite review and evaluation. An administrative check should be made prior to mailing, to ensure that the following are included in the sequence indicated. Each item is discussed in detail in the following sections.

Check list of complete proposal contents. APPENDIX FORMATS SHOULD BE COPIED FOR USE IN PROPOSAL.

A. Title Page (Appendix I)
B. Proposal Source Document (Appendix II, 2 pages)
C. Special Considerations, Assurances, Certification (Appendix III)
D. Proposal Summary (Appendix IV, 2-3 pages)
E. Project Description (15 page MAXIMUM)
F. References for Project Description
G. Vitae and Publications Lists
H. Budget (Appendix V)
I. Budget Justification. This includes any budget for pass-through funding (Appendix VI) and its justification.
J. Current and Pending Support (Appendix VII)
K. Appendices to Project Description (if any).

A. Title Page

Format - Appendix I is the format for the title page. Copies of Appendix I must be used. An original title page with all relevant signatures must be included with the original proposal. Other copies of the proposal should also have a title page.

Title of Proposal - The title (80 characters maximum) will be used for the USDA Current Information Retrieval System (CRIS), for information to Congress and for press releases. Therefore it should not contain highly technical words. Phrases such as "Investigation of" or "Research on" should not be used. Other items of the title page are self-explanatory.

B. Proposal Source Document; only one copy required. (Use a copy of Appendix II.)

THE PROPOSAL SOURCE DOCUMENT IS AN ESSENTIAL PART OF THE PROPOSAL. It provides the Bean/Cowpea Program with data for compiling information requested by government agencies, the Congress, and the grantee community. The items are self-explanatory for the most part. Please note the following: (a) the Performing Organization is the Organization of the PI, which will receive the grant through a subcontract with the management entity for the bean/cowpea CRSP. (b) The Institutional Administrative Official should be the same as the one given on the Title Page.

C. Special Considerations, Assurances; Certification and Acceptance. (Use a copy of Appendix III.)

The proposal must contain an original of this signed document.

Research Involving Special Considerations

Some research situations require special information and supporting documentation before funding can be approved for the project. If special information or supporting documentation is involved, the Proposal Source Document should so indicate. For research that involves either recombinant DNA or human subjects, special instructions follow.

Recombinant DNA. Principal investigators and endorsing performing organization officials must comply with the guidelines of the National Institutes of Health (See "NIH Guide for Grants and Contract," Vol. 6, No. 19, Oct. 17, 1977 and subsequent revisions). A Memorandum of Understanding and Agreement and approval by the local Biohazards Safety Committee, must be provided before a gant can be awarded.

Human Subjects. Safeguarding the rights and welfare of human subjects involved in research supported by the bean/cowpea CRSP is the responsibility of the performing organization. The informed consent of the individual is a vital element in this process. Guidance is contained in Public Law 93-348, as implemented by Part 46, Subtitle A of Title 45 of the Code of Federal Regulations, as amended (45 CFR 46).

If the project involves human subjects at risk, the grantee must furnish a statement that the research plan has been reviewed and approved by the appropriate Institutional Review Board at the grantee organization, and that the grantee is in compliance with DHEW policies, as amended, regarding the use of human subjects. Required documents should follow this page.

Principal Investigator Assurance (See Appendix III)

Certification and Acceptance (See Appendix III)

D. Proposal Summary

Immediately following the certification should be a Proposal Summary, on two pages (use a copy of Appendix IV). This should focus on: overall objectives and proposed goals; relevance and significance of the proposal; and experimental methods, training methods and approaches.

This summary will be photocopied by the planning office. It will be sent to appropriate LDC institutions to ascertain their interest in collaborating on the work outlined in your proposal and/or on other relevant activities of the principal investigator and/or your US institution. For the information of all principal investigators, it will also be sent to others that have submitted CRSP proposals. This summary should be in language that will be meaningful to others in the relevant sciences. The responses from LDCs will be used by the second peer panel review. The copies sent to prinvipal investigators should help aim proposal revisions toward a coordinated unity as required for collaborative research.

The summary should also present additional ongoing activities of the principal investigator(s) and or institution that may be of interest to collaborating LDC scientists or institutions. Describe all of your activities with beans and/or cowpeas, or with relevant biological, sociological, or economic disciplines. Indicate how your institution has and/or will focus all of these relevant disciplines on research and training for furthering the goals of the bean/cowpea CRSP.

E. Project Description (15 page maximum)

1. Introduction - State overall objective(s) and long-term goals of the proposed research. Review the most significant previous work, including your own, and describe the current status of research in this field. Document with references.

2. Rationale and Significance - Present concisely the rationale behind the proposed research-training and list specific objectives for the total period of requested support. Show how these objectives relate to potential long-range improvements in bean/cowpea production or use in LDCs. What is the potential importance of the proposed research-training? Discuss any novel ideas or contributions which the project offers.

3. Experimental Plan - State clearly your hypotheses or the questions you will ask and give details of the research and training plans. Include a description of the experiments or other work proposed; the methods and techniques to be employed and their feasibility; the kinds of results expected; and the means by which the data will be analyzed or interpreted. Include, if appropriate, a discussion of pitfalls that might be encountered, and limitations of the procedures proposed. Insofar as possible, describe the principal experiments or observations in the sequence in which it is planned to carry them out, and indicate, if possible, a tentative schedule of the main steps of the investigations and training within the project period requested.

4. Training Plan - Indicate how training for research on bean/cowpea related problems that is to be conducted in the LDCs is incorporated into your proposal. How will the proposed work strengthen the research capabilities of the LDCs?

5. Expected Time Of Testing On Small-LDC Farms - Indicate whether you see results of your proposal as being ready for testing on small-LDC farms within 5, 10, 15 or 20 or more years. Explain as appropriate.

6. Expected Duration Of Proposed Effort - State whether you see the proposed effort as being completed in 5, 10, 15 or 20 or more years. Explain as appropriate.

7. Facilities and Equipment - Describe the facilities available for this project, including laboratories and training opportunities. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. List major items of instrumentation and research or training equipment which reasonably could be made available by the parent institution for this research.

8. Potential Collaborative Arrangments

Indicate the LDC scientists and/or institutions (including regional and international centers) that you desire collaboration with as the means of achieving the objectives of your bean/cowpea CRSP proposal. For each indicated scientist and/or institution give reasons for favoring this specific collaborative linkage. Use the following format.

(1) Institution_____ Scientist(s)_____

Reasons for suggested collaboration (include relevant capabilities, facilities, resources, environmental assets, etc.).

(2) Institution_____ Scientist(s)_____

Reasons:

(3) Institution_____ Scientist(s)_____

Reasons:

b. Support your collaboration record as follows:

(1) Past and current collaboration of the principal investigator(s) with LDC institutions. (Document with project titles and/or publication citations or other evidence of activity.)

(2) Past and current collaboration of the principal investigators with other US institutions. (Document with project titles and/or publication citations or other evidence of activity.)

(3) Past and current collaboration of the principal investigators with other disciplines (not entering into your proposal) related to beans/cowpeas, including relevant social and economic disciplines.

(4) Past and current collaboration between the principal investigators. (Document with project titles, publication citations, or other evidence of activity.)

F. References to Project Description

These references should follow an accepted journal format.

G. Vitae and Publications List(s) of PI(s)

Vitae of the principal investigator, senior associates, and other professional personnel should be provided to assist reviewers in evaluating the competence and experience of the project staff. This section should include curricula vitae of all key persons who will work on the project, whether or not CRSP funds are sought for their support. Indicate language capabilities relevant to the countries where the collaborative research is likely to occur.

Provide for each person a chronological list of the most representative publications during the preceding 5 years including those in press. List the authors in the same order as they appear on the paper, the full title, and the complete reference as these usually appear in journals.

H. Budget

A detailed budget is required for one year of the proposed project. COPIES OF APPENDIX V MUST BE USED. Funds may be requested under any of the categories listed so long as the item is necessary to conduct the proposal. The JRC guidelines call for an average of 25% of a CRSP's funding to come from funds of the institution sponsoring CRSP proposals. This may be achieved by assigning staff salaries or operating funds from the institution's own sources, or foregoing overhead funds. Ongoing efforts can be so assigned, as long as the objectives coincide with those of the CRSP proposal. These sponsoring-institution funds cannot be Hatch or other federal-source funds, except for proposals from federal agencies. Instructions follow for the items to be inserted in the format illustrated in Appendix V and Appendix VI. Amplifications and justifications should be included on separate pages. (See Budget-I on page 24.)

(A.) Salaries and Wages - Salaries of the principal investigator and other personnel associated directly with the research constitute appropriate direct costs in proportion to their effort devoted to the bean/cowpea CRSP. Charges by academic institutions for work performed by faculty members during the summer months or other periods outside the base salary period are to be at a monthly rate not in excess of that which would be applicable under the base salary and to other provisions of section J.7 to the cost principles for educational institutions (FMC 73-8).

The submitting organization may request that senior personnel salary data not be released to persons outside the government. In this case, the item for senior personnel salaries in the formal proposal may be expressed as a single figure and the man-months represented by that amount omitted. If this option is exercised, however, senior personnel salaries and man-months must be itemized in a separate statement, two copies of which should accompany the proposal. This statement must include all of the information requested in Appendix V for each person involved. The detailed information will not be forwarded to reviewers and will be held privileged to the extent permitted by law.

For research associates and other professional personnel, each position must be listed, with the percentage of full-time and rate of pay (hourly, monthly or annual) indicated. For other personnel (graduate students, technical, clerical, etc.) the total number of persons and total amount of salaries per year in each category can suffice. Salaries requested must be consistent with the regular practices of the institution.

Grant funds may not be used to augment the total salary or rate of salary of project personnel or to reimburse them for consulting or other time in addition to a regular full-time salary covering the same general period of employment. The grantee is responsible for work performed by a faculty member or any other employee under a grant.

(B.) Fringe Benefits - If the usual accounting practices of the performing organization provide that the organizational contributions to employee "benefits" (social security, retirement, etc.) be treated as direct costs, grant funds may be requested to defray such expenses as a direct cost.

(C.) Total Salaries and Benefits

(D.) Equipment - Equipment is defined as an item of property which has an acquisition cost of $300 or more and an expected service life of 1 year or more. Organizations performing research or training with the support of a CRSP grant are expected to have appropriate facilities, suitably furnished and equipped. Only under very unusual circumstances should grant funds be requested for office equipment and furnishings, air conditioning, automatic data processing equipment, or other "general purpose" equipment which is usable for other than research purposes. This type of equipment requires special justification and arrangement with the CRSP office.

Items of needed scientific equipment or instrumentation should be individually listed by description and estimated cost, and adequately justified. Allowable items ordinarily will be limited to scientific equipment and apparatus which is not already available for the conduct of the work.

If purchase or lease of expensive, special-purpose equipment having a unit acquisition cost exceeding $10,000 is planned, the proposal must contain a certification that the equipment (a) is essential and not reasonably available or accessible to the proposed project, and (b) will be subject to reasonable inventory controls, maintenance procedures, and organizational policies designed to enhance multiple or shared use on other projects if such use will not interfere with the project for which the equipment is being acquired.

(E.) Materials and Supplies - The types of expendable materials and supplies required should be indicated in general terms with estimated costs. Where substantial funds are requested, there should be a more detailed breakdown.

(F.) Travel - The type and extent of travel and its relationship to the research should be briefly specified. Funds may be requested for field work or for travel to CRSP-related scientific meetings.

Travel in Canada, Puerto Rico, the United States or its possessions is considered domestic travel. All other travel is considered foreign. If foreign travel is planned in connection with the research, the proposal should include relevant information (including countries to be visited) and justification.

Allowances for air fare will not normally exceed round-trip jet economy air accommodations. Persons traveling under Federal grants must travel by U.S. flag carriers, if available, unless:

a. the traveler, while en route has to wait 6 hours or more and no U.S. carrier is available during this period.

b. the flight by a U.S. carrier takes 12 or more hours longer than a foreign carrier.

(G.) Shipment and Storage of Household Goods. Costs for shipping or storage of furniture of long-term trainees, visiting staff, etc.

(H.) Housing Allowances. Costs for housing trainees, visiting staff, temporary quarters.

(I.) Orientation and Medical Expenses. Costs of travel shots, or required medical examinations. Orientation and language training costs.

(J.) Publication Costs. Costs of preparing and publishing the results of research conducted under the grant, including cost of reports, reprints, page charges or other journal costs, and necessary illustrations, may be included.

(K.) Computer Costs. The cost of computer services, including computer based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates at the proposing institution should be provided. Reasonable costs of leasing automatic data processing equipment may be requested, if justified.

(L.) All Other Direct Costs. Other anticipated direct costs not included above should be itemized. Examples are: space rental at research or training establishments away from the performing organization, minor alterations, and service charges. Reference books and periodicals may be charged to the grant only if they are related specifically to to the research project. Proposed subawards should be disclosed in the proposal so that the grant instrument may contain prior approval, if appropriate. None of the research effort under a CRSP grant may be contracted or transferred to another organization without prior CRSP approval. This also applies to pass-through funds.

Consultant services should be included in this section. Grantees normally are expected to utilize the service of their own staff to the maximum extent in managing and performing the activities supported by grants. Where it is necessary for a grantee to contract for the services of persons who are not its officials or employees, it is expected to do so in accordance with written organizational standards which provide for consideration of the factors outlined in the governing Federal costs principles.

If the need for consultant services is anticipated, the proposal narrative should provide appropriate rationale, and the Proposal Budget should estimate the amount of funds which may be required for this purpose. To the extent possible, consultant rates should show separate amounts for actual services and each of the components of the rate.

(M.) Training costs. Give the total for tuition, fees, facility rentals, translational services, etc.

(N.) Total Direct Costs.

(O.) Indirect Costs. The indirect cost (rate(s) negotiated by the granteee organization with the cognizant Federal negotiating agency must be used in computing indirect costs for a research proposal. Determination of the appropriate indirect cost rate(s) is dependent upon a combination of factors including but not limited to physical location of the work. The official responsible for Federal business relations should review this part of the proposal to see that it properly describes any particular factors which may have a bearing upon the indirect cost rate(s) applicable to the project. Normally, the rate in effect on the date the proposal is recommended for award by the CRSP Planning Office will be used.

If an organization has no established indirect cost rate it should consult the CRSP Planning Office, which will establish liaison with the cognizant Federal negotiating agency.

(P.) Total Direct and Indirect Costs. /(N.) plus (O.)/

(Q.) Less Residual Funds. Unused and uncommitted funds remaining at expiration of current CRSP grant. (Does not apply for original proposal.)

(R.) Total Amount of this Request.

(S.) Proposed Expenditures in Developing Countries. All such expenditures have been included in the Total Amount /(R.)/ above. Give details of all such expenditures by using Appendix VI. This should include pass-through funds which are monies that will be spent under the direct control of the LDC scientist(s) and institution(s) with which you are collaborating. A contract will be required with the LDC institution to guarantee that these funds will be spent on the objectives of your CRSP proposal.

I. Budget Justification: Supporting statements should be provided for all major expenses on pages separate from the budget pages. Present these for each budgetitem /(A) through (S)/ as follows:

(A.)
(B.)
(D.) etc. as needed through (S.)

J. Current and Pending Support (Appendix VII)

The proposal must list all current public or private research support, in addition to the proposed project, to which the principal investigator and other senior personnel have committed a portion of their time, whether or not salary for the person involved is included in the budgets of the various projects. The proposal must also provide analogous information for all proposed research which is being considered by, or which will be submitted in the near future to, other possible sponsors. USE COPIES OF APPENDIX VII.

If the project submitted for support has previously been funded from a source other than CRSP funds, the items of information requested in the foregoing paragraph should be furnished for the immediately preceding funding period. This information will help analyze shifts in research support. Concurrent submission of a proposal to other organizations will not prejudice its review by the CRSP.

K. Appendices to Project Description.

Each project description is expected by the members of review committees and the staff to be complete in itself. Distribution of additional material, other than for the records, is limited to the principal reviewers. In those instances where appendix material is necessary (as for example: photographs which do not reproduce well, and reprints or other especially pertinent material which are not suitable for inclusion in the proposal), at least 6 copies or sets, identified by title of the research project and name of the principal investigator, should accompany the proposal.

L. Revisions to Proposals during Review-Planning Process.

Revisions of submitted proposals (or budgets) may be recommended by the review panel, as may receipt of proposals in disciplinary areas not adequately represented in the proposals received. The recommended revisions or requests for additional proposals will be for more precisely aiming the proposal at the Bean/Cowpea CRSP objectives, or for adding research or research-training that is considered essential to a complete and balanced CRSP.

Research Proposal Submitted
to the
Bean/Cowpea Collaborative Research Support Program

Title_____
(80 characters or less including spaces and punctuation; see instructions.)

Proposed amount:_____ Proposed duration:_____

_____ _____
Principal Investigator (PI) Name Submitting Institution

Address of Principal Investigator: Address of Submitting Institution:

_____ _____
_____ _____
_____ _____
_____ _____

Name(s) of Co-principal Investigator(s)
(U.S. Colleagues)

1. Name_____
   Dept._____
2. Name_____
   Dept._____
3. Name_____
   Dept._____
4. Name_____
   Dept._____

Make grant to:_____
Name of Institution or Organization to which funding should be made.

IRS Number_____ Congressional District Number_____

Endorsements:

Principal Investigator

Name_____
Title_____
Phone No._____
Date_____
Signature_____

Institutional Administrative Official

_____
_____
_____
_____
_____

Dept. Head, Director, or other.

Name_____
Title_____
Phone No._____
Date_____
Signature_____

_____
_____
_____
_____
_____

~~Appendix II(page 1 of 2)~~

PROPOSAL SOURCE DOCUMENT

Principal Investigator(s) (PI) Names

	First	Middle	Last
PI #1			
PI #2			
PI #3			

Proposal No. (CRSP use)

PI #1 _____ (City) _____ (State 2-letter abbr.) _____ (ZIP code) _____ (Department or street address)

PI #1 _____ (Phone + area code) _____ (Total requested (Direct & indirect)) _____ (Institute or subdivision of performing organization (35 characters))

PI #1 _____ Name of performing organization (35 Characters)

Institutional Administrative Official

_____ (CRSP use) _____ First name _____ Middle name _____ Last name

_____ Phone + area code _____ Department or Organizational Unit

_____ City _____ State (2-letter abbr.) _____ ZIP code

_____ (CRSP use) _____ Date received (CRSP use) _____ Grantee Organization (35 characters)

_____ Title of Proposal (maximum 80 Characters)

~~Appendix II (page 2 of 2)~~

PROPOSAL CODE

A. Which of the following best describes the performing organization of the first principal investigator? Check one choice only.

1.____USDA/SEA Laboratory
2.____Other Federal Research Laboratory
3.____State Agricultural Experiment Station (SAES)
4.____Land Grant University (1862, 1890) or Tuskeege Institute
5.____Public University or College. Non-land grant
6.____Private University or College.
7.____Private Profit Making Organization
8.____Private Non-Profit Organization
9.____State or Local Organization
0.____Other (describe)

B. Has the first principal investigator completed her/his most advanced degree within the last 5, 10, 15, 20, 25, 30 or more years?
(Circle one)

C. Will the work in this proposal deal with recombinant DNA or with human subjects?

1.___ Neither 2.___ DNA 3.___ Human Subjects

D. Congressional District of the grantee organization_____.

SUPPORT CODE

A. Will this proposal, or parts of it, be sent to another granting agency? If so, indicate.

1.____ None
2.____ Other USDA units
3.____ NSF
4.____ NIH
5.____ Other (describe)

~~Appendix III~~

Special Considerations

Check appropriate statements. Supply additional information when necessary.

____ "This project does not involve human subjects."

____ "This project involves human subjects. It was approved by the Institutional Review Board on _____ (is scheduled for review by the Institutional Review Board on _____)." See DHEW regulations regarding the use of human subjects, appearing in Title 45, Code of Federal Regulations, Part 46, Subtitle A.

____ "This project does not involve recombinant DNA research."

____ "This project involves recombinant DNA research. It was approved by the institutional Committee on _____ (Supply apropriate documents as required by "NIH Guide for Grants and Contracts," Vol. 6, No. 19, October 17, 1977 or subsequent revisions thereto)."

Principal Investigator Assurance

"The undersigned agrees to accept responsibility for the scientific and technical conduct of the research project and for provision of required progress reports if a grant is awarded as the result of this proposal."

_____ _____

Date Principal Investigator

Certification and Acceptance

(To be signed by Authorized Official of Submitting Organization)

"The undersigned certifies that, if a grant is awarded, the above-listed organization will make available the necessary facilities, equipment, services, and personnel to conduct the project substantially as outlined in the proposal or such modifications of as may be mutually agreed and accepts the obligation to comply with the Guidelines of the Joint Research Committee (JRC) of the Board of International Food and Agricultural Development (BIFAD).

_____

(Signature)

_____

(Typed Name and Title)

_____

(Date)

Summary of Proposal
for the
Bean/Cowpea Collaborative Research Support Program

Principal Investigator and Department_____

Institution and Location_____

Co-Principal Investigator and Department_____

Institution and Location_____

Co-Principal Investigator and Department_____

Institution and Location_____

Summary (Continued)

Brief description of personnel and activities they will perform in the LDCs.

Additional ongoing activities of the principal investigator(s) and/or institution that may be of interest to collaborating LDC scientists or institutions.

Appendix VIII.1
~~Appendix V~~

Proposed Total Yearly Funding for Proposal

Organization and Address

Proposal No._____
Assigned by Planning Office

Principal Investigator(s) (PI)_____

	No.	Time % on CRSP	Proposed Budget: Total for CRSP	From Your Instit.	From Title XII	Assigned By CRSP Planning
A. Salaries and Wages						
1. Senior Personnel						
a. (Co)-PI(s)	___	___	$	$	$	$
b. Senior Associates	___	___	$	$	$	$
2. Other Personnel (Non-Faculty)						
a. Research Associates-Postdoc	___	___	$	$	$	$
b. Other Professionals	___	___	$	$	$	$
c. Graduate Students	___	___	$	$	$	$
d. Pre-Baccalaureate Students	___	___	$	$	$	$
e. Secretarial-Clerical	___	___	$	$	$	$
f. Technicians	___	___	$	$	$	$
TOTAL SALARIES AND WAGES			$	$	$	$
B. Fringe Benefits (if charged as Direct Costs)			$	$	$	$
C. Total Salaries, Wages, and Fringe Benefits(A+B)			$	$	$	$
D. Equipment (List Items & $ Amounts for Each Item)						
Total Equipment			$	$	$	$
E. Materials and Supplies (List)						
Total Materials and Supplies			$	$	$	$
F. Travel--1. Domestic (Including Canada) 2. Foreign (List Destination & Amount for each trip) 3. Accompanying Dependents (on long-term assignments)			$	$	$	$
G. Shipment and Storage of Household Goods			$	$	$	$
H. Housing Allowances			$	$	$	$
I. Orientation and Medical Expenses			$	$	$	$
J. Publication Costs/Page Charges			$	$	$	$
K. Computer Costs			$	$	$	$
L. All Other Direct Costs (List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full in proposal.)			$	$	$	$
M. Training Costs			$	$	$	$
N. Total Direct Costs (C through M)			$	$	$	$
O. Indirect Costs (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs included in on/off campus bases in remarks)						
Total Indirect Costs			$	$	$	$
P. Total Direct and Indirect Costs (N plus O)			$	$	$	$
Q. Less Residual Funds (If for further support of current project)--will only apply in future years.			$	$	$	$
R. Total Amount of this Request (P Minus Q)			$	$	$	$

Note: Signatures Required Only for Revised Budget. This is Revision No._____

Sig. of Principal Investigator — Date of Signature — Typed or Printed Name and Title

Sig. of Authd. Organizational Rep. — Date of Signature — Typed or Printed Name and Title

~~Appendix VI~~
Appendix VIII.1

Proposed Expenditures in Developing Countries

These must have been included in the proposed total yearly funding. Identify proposed pass-through funds to be spent under control of a collaborating LDC institution.

Organization and Address

Proposal No. _____
Assigned by Planning Office

Principal Investigator(s) (PI) _____

	No.	Time % on CRSP	Proposed Budget: Total for CRSP	From Your Instit.	From Title XII	Assigned By CRSP Planning
A. Salaries and Wages						
1. Senior Personnel						
a. (Co)-PI(s)	___	___	$	$	$	$
b. Senior Associates	___	___	$	$	$	$
2. Other Personnel (Non-Faculty)						
a. Research Associates-Postdoc	___	___	$	$	$	$
b. Other Professionals	___	___	$	$	$	$
c. Graduate Students	___	___	$	$	$	$
d. Pre-Baccalaureate Students	___	___	$	$	$	$
e. Secretarial-Clerical	___	___	$	$	$	$
f. Technicians	___	___	$	$	$	$
TOTAL SALARIES AND WAGES	___	___	$	$	$	$
B. Fringe Benefits (if charged as Direct Costs)			$	$	$	$
C. Total Salaries, Wages, and Fringe Benefits (A+B)			$	$	$	$
D. Equipment (List Items & $ Amounts for Each Item)						
Total Equipment			$	$	$	$
E. Materials and Supplies (List)						
Total Materials and Supplies			$	$	$	$
F. Travel--1. Domestic (Including Canada)						
2. Foreign (List Destination & Amount for each trip)						
3. Accompanying Dependents (on long-term assignments)			$	$	$	$
G. Shipment and Storage of Household Goods			$	$	$	$
H. Housing Allowances			$	$	$	$
I. Orientation and Medical Expenses			$	$	$	$
J. Publication Costs/Page Charges			$	$	$	$
K. Computer Costs			$	$	$	$
L. All Other Direct Costs (List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full in proposal.)			$	$	$	$
M. Training Costs			$	$	$	$
N. Total Direct Costs (C through M)			$	$	$	$
O. Indirect Costs (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs included in on/off campus bases in remarks)						
Total Indirect Costs			$	$	$	$
P. Total Direct and Indirect Costs (N plus O)			$	$	$	$
Q. Less Residual Funds (If for further support of current project)--will only apply in future years.			$	$	$	$
R. Total Amount of this Request (P Minus Q)			$	$	$	$

Note: Signatures Required Only for Revised Budget. This is Revision No. _____

Sig. of Principal Investigator — Date of Signature — Typed or Printed Name and Title

Sig. of Authd. Organizational Rep. — Date of Signature — Typed or Printed Name and Title

Current and Pending Support on beans or cowpeas or relevant disciplines - and on all unrelated projects. (Account for 100% of PI's times including CRSP proposal.)

Names		Agency	Total Annual Rate	Period Covered	% of Effort Committed	Project Title
PI:_____ _____						
Current	a.					
	b.					
	c.					
Pending	a.					
	b.					
	c.					
	d.	CRSP				
Co-PI:_____						
Current	a.					
	b.					
	c.					
Pending	a.					
	b.					
	c.					
	d.	CRSP				
Other:_____						
Current	a.					
	b.					
	c.					
Pending	a.					
	b.					
	c.					
	d.	CRSP				

Comments (if any)

CATIE

TURRIALBA

CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA

Department of Tropical Crops and Soils

DEALING WITH RISK AND UNCERTAINTY IN CROP PRODUCTION,

A LESSON FROM SMALL FARMERS

Luis A. Navarro

Turrialba, Costa Rica

1977

FOREWORD

The presentation to follow is based on observations made during the life of a Programme of Research into Cropping Systems for Small Farmers. This programme was initiated in 1973 by the Department of Tropical Crops and Soils of CATIE (Centro Agronómico Tropical de Investigación y Enseñanza or the Tropical Agricultural Research and Training Center).

CATIE is an autonomous non profit institution of scientific and educational caracteristics. It was founded in June of 1973 by a joint action betwe n the Interamerican Institute of Agricultural Sciences (IICA) and the Government of Costa Rica. Its purpose was to orient research toward the agricultural problems of Central America and the Caribbean region. Panama has also become a member of the association.

At present, CATIE is a transformation of the old Training and Research Center (CEI) - which gave origin to the Interamerican Institute of Agricultural Sciences (IICA) belonging to the OAS in Turrialba, Costa Rica in 1940-which provided research and training services for all the countries of Latin America. Its main thrust has always been investigation in agriculture and related fields as well as education. It was the first Latin American graduate school in agriculture and has trained students from Latin America, the United States, the Caribbe and various other countries.

Another contribution of the Center to the field of agricultural investigation and education has been the TURRIALBA journal. This journal publishes articles in Spanish or English and has been communicating developments in agricultural research since 1951.

CATIE is organized in three departments; Animal Husbandry, Forestry and Tropical Crops and Soils Department.

DEALING WITH RISK AND UNCERTAINTY IN CROP PRODUCTION, A LESSON FROM SMALL FARMERS*

Luis A. Navarro**

THE PROBLEM

Any review of the agricultural statistics for Central America shows the importance of small farms for the sector and for the economies of the different countries. They are the most numerous and also produce most of the basic grain crops for the area using technologies which are sometimes classified as traditional and/or archaic.

Even though there have been substantial efforts to transfer improved technologies generated in Experimental Stations and International Centers, small farmers have not adopted these "improved" technologies very quickly.

Without doubt there are many reasons for this. In general, however, it is obvious that most of those technologies are not appropriate for the conditions of small farms in tropical areas. The farmers themselves, perceive them as such and consequently they do not adopt them. They cannot.

---

* Paper presented at the "Symposium on Risk and Uncertainty in Decision Processes of Small Farmers in Less Developed Countries", held during the AAEA-WAEA joint annual meeting in San Diego, California, July 31-August 3, 1977.

** Ph.D., Agricultural Economics, CATIE

Until recently, most of the modern agricultural technologies were being generated in temperate areas. The few experimental stations in the tropics generally presented environmental conditions quite different from those of small farms. Although the generated technologies may accommodate to the bio-physical conditions of small farms they were not suitable from a socio-economic viewpoint.

The above described situation gave different people in various institutions the incentive to review the entire process of generating, evaluating and transfering new technologies to small farms in tropical America.

It was concluded that research efforts should be directed toward the generation of production technologies appropriate to the conditions of small farms.

Such has been the main objective for the action of the Department of Tropical Crops and Soils at CATIE since 1973.

THE BEGINNING OF A PROGRAMME

To face the challenge of devising appropiate technologies for small farms the members of the Department started by studying: 1. The general situation of small farmers in the area, and their crop production systems. 2. The organization of the Department itself in relation to the proposed research.

The analysis showed the situation of the small farmers and their production systems to be highly complex and dynamic. In addition the members of the Department realized that they knew very little about the management and deeper characteritics of those systems. The members of the Department realized that such complexity and lack of knowledge did

not allow an effective use of traditional research methodology. That is, the organization in which each investigator works independently facing the problem only in terms of his own discipline was inappropriate.

It was clear that the production systems should be studied as an integrated whole working in a complex environment. The ecological, social and economic components of the total environmental needed to be considered if the system was to be completely understood.

The first step taken by the members of the Department was to reorganize themselves into a multidisciplinary team. Immediately a training programme was initiated for gaining experience on how to approach specific problems as a multidisciplinary team. For doing this, activities were initiated: 1. At the Experimental Station in Turrialba, and 2. With selected small farmers in Costa Rica. The focal point of this training effort was the "Central Experiment". In this experiment they started with five crops which were planted in different combinations. Those combinations were spacial and chronological arrangements of one, two or three crops, which tended to simulate various cropping systems practiced by small farmers. Combined with the "Central Experiment" there were the "Satellite" and "Complementary" experiments whose objective was to allow closer study of specific questions not answered by the main experiment. The Universities of Florida and North Carolina participated in some of these early experiments and in related work in cooperation with the Department.

THE PROGRAMME OF RESEARCH INTO CROPPING SYSTEMS FOR SMALL FARMERS

The initial effort and results indicated a great potential for the approach. Consequently the Department approached AID to fund a regional project to develop research on cropping systems for small farms in Central

America. This financing would provide outreach for the CATIE programme. AID considered that the contract should be administered by the Regional Office for Central American Programs of AID (ROCAP) with headquarters in Guatemala. The final project contract (AID 596-153) was negotiated with ROCAP and was signed on June 10, 1975.

The financing permitted expasion of the multidisciplinary team and allowed the programme to be extended to other countries in Central America

The primary objectives of the programme can be stated as follows:

- To learn about the systems of annual crops production used by the small farmers of Central America.
- To search for possible alternatives or modifications to improve the generation of income, use of labor or nutritional aspects of those systems which could be adopted by the farmers.
- To create in the individual countries a working capacity to continue the study and improvements of those cropping systems.

The 20 professionals in the team represent, today, most of the agronomic disciplines and include two economists, two communicators and an anthropologist working as consultant.

Presently the main thrust is being developed in specific locations selected as priorities by the governments of Costa Rica, Nicaragua and Honduras. The programme is also beginning action in El Salvador and Guatemala. The situation of Panama is now under study.

The location in each country are as follows:

Costa Rica

Atlantic zone; the specific locations are near Guapiles (Guacimo and Carlari) and near Turrialba (Guayabo).

South Pacific zone; the specific locations are near San Isidro de El General (San Rafael de Platanares, Pacuare, Pejibaye).

Nicaragua

Center part of the country; the specific locations are near Matagalpa (Samulali) and Esteli (Estanzuela).

Honduras

San Pedro Sula Valley; the specific locations are near San Pedro Sula (Yojoa, El Progreso, Agua Sucia and Cuyamel).

El Salvador

Proposed area is in the northern part of the country near Chalatenango.

Guatemala

Proposed area is in the highlands near Quezaltenango.

An interested reader could consult an ecological map and find that these locations represent different points on gradients of rainfall, soil, altitude, climatic or other conditions. They are representatives, also, of different market and socio-economic conditions.

Logistically there is one member of the team, and his assistant, stationed in each country outside of Costa Rica. Most of the remaining team members are housed in CATIE, Costa Rica, but travel continously to each site.

The member, stationed in each country works in close contact with the respective national agricultural research institution from where he receives additional support.

THE METHODOLOGY

The following is the simplest description of what the programme is at the moment: A multidisciplinary team trying to use a system approach

to study the problem of generating (sometimes adapting), evaluating and giving the base for transfering alternative cropping system technologies which are adaptable to small farms.

What is described in this mouthful did not start overnight. It came to its present state through a natural, sometimes painful, evolutionary and learning process. This evolution is the result of interaction among team members and also reflects the interaction of the team with: the literature, other institutions, experts in different disciplines, technicians working in the field and mostly, the small farmers themselves.

The consideration of the farmer himself in the production system-environmental complex has always been a key aspect. Only in interaction with farmers has the team been able to accumulate useful knowledge about the system and its environment. This interaction allows the team to detect key problems which help to direct research efforts, and both farmers and staff members feel their interaction is mutually beneficial. The exchange of experience and knowledge between the technicians and farmers is recognized as a positive and immediate output of the total effort.

In short, the immediate goal of the team is to gain: A working knowledge of the total environment and the cropping systems practiced by the small farmers of an specific area. This knowledge is the base for finding the key problems and possible modifications or alternatives to improve such systems, and also provides base for evaluation and transference of those findings.

The Steps in the Methodology

One may specify different phases in the methodology as follows:

- To learn about the system and its environment.
- Identify specific problems and possible solutions.

- Design and initiate test of alternative which include those possible solutions.
- Evaluation of the most promissing alternatives.
- Transference.

These steps do not necessarily occur chronologically. Any or all of them may be happening at any given moment. The team interaction with farmers permits that some knowledge of the team be transferred to them from the beginning and allows the team to continuously accumulate more knowledge about the production system and its environment.

Up to the present the programme at CATIE has been giving emphasis to the three aspects listed first. The crucial evaluation of generated technologies will start when they are released to the direct and exclusive management of collaborating farmers. The process of intensive transference will need further support from national governments.

It is important to note, also, that the same team should be involved in all the listed phases until well advanced into the transference effort. It is the only way to give the flexibility and adaptation of the methodology to the sites in which the effort is being developed.

The total scheme suggested could be an alternative to the traditional approach Experimental Station→Extension Service→Farmers. The last has often proven to be non-effective in Latin America because the two ways arrows are virtually non existent.

Fig. 1. misplaced between pages 10-11 could represent, in summary, the proposed methodology.

At this point there are two clarification to make:

1. Specialized and basic research is still a valuable effort for supporting teams working in the described manner. They have a rightfull place in the general scheme of betterment of agriculture.

2. Eventhough the discussed methodology might look too site specific there are aspects which might satisfy those souls yearning for "bigger", "more significant" impacts. The advantage of having the same team work accross sites allow them to observe the reaction of the systems under study to:

   A. Changes in manageable production factors as usual. This are changes in plant population, fertilizer dosification, etc.

   B. Changes in non-manageable factor (environmental) which cannot be done working in only one place (i.e. an experimental station).

All these allow the team to find guidance to a more efficient use of both types of factors. This is very crucial especially when working at small farmers level where the ratio of B type of factors to the A type are larger than for better resource endowed producers. At the same time the added knowledge facilitates the task of interpolation and extrapolation of the accumulated knowledge and experience. Finally and assuming that the cross sectional differences in the B type factors -in a specific year- simulates the year to year variation in them the stability of the systems can be also studied.

The Tools in the Methodology

Besides the consultation of existing secondary information and institutions working in a comparable fashion (i.e. IRRI, ICTA) there are specific tools which have been used in the programme. They can be briefly presented here.

Surveys

They have been used from the beginning to accumulate information in

agronomic and socio-economic aspects on specific sites. Their structure has been simple and they have attempted to answer specific questions needed for program planning.

Case Studies

The information provided by the surveys has been complemented, in some cases, with single family type case studies. The purpose here is to obtain a more profound insight about the total environmental of the sites. The ideal would be to perceive the situation as the farmer does. The operation of these case studies has been to periodically visit the family for unstructured conversations which are complemented with the use of specially designed forms to accumulate daily information. In most cases the forms are managed by family members.

The combination of surveys and case studies help teams members to understand what the farmers do, and why they do things the way they do.

Specialized Reconnaissance

For specific aspects there have been visits to the sites by experts (i.e. anthropology) or group of them (i.e. soil surveys). The objective of these reconnaissance visits is to accumulate specific information which will help to better characterize the sites. This information also helps to make comparisons among sites as well as between sites and other larger areas of Central America.

Field Experiments

The initial experiment done with farmers in their farms is mostly of an exploratory type. Beginning with the second round of field experiments the team starts to introduce new alternatives or to suggest modifications and testing of existing alternatives.

It is expected that as the programme continues into the posterior phases, new research tools will be needed.

THE LESSONS

The close contact with small farmers and their production systems allows one to understand the dynamism and complexity of those systems. They are the manifestation of the ways in which farmers have evolved and adapted their activities to produce in different environments. It is also a good opportunity to observe the manners in which small farmers have dealt with situations of risk and uncertainty imposed by the environment during their decision-making processes.

What follows, in this presentation, are results of observations -in respect to the later part- made during the life of the programme [illegible] previously.

It is necessary to point out that most of this material has been collected in an unstructured manner. Consequently, in many cases a more strict study is necessary.

This is an attempt to communicate some preliminary findings and the effort is done mainly to:

a) Stimulate further studies in some of key points to be discussed.

b) Provide incentive for the development of simpler more practical tools to be used by economists having contact with field work, especially to handle risk and uncertainty issues.

The tools, mentioned in point b) should allow more than just an impressive presentation of someone's results to our colleagues in the profession. They should help the economist to obtain a working knowledge of farmer's decision making process and also help in his communication with

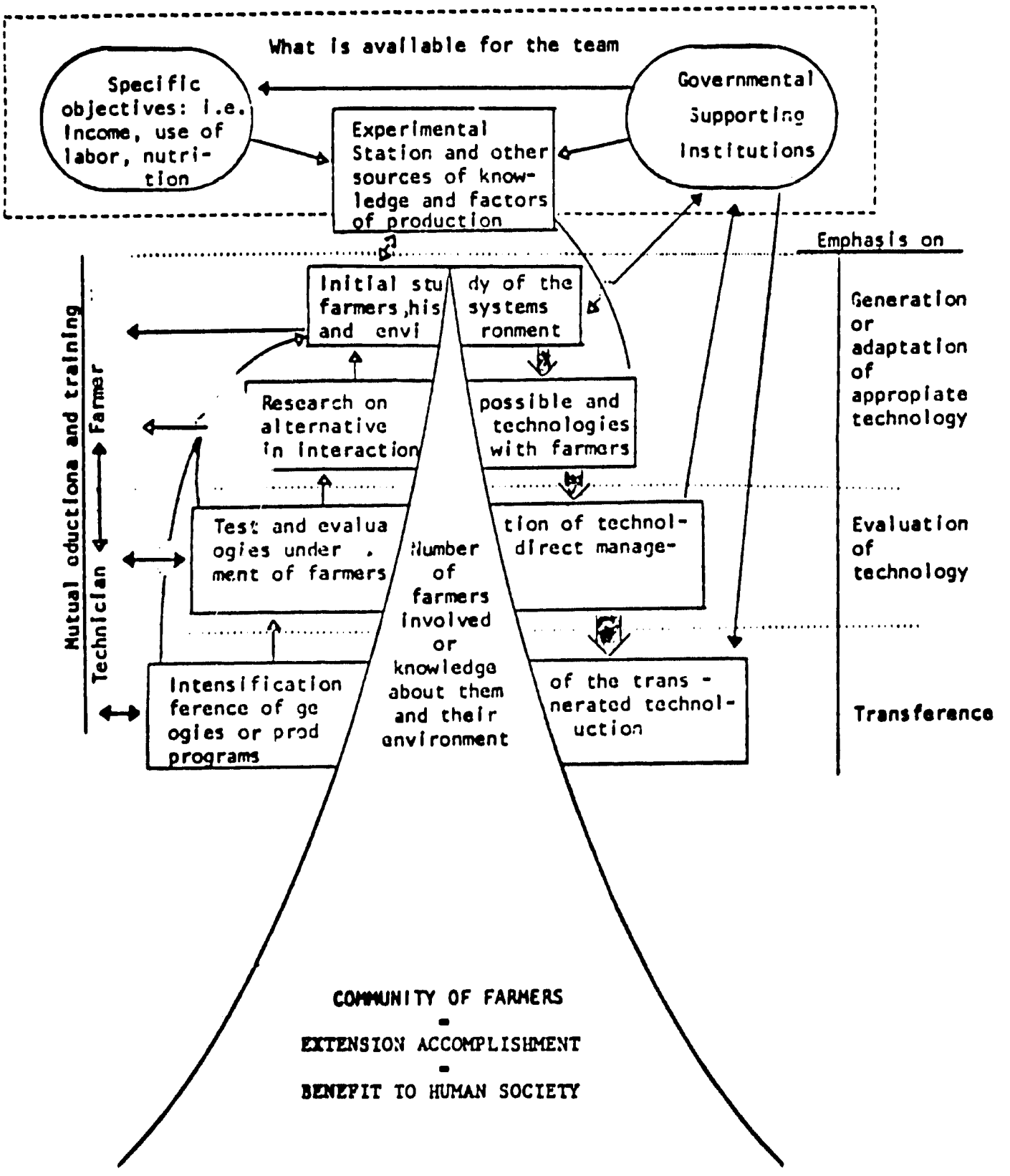

Fig. 1. Involvement of a research team in an area of small farms concentration

team mates -most of them non-economists- government officials and other professionals. They should also lend themselves for transference to economists with less theoretical or mathematical training.

Organization of the Presentation

For communication purposes the presentation is organized by concentrating attention on the three basic economic questions: 1) What to produce? 2) How much to produce? and 3) How to produce? Furthermore, to give an idea of the dynamism and complexity of the decision processes followed by small farmers in Central America, special attention will be given to the components of "How to produce?", that is, the technology which will be employed. These components which may look too "agronomic", imply that some decisions are taken,usually under conditions of incomplete information. Furthermore, those decisions influence the flow of inputs or outputs proper to the systems which have immediate socio-economic implications. The phases to be reviewed are: 1) Soil preparation, 2) Seeding or planting, 3) Use of fertilizer, 4) Weed control, 5) Diseases and insect control, 6) Other cultural measures, 7) Harvesting and 8) Product handling.

What to Produce?

Consistent with the objectives of the programme described above, main attention will be given to the production of annual crops on the small farm. These crops are just one of the components of the small farmer's total production system -the farm.

Few small farms specialize in the production of only annual crops. The farmers know that these are more risky from a production point of view in comparison to the other components of the farm, i.e. perennial crops

and animals.

Perennial crops. When permitted by the bio-physical environment, i.e. low production risk, and viability of the crop because of a secure market, perennial crops may become the main cash crops, i.e. coffee, sugar cane, plantain, cacao. Otherwise they are relegated to a few fruit trees exclusive for home consumption.

Animals. At the small farmer level animals are proferentially poultry and swine because they imply lower investment and less care. Poultry are mainly for home consumption. On the other hand swines are a sort of safe-guard. They are sold specially during periods of cash shortage which may occur when money is needed for operation of the farm or food for the family.

Bovine animals also exist in the small farm but in small numbers. They are also a clear device to deal with risk. In most cases their purpose is saving -farmers prefer to put their money in a cow than in a bank- for emergencies or to be used as collateral to obtain credit. The milk production, usually for home consumption, is a free bonus.

It is expected that a pure economic evaluation of the different animal enterprises included in the small farm will give, at best, results close to break-even. However, the evaluation made by farmers is different and thus, in his context, they are of significant benefit.

Annual crops. Compared with perennials these crops are risky in production. Unless the market is protected for the farmers i.e. price support, they also face a marketing risk besides the low value of their product. All of these characteristics may partially explain the adversion shown, for producing annual food crops, by larger producers.

Most of the annual crops cultivated by small farmers are food crops [9]. These are partly cash crops and partly for home consumption.

The proportions depend on the ecological and market conditions of the area.

In areas with comparative advantages, small farms will produce vegetables as cash crops or non-food annual crops as cash crops also, for example, tobacco. In specific areas some annual food crops are grown exclusively as cash crops, for example wheat in the highland of Guatemala.

There are food crops which have no market but are grown in small quantities on the small farm, strictly for home consumption. Usually these are crops of low production risk for the area requiring minimal care.

How Much to Produce?

In any given year the maximum level of production of annual crops that a small farmer can attempt depends on the amount of land, capital and labor available, at key moments, for such an enterprise. The availability of the production factors for annual crops depends on the composition of the farm.

Land. Annual crops compete for this resource with perennial crops and animals. In general it has been observed that the larger the ratio of family size/farm size, the larger the proportion of farm land dedicated to annual crops. This implies that the primary goal is to produce food for the family and then for market [9]. It is rare, however, to find a small farm producing only annual crops -except under share or renting arrangements. The tendency is to diversify the number and type of enterprises as a means to avoid production and marketing risks. The relative composition depends on farm size and also on the comparative advantages of the possible enterprises.

Capital. For the small farmer, the most important capital factor element in annual crop production is seed. It is the only capital factor

element he cannot do without. Except for seed, small farmers tend to avoid risk by investing as little as possible in other cash inputs such as fertilizer, pesticides and the like. For the small farmer the risk of losing the money invested in these cash inputs is more important than the risk of lower yields induced by low fertility, insect attacks or other problem. This consideration is a key one in relation to transference of technology. The high cash requirement of most modern technologies proposed to small farmers is one key reason for their rare adoption. Under the present situation faced by small farmers proposed technologies have to require less operating cash. Technologies requiring higher cash inputs and possibly socio-economically more attractive technologies, will have potential only if accompanied by some institutional support, for example effective credit or subsidies.

Labor. When land and seed are not problems, labor could constitute a serious one. The curve of labor requirement for agricultural work presents notorious peaks and valleys at specific dates during the year. This implies an added risk for the individual farmer. He will plan his production based on the possibility of obtaining enough hand labor at key moments.

Because of present day opportunity cost of labor, there is a clear shortage of hand labor for annual crop production at the small farmer level especially during periods of higher requirements in many areas of Central America. Large families do not adequately alliviate this shortage since their members have the same opportunity cost and tend to work in alternative jobs to increase the cash inflow for the family.

There are various manners in which farmers have been dealing with the risk of not having an adequate labor force at critical dates, which may imply crop losses. They may offer higher salaries, tend to use some labor

substituting inputs such as herbicides -which are expensive- or tend to use cropping systems with lower labor requirements. Most of the measures taken imply increased cost or the exchange of one type of risk for another. The greater amount of cash needed to obtain labor or its substitute is an added barrier to motivate farmers to add non labor substituting inputs to their technologies.

How to Produce It?

To observe how the small farmers respond to the question "how to produce?" is to observe their technologies.

Careful students of those technologies have already categorized them as highly efficient in using the available resources. This is possible because of the empirical knowledge, about the total environment and the alternative cropping systems, accumulated by the small farmers and their ancestors.

A close look at the technologies used by small farmers to produce annual crops helps the investigator to identify several strategies used by the farmer to deal with situations of incomplete information. Some of these devices will be reviewed in this presentation. It is not an exhaustive review since there is more to learn from small farmers.

Soil Preparation

The small farmers realizes that there are production benefits, from a technical, "good" soil preparation. Usually, however, "good" implies the use of plow and the necessary power source. This represents an added investment and the farmer will be reluctant to make it. Furthermore such "good" preparation may have disadvantages -i.e. accelerate erosion- wich

are magnified under the generally non favorable conditions of soil slope and structure in most small farms. Consequently, under the generalized conditions of capital restriction and low quality of resources, small farmers tend to prepare soil by hand.

In some areas, a primary mechanization exists for improved soil preparation, usually based on animal energy and wooden plow or light machinery doing a minimal work of the soil. In all cases the cost of soil preparation is lower than a technically recommended one.

It is generally accepted that improved soil preparation not only provides a better growing medium for crops, but also reduces risk from insects, diseases and weeds. as well as enhances water penetration. While the small farmer generally does not have access to means which make the benefits of improved soil preparation available to him, he frequently obtains many of the same benefits with alternative practices. These practices may include the burning of crop and weed residues, manual weed control, or use of some herbicide and special practices for seeding. The seeding practices depend on soils type, their slope and moisture content.

At the small farm level the soil preparation is sometimes highly sophisticated but the tendency is to minimize tillage. The advantages of minimum tillage in relation to costs, energy and resources conservation is now being recognized by investigators and larger producers. Small farmers have been practicing it for hundreds of years.

Seeding (or Planting)

In relation to seeding there are two aspects to observe separately; the seed and the seeding process itself.

Seed. It was anticipated that for small farmers the seed is the most important component element of capital. Usually a small farmer does not know the exact area planted with a specific crop. He knows, however, exactly how much seed he put there. The quantity of seed is usually measured in volumetric units instead of weight. They use the same units to assess yield and relate the volume of grain harvested to the volume of seed used instead of the common weight / area index used by technical people. That is, the return to the seed used is one of the main indexes used by small farmers to evaluate their crops. This is an important fact to consider in communicating with farmers specially when surveying areas for production and land productivity i.e. censuses.

Because of the importance of seed, small farmers are very careful about knowing the behavior and quality of this input. This attitude has made it very difficult to stimulate a rapid use of improved varieties at the small farmer levels. Sometimes it is easier to attract attention for a new crop for which they have no seed than for a new variety of crops which they already have. They consider those new varieties highly risky specially when they require, as complements, higher levels of other inputs such as fertilizer, which is common.

Another risk safety device is already built into the farmer seed itself, this is its genetic variability. That is, the seeds used by small farmers usually are mixtures of cultivars [21] . The farmer knows it and tries to maintain the mix. They expect that under non favorable conditions at least some of the components in the mix will be able to produce, thereby avoiding a total failure of the crop. This is a good defense against risk of insect, diseases, drought and the like, which affect differently the

various components in the mix. This principle used during hundreds of years by small farmers is also being considered today by plant breeders. There are several "synthetic" varieties in corn and "multilines" in bean which are based on this principle.

Seeding process. The various aspects of seeding or planting the different crops are again lessons on how to handle some production risk. The principle seems to continue being the imposition of variability or, in economic term, to impose different types of diversification. They seldom put only one variety in a significant area of the land allocated to annual crop. They tend to divide the land in parcels which they seed with the different "varieties" they have selected over time. Furthermore they tend to form an echelon of seeding dates with those parcels during the seeding period. This in turn implies that seeding rate also varies, being higher at the end of the seeding period. [21]

All these practices tend to reduce the risk of missing the, usually allusive, rain distribution during a specific year. The tremendous variability almost eliminates the risk of a total failure due to a single problem such as a specific insect or desease. It is known that those biotic agents tend to prefer specific ! ' ' s and concentrate in short periods of time and seldom will produce a general attack.

The same idea of inducing variability to face the environmental variability is present in the practice of multiple crooping common among small farmers [9]. Under this practice the risk of failure due to problems in the bio-physical environment is diminished even more. Besides the benefit of genetic variability, discussed previously, the differences among species present added benefit. Some of the crops acts as barriers against wind or insects protecting the accompanying crops. Furthermore some combinations

allow a better utilization of space above or underground.

Finally the physical operation of puting the seed on the ground is also important to observe. Usually the farmer will put the seed in a hole dug as deep as necessary to secure moisture for germination. In most cases they use a stick with an iron tip which they force into the ground to open the hole and throw the seed in. Also, they tend to put several seeds in one hole despite the usually good quality of this input. The objective now is to secure the survival of some seedlings after the unavoidable attack of ants, birds and insects. It is again a safety device which they use even when they broadcast seed or seed after a plow.

Use of Fertilizer

Most small farmers recognize the benefits of fertilizer for better yields. However, because they consider this input to be expensive they are not sure of the net benefits for them. They see that the necessary investment increases the loss risk.

Another problem conceptualized by farmers in relation to fertilizers is the fact that an efficient use of the recommended dosis requires complementary inputs. When soil fertility is a problem it means that some nutrients, which are complementary in production with other inputs, are low. The application of small quantities of fertilizer increases the efficiency in production of those other factors up to a limit. If too much fertilizer is applied then the fertilizer is used inefficiently since their complementary inputs now too low. To solve this new situation small farmers would need to invest even more implying a loss of control over their cropping system which they do not like.

In most cases, when a small farmer uses fertilizer, it is observed

that quantities used are much lower than those recommended. This is a rational behavior under the analysis made above.

In summary, the implicit cost and the fact that fertilizer does not clearly substitute other imputs, but rather tends to require complementary inputs, diminishes the farmers' interest.

Organic matter is not always used as fertilizer either. The farmer will have to decide between leaving the vegetative residues as mulch and organic matter to be added to the ground or eliminate it by fire. The decision depends on the type of crop and insect or slug risks.

Weed Control

The risk of losses because of weeds is well recognized by farmers and different characteristics of their cropping systems can be identified as devices to handle the problem.

It was mentioned earlier that it is common to observe farmers burning vegetative residues during soil preparation. Such practice already helps in eliminating some weeds which could constitute a problem later on.

The crop varieties selected by farmers are usually of aggressive behavior. This helps them to compete with weeds by growing faster, covering quickly the ground, or climbing and finally sofocating some weeds.

In most areas, however, these practices are not enough, and farmers usually hand weed their crops which implies a pressure over the short supply of labor. This pressure on labor at weeding time is more notorious in areas where at least some rudimentary mechanization exists for soil preparation. In those areas the small farmers are able to prepare and seed larger plots of land to make more efficient use of the implement. In turn this means that weeds will be growing at the same time in a larger area also. The

farmer is forced to start weeding in one part too early and finish weeding the latter part too late because the lack of labor or because he cannot invest in hired labor.

Sometimes, farmers use a plow to partially weed their crops or they may attempt the use of herbicides. The last happens preferentially in areas where they are familiar with use of herbicides because of the example given by commercial banana or coffee farms. The main attraction of herbicides is their capability to substitute labor.

For those farmers who have formed an echelon of seeding dates the handling of weed problems is easier with less available labor since they move from one plot of land to another.

It is also interesting to note that small farmers do not try to maintain the crop completely free of weeds as is usually seen in experimental stations. On occasions they weed only the interrows leaving some weed within the rows. Usually they attempt to eliminate more carefully only those weeds which they know are more aggressive.

Diseases and Insect Control

The disease and insect (including slugs), risks are very high on the small farms of tropical America. Small farmers tend to feel defenseless in front of these problems which they rank very high [21]. Practices to diminish these risks include burning of vegetative material during soil preparation, seed cleaning and sometimes hand control. In a few cases they use insecticides or fungicides, specially when they grow vegetables or other crops of higher value. Without doubt this type of risk will continue to be high for small farmers.

Other Cultural Measures

There are other operations which are specific of the management of some cropping systems and which also tend to diminish some of the risk involved in production. A couple of examples will help to illustrate this.

Hilling in corn. This is done for weed control or to increase lodging of the plants in case of strong winds, or to help the generation of new roots specially under risk of insects attacking the roots, i.e. white grubs.

Doubling of corn. After corn has reached physiological maturity small farmers usually double the stalk immediately below the ear. This practice helps the corn to dry more quickly, prevents water from entering the ear with a concomitant rotting as is the case if corn is not doubled over, and also reduces insect or bird attacks. In many cases this is also a traditional way of storing corn until time for consumption or sale. In some areas, an added practice at the time of doubling over corn is the removal of most of the corn leaves. These leaves are used as animal feed or mulch for weed control before the next crop is seeded among the corn stalks. However, the main interest of removal of the leaves is to allow ventilation and entrance of more light to allow a better drying of the corn.

Harvesting

At harvesting time there are also risks which the farmer tries to reduce. Some of them are excessive moisture sprouting of grain on the plant, bird attack, loss of grain.

The progressive seeding dates used by many small farmers, and the differences in the life cycle of different varieties disminishes some of the mentioned problems. In this manner, at least part of the crop is ready

for harvesting at a date with favorable environmental conditions. Most of the varieties have also been selected considering their behavior at harvesting time, i.e. beans or corn should not germinate on the plant, and beans pods should not open before harvesting but they should release the bean easily under the normal practices.

Product handling

The product is handling differently depending on its purpose.

Small farmers will put the most effort into cleanning the product considered for direct consumption, less care is taken in cleanning grain for marketing and even less for the grain they will store.

The grain for market is cleaned as much as is necessary for this to be accepted by intermediaries; they do not see the advantage of additional efforts. In the case of grain for storage, they prefer to leave enough residues to maintain some humidity and control of temperature under their traditional storage methods. They argue that perfectly clean beans lose too much humidity which implies a loss in culinary quality and allow some insects to attack, i.e. weevil. These are, again, risks faced by farmers and some devices used to diminish them.

Final Comments

As anticipated this was not an exhaustive reviewing of the decision making process done by farmers. It shows, however, some of the many identifiable considerations which are taken into account by the small farmer even when the analysis is done only for annual crop production which is just one part of the total production system managed by him -the farm.

The interrelationships among the different enterprises in the farm

can be also rationalized as safety devices to handle problems of risk and uncertainty in production and marketing. There is no doubt that some of those enterprises or practices are uneconomical. The economic evaluation of them may not be the appropriate one to make. However, there are many indications that lowering risk is a condition the small farmer imposes to his actions tending toward an economic benefit. So it is not strange to observe that small farmers many times cross-subsidize enterprises which are clearly uneconomical inside their farm simply to assure a security level they feel comfortable with.

The whole field of small farmer behavior is, without doubt, an interesting field for research. It also offers the possibility of identifying factors which could be useful for these people who need help but can also help society in general. Their technologies have a lot of positive characteristics when considering issues of resource conservation and freedom from fossil energy. With appropriate institutional support the experience of small farmers could be transferred to benefit the whole society.

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CATIE
CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA
Program of Annual Crops
Turrialba, Costa Rica

THE CORN AND BEANS CROPPING SYSTEMS IN SAMULALI, NICARAGUA

The agricultural community of Samulalí, in Nicaragua, has 160 families which total 1000 inhabitants. One of the most important cropping systems is the planting of corn in the beginning of the rainy season, in April or May ("primera"), followed by the planting of beans in early September ("segunda") in the same field. Beans are planted prior to the ripening of the corn. Farmers remove some of the corn foliage permiting sunlight to reach the beans. Both crops are harvested in December (see Fig. No. 1).

The preparation of the land for planting, the care of the plants, as well as the harvest, transport and marketing of the grains is done in a traditional manner utilizing local equipment. Pesticides are applied once and fertilizer twice a year, and decisions related to the quantity, doses and locality of product application and times of application are made taking into account only the necessities of the corn crop.

Planting densities are high. The beans, planted between the corn rows, soon cover the soil and prevent the farmer from entering his fields and harvesting his corn.

After two years of intensive studies CATIE has designed an alternative system without modifying substantially the farmers' and introducing only the following changes:

a. Modification of the spatial arrangement of the beans to enable the farmer to enter his field to harvest corn in October at maturity and not at December. This reduces the loss of corn caused by insect damage. However, the bean population is reduced.

b. Modification of the dosage, quantity, frequency and position of the fertilizers applied to the corn. This change, combined with the altered spatial arrangement, permits the beans to benefit from the residual effect of the fertilizer (see Fig. N°2).

c. Farmers are advised also to apply additional insecticides (optional) and fertilizers to both the corn and beans.

These simple modifications permit the following: (see Table No. 1).

1. A notable increase in production; according to experimental results the beans yields increased from an average of 550 Kg/ha using the traditional methods of the farmers, to 975 Kg/ha using the improved alternative although at lower plant density; corn yields increased from an average of 2500 Kg/ha.

2. Although the farmer obtains only 70% of the output achieved experimentally, his net income would increase from 64% to 135%.

3. Total costs increased only 9%.

Humberto Jiménez-Saa
January 1979.

Table No. 1. Comparative economic analisis for the farmer's cropping system and its recommended technological alternative. Samulali, Nicaragua

	Farmer's cropping system	Alternative cropping system	Rate of increase in relation to the best of the control farmer
	Expected range	Expected range	Expected range
Corn yield* (Kg/Ha)	3000-2000	6000-5000	100%-67%
Beans yield (Kg/ha)	500-600	850-1000	42%-67%
Gross income (CA$/Ha)**	606-503	1155-1071	92%-77%
Net income (CA$/Ha)	116-13	619-535	434%-361%
Net income when assuming only a 70% of experimental yields	116-13	273-214	135%-84%
Family income (it assumes that all labor is family labor)			
Family income based on experimental evidence. (CA$/Ha)	443-340	959-875	116%-98%
Family income when assuming only a 70% of experimental yields. (CA$/Ha)	443-340	613-554	38%-25%

* Data for the farmer's yield variation were obtained through interviews with farmers in Samulali. Yield data for the technological alternative are based on experimental results.

** CA$ = US$ (one Central American peso = one USA dollar)

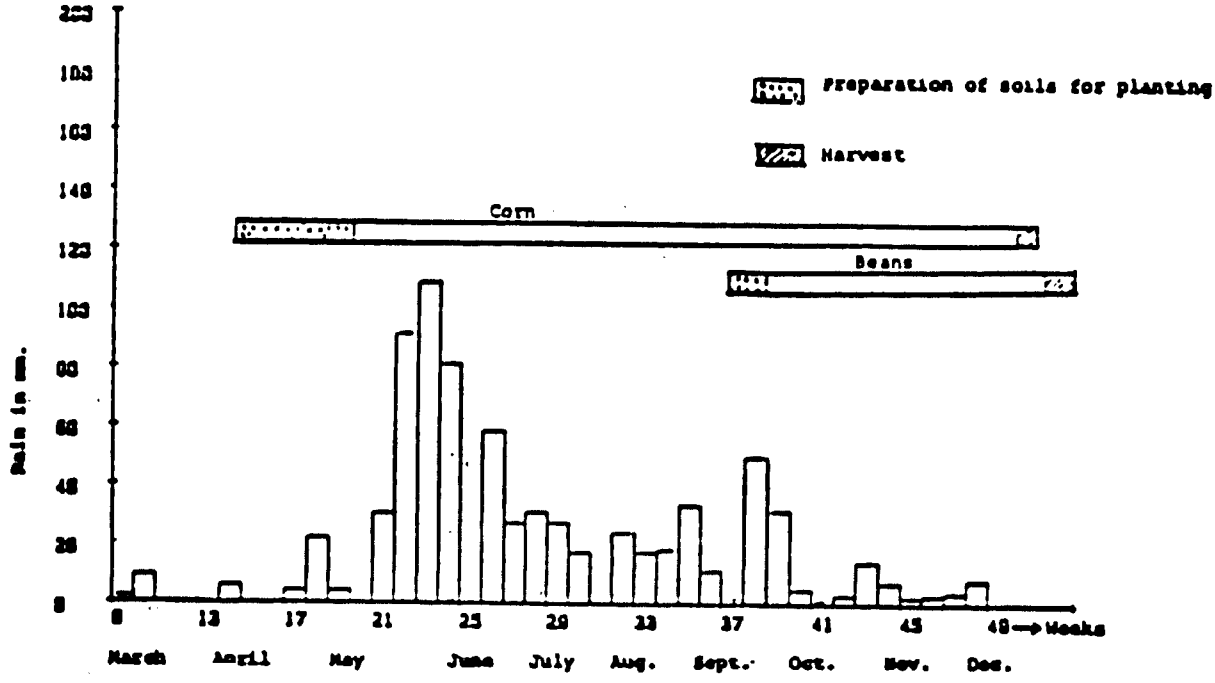

Fig.1 Sequence of cultural practices in the corn and beans system. Distribution of rain in periods of 7 days. Samulaif, Nicaragua

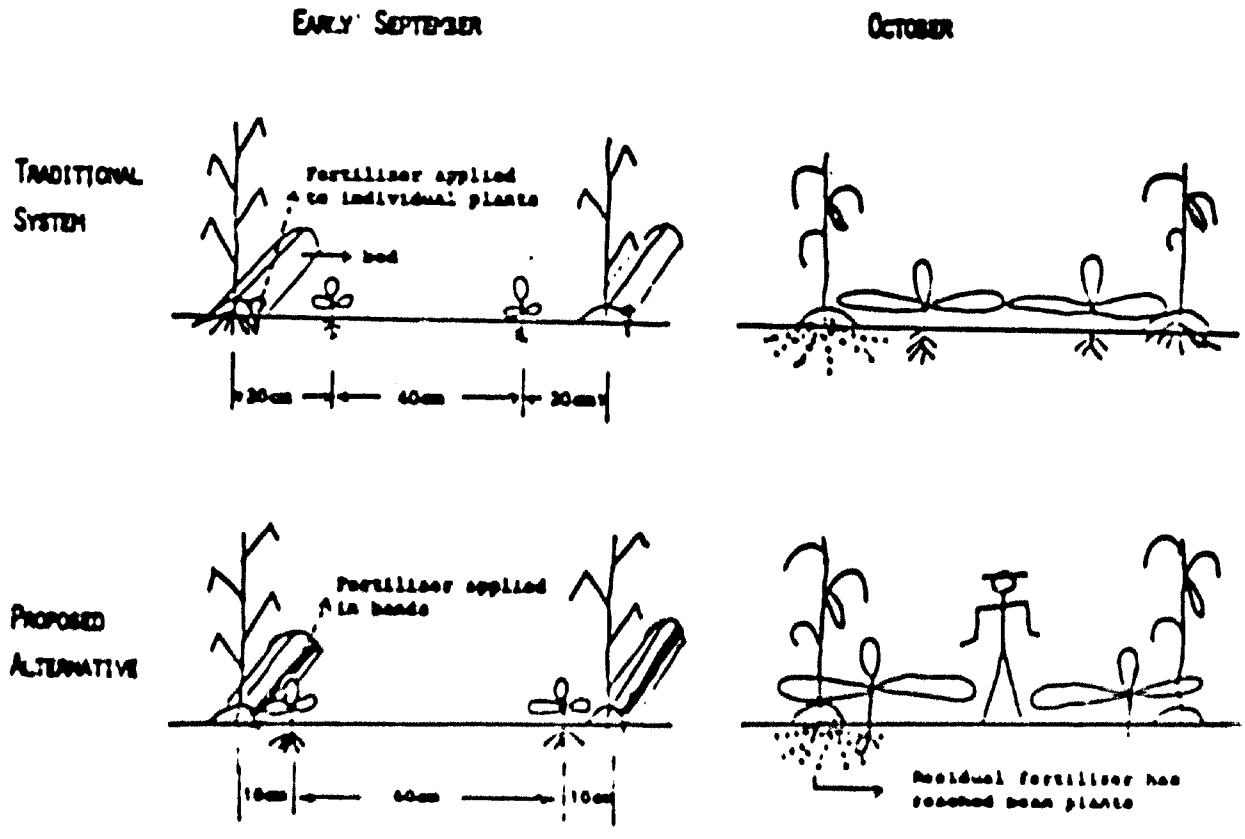

Fig. 2. Two simple modifications of the corn + bean system in Samulaif, Nicaragua, i.e. spatial arrangement of seeds and position of fertiliser. These permit the farmer to harvest corn early, and the beans to benefit from residual fertiliser.

From: Activities at Turrialba 6: No 1 January - March 1978
Tropical Agricultural Research and Training Center. Turrialba, Costa Rica

DON VICTOR: A SMALL FARMER IN COSTA RICA

Summary of a case study

Introduction

Considering the important role that low-income farmers play in the agricultural economy of the Central American Isthmus, there is now some concern to improve more rationally their economic and social situation. CATIE, very much aware of this trend, has been developing a methodology to identify or develop cropping systems, technically improved, adapted and adoptable, which can help to improve the lot of those farmers. This means that the efforts being made should improve earlier attempts which tried the simple transference of technologies that were developed in experimental stations and that considered only technical factors to be used in a social vacuum.

The cropping systems that are traditionally utilized by low-income farmers in the Central American Isthmus show a clear adaptation to the physical-biological and socio-economic conditions of the environment in which those farmers operate. Undoubtedly, those systems are the result of a selective and evolutionary process that has permited their adaptation and approximation to a dynamic equilibrium with the environment in which they prosper (4, 6, 9). These observations suggest that the identification or generation of improved, adapted and possibly adoptable cropping systems should be based on previous knowledge of the environmental conditions under which those systems are expected to prosper. This is one of the most important aspects of the methodology being utilized in the Cropping Systems Project of CATIE (7).

The previous knowledge that is obtained from the environment in which the small farmers operate make it possible: a) to orient research and required studies to find the necessary improvements for production systems; b) to identify the restrictions to the research results; c) to find the bases for evaluating results; and d) to give adequate direction later to the diffusion process, or production programs (6, 8).

An examination of the environment in which the cropping systems prosper implies a study of the physical-biological and socio-economical factors, both within (endogenous) as well as outside (exogenous) the farm.

The study of physical-biological factors has been generally governed by traditional agricultural research. The consideration of human elements (socio-economical factors) is, however, recent in efforts of this type, and its methodology is in a state of evolution (2, 4, 5, 6, 7).

CATIE's project in small farm cropping systems is studying the environment of the small farmers by periodic visits to their communities, statical and dynamic surveys including some special studies of individual families (case study).

Case study

A case study consists of selecting a family, among those that have offered to cooperate in the area being studied, and visiting it periodically for informal interviews during the agricultural year. The information acquired during the interviews is complemented with the use of farm records showing daily activities.

The records have been oriented, in most cases, towards production aspects and endeavor to reflect the activities of the family group living on the farm, including the use of inputs and sale of products. The keeping of records has been done by one member of the family, which has made it possible to obtain information with respect to the family's consumption habits.

The case studies are based on the following supposition: the study of the activities of the farmer and his family, for one agricultural year, gives the observers an opportunity to envision the situation in a manner closer to the way the farmer faces it. This, in turn, makes it possible to evaluate the farmer's activities and the decisions he takes in a more adequate way, and thereby learn something from the exercise.

The small size of the "sample" (a family living in the community) is considered to be partly compensated by the intensity of the observations during the year. The representativeness of the selected families is determined in previous visits to the community by program technicians who choose a family among those wishing to cooperate.

In Costa Rica, three case studies have been carried out. One family was chosen to represent the more traditional small farmer, in accordance with his technology and production of basic grains, which served only partly for subsistence, since he sells more than fifty per cent of his production. The second family represents those small farmers whose technology is more up-to-date, utilizing more modern inputs and inclined towards vegetable production. The third family represents those progressive small farmers inclined towards producing commercial crops such as coffee and sugarcane.

This paper by Dr. Luis A. Navarro, Agricultural Economist, refers to the case study made of the most traditional farmer. Some of the most important aspects of the case are summarized here. A preliminary report has already been published (reference No. 7) and is available in Spanish to those persons interested in obtaining a copy by writing to Ing. Humberto Jiménez, Specialist in Communication, CATIE, Turrialba, Costa Rica.

The family and its resources

Don Víctor (52 years old) and his wife Teresita (47 years old) have 12 children, of whom 10 live with the family, made up of 16 persons. The permanent family labor staff consists of don Víctor, three sons over 12 years of age and a son-in-law. The rest of the family works with less intensity in the farm activities dealing directly with production.

The farm covers 13.5 hectares, 62 per cent of which is devoted to annual crops, 31 per cent to natural pasture, 4 per cent to coffee and 3 per cent to

The hut in the background is don Victor's storehouse. Although built in the traditional style, it is very efficient for storing grains.

buildings and idle land. The few forest and fruit trees found on the farm are limited to the fence rows or associated with the coffee. Eighty-two per cent of the farm is on land with a 10 to 45 per cent slope, which is not favorable to intensive agriculture, especially when one considers that the original soil material is saprolitic, derived from sedimentary mud rock, which is completely unweathered. This means that the problem of erosion and landslides is critical, and is aggravated even more due to the high rainfall intensity in the area. The chemical characteristics of the soil are not so unfavorable (although the fertility has decreased), which can explain, in part, the low level of fertilizer use. In 1976, US$12 were spent on this input.

Based on the rainfall data for San Isidro de El General, a distance of 40 km from the farm, the

Eighty-two percent of don Victor's farm has sloping land not suitable to intensive agriculture.

20-year average comes to a maximum of 587 mm in October and a minimum of 15 mm in February; the annual average being 2944 mm (Fig. 5). From the agricultural point of view, the rainfall distribution can be considered as if it were bimodal, which gives rise to the existence of two cropping periods, the "primera" or "invernis" which begins in April-May and the "postrera" which begins in August-September. The canicula, a relatively dry period in July-August, makes it possible to harvest the crops of the "primera" and to plant those of the "postrera".

Farm activities are determined mainly by rainfall distribution (availability of water) and also by the coffee picking season, which begins at the end of September in the area and implies competition for labor, including that of the family.

Cropping systems

Farm production destined for market or consumption is based mainly on annual crops and coffee. The main annual crops are basic grains such as maize, beans and rice.

Maize and beans are planted in both cropping periods. Bean management and technology is more intense in the "primera", which is the least favorable for this crop as far as climate is concerned, but more favorable with respect to the availability of labor. Beans in the "postrera" are cultivated as "frijol tapado", a traditional technique, using a minimum of labor. It consists of broadcasting the seeds on land that has been "resting" and which is therefore covered with high weeds. Then the weeds are cut flush to ground level and cover ("tapado") the beans. The next job is to harvest the beans.

Rice is planted during the "postrera", although the most adequate period would be in the "primera". The main reason for not doing it in the "primera" is the scarcity of alternate food crops in this period for the wild birds, implying a great risk for the planting; something that does not occur in the "postrera".

Coffee picking activities are concentrated in the last part of the year. This means that the family labor, at this time, should be free of activities dealing with the annual crops on the farm, to pick their own coffee and also to go out to pick coffee in other farms, and thus increase the influx of needed cash.

Other crops such as cassava (*Manihot esculentum*), pigeon pea (*Cajanus cajan*), tanier (*Xanthosoma* sp.), squash (*Cucurbita moschata* and *Cucurbita maxima*), and cucumber (*Cucumis sativus*), are grown in small quantities and only for family consumption. Fruit production is minimal and mainly for family use also. Occasionally avocados and oranges are sold, depending on the time of the year they come into production.

The technology used on the farm can be described as traditional, tending to reduce the use of modern inputs, with almost all the work done manually. During the year 1976, the family obtained a knapsack sprayer to apply herbicides for use mainly in the pastures and in the rice fields, under the direction of local suppliers of this input. Other inputs included a little fertilizer for the corn; bait to control terrestrial slugs, which are one of the outstanding biotic problems that exist on the farm, especially in beans; and aldrin for treating seeds.

Land is prepared without breaking the soil, just by scraping and burning crop residues, or leaving them as mulch in the case of maize, which does not suffer from slug attacks.

The sowing of crops is done manually with the help of dibbles ("espeques" or "macanas"), and plant densities are generally low. All the crop "varieties" can be considered as local; weed control is also manual.

The most common cropping systems are: 1) beans planted between rows of maize 6 meters apart, both planted in "primera" and rice planted in "postrera" between the bent over maize of the "primera"; 2) beans planted between rows of maize 6 meters apart, both planted in "primera" and maize planted in "postrera" between the bent over maize of the "primera"; 3) maize planted in "primera" followed by maize planted in "postrera" between the bent over maize of the "primera"; 4) "frijol tapado" broadcast in the "postrera" on land that has been "resting" for at least the first part of the year; 5) maize planted in the "primera" followed by rice planted in the "postrera" between the bent over maize of the "primera".

The management of these systems consists of working small tracts of land. Only in one case did the farmer plant more than one hectare at one time. Every agricultural practice is completely finished in each plot before going to the next in order to permit an adequate control of weeds considering the total land cultivated and the availability of labor. In 1976, there were 12 plots of land, varying in size from 0.18 to 1.05 Ha, managed independently in the first planting period and 19 portions, varying in size from 0.04 to 1.05 Ha, identified as being differently managed in the second part of the year.

The value of the production from the annual crops for the year 1976 was US$1,750 of which 52 per cent was sold, demonstrating that the function of these crops is not only for marketing, but also for subsistence.

Livestock

The livestock management is quite extensive, especially with respect to cattle. The five hectares of poor pasture are stocked with three cows, three heifers, two smaller animals and a horse. The most important care consisted in looking after the cows and controlling parasitic insects such as "tornalo" (*Dermatobia hominis*). During the dry season, when the pastures can not sustain the stocking rate, they manage the animals by letting them graze alternately on the crop residues and in the pastures. This benefits both the cattle and the land to be cultivated, since the trampling breaks up the residues and the animals "control" the weed growth, which means a saving of labor at the time of preparing the land for the following harvest period.

The hogs (8 of various ages) and chickens (90 of various ages) are cared for by the housewife. The pig-pen is maintained perhaps too close to the house. The hogs and chickens are fed concentrates and part of the basic grains produced on the farm. In 1976, the family spent US$179 on concentrates for these animals.

The economic efficiency of the livestock operation is clearly inferior to that of the annual crops and coffee on the farm. This alone is reflected in the fact that the objective function of the livestock is not exactly economic, but rather social; providing subsistence, security and a way to invest. In fact, the livestock was partially subsidized by other activities on the farm.

The poultry was raised mainly for meat and eggs. There were sporadic sales when there was an excess over what was needed for the usual consumption (1–2 chickens and 10 to 15 eggs weekly), or in minor emergencies. The hogs come closer to being a commercial operation, besides being considered as an asset which can easily be converted into cash in case of major emergencies. The cows are raised only partially for their milk, and for the time being, as means of savings and major investment. They are sold (which is considered a true "sacrifice") only in case of serious emergencies, and can be used also as guarantee, should there be a need for requesting credit. In general the family resists getting credit for production, and only considers it necessary for investments in land or for buying more animals. Faced with the need for cash to produce, the preference is to go off the farm to find work, in which case don Víctor usually utilizes his skill as a carpenter.

Forestry aspects

The forestry aspects are not to be considered as a business operation, but rather as an operation complementary to the others. The trees are used for fences or firewood, and occasionally to make charcoal to be sold. Due to the characteristics of slope and type of soil of the land resource, this operation should be more important; the same for perennial crops.

Farm-environment relationship

Don Víctor's farm is located 4 km from Pejibaye, a populated center with 400 persons, in the district bearing the same name in the canton of Pérez Zeledón, San José province, Costa Rica. The district covers 7245 Ha, with 854 agricultural operations and a population of 8000 (3).

Pejibaye is the main market to purchase inputs, food and products needed on the farm.

The market for inputs and food supplies consists of three grocery stores and shops, besides a commissary belonging to the National Production Council ("CNP"), a governmental entity. The market, mainly for basic grains, is in private businesses, which act as middlemen between the farmer and the "CNP". The coffee is sold by the farmers directly to the processors through collecting terminals established in the community.

The family has to travel to San Isidro de El General, a city 40 km away, to buy clothes, for medical care or dental work. Pejibaye offers limited medical service, only in the case of emergencies. The existing roads leading to the farm are passable year round.

Whatever additional labor, other than that of the family, comes from the community.

The following diagrams –figures 1–4– show the flow of cash as income, as expenditures, and the use of labor, as observed during 1976 and part of 1977.

Other observations and comments

The data included in this report are only preliminary, and are based on observations made between April 23, 1976, and January 23, 1977.

The economic movement of the farm during the year is one of the most interesting among the observations. These observations are summarized in Table 1.

The opportunity costs utilized in Table 1 are in agreement with the possibilities existing in the area during the study. The daily wage paid for family labor was quoted at US$2.34, and the yearly cost of land use at US$50.20 per hectare. The results in the table show that only 17 per cent of all costs are in cash, which implies a relatively intensive use of the land and labor resources.

The same results show that 54 per cent of the production was sold, and 46 per cent for consumption or storage for later sales. Finally, the index of economic efficiency (1.28) indicates an attractive net return of 28 per cent on total investment, although at the time of the analysis, the family had received an advance of only 75 per cent of the final value of the coffee picked during that season.

The indices undoubtedly indicate a high efficiency for the farm's activities during the period. The figures reconfirm, at the same time, the low intensity of technology as far as the use of capital, and the high intensity with respect to the use of the farmer's own resources, especially family labor which, although modestly evaluated, comes to 50 per cent of all the costs. If it were necessary to identify the most limiting factor, without a doubt, it would be capital, especially in the form of an adequate flow of cash.

Although the efficiency of farm production is good, the low use of capital implies that the volume or absolute levels of income are very low in relation to the land resources and family size. This means that the family lives in quite a tight situation for getting the means to survive and conserve its means of production.

The major limitation for the family constitutes the availability of cash. During the observation period, they received US$2,191 in cash; 82 per cent came from farm production, 7 per cent from the family working off the farm, and 11 per cent from an extraordinary income, thanks to an inheritance. Of this money, US$2,133 was spent in the following manner: 47 per cent on consumer's goods (food, household articles, medical care), 20 per cent on farm operating costs, and 33 per cent on investments. The

Table No. 1. Monetary values for the different components of receipts and expenditures made by don Victor on his farm, as a production system between April, 1976, and January, 1977.

ITEM	US$ Total	US$ per Ha
EVALUATION OF INPUTS (Cost)		
Labor		
Cash payments	171	13
Total (includes family labor)	1480	110
Materials		
Cash payments	235	17
Total (includes use of own seeds)	303	22
Other costs (Opportunity costs)		
Payments made in cash for the period	12	0.9
Total	837	62
Total Costs		
In cash	418	31
Total	2620	194
EVALUATION OF OUTPUTS (Income)		
In cash (sales)	1800	133
Total (value of total production)	3343	248
Returns or net income		
In cash (considers only cash and cash income)	1382	102
Total	723	54

investments, however, include payment of the debt on the land, purchase of animal and production materials, but not the improvement of resources.

The remainder of the cash, when the study was terminated, about US$60, besides the rest of the payments on the coffee, would be the money available for consumption and production activities on the farm between February and July. This is too austere, and the members of the family will have to go off the farm to work, besides resorting mainly to the sale of hogs.

This limit of cash in relation to family needs makes it impossible to consider conserving or improving resources, especially the land. The latter implies that farmers, such as the one studied, are consuming their resources, which, on a long term basis signifies a total deterioration of resources, and a collapse of the farm, even as a means of simple subsistence. This is a social problem inasmuch as the resources, although possessed and managed by the farmer, are also society's resources, and their deterioration should be the concern of everybody, especially the government.

Interviews with the farmer being studied, and others similar to him, show that they are conscious of what is happening, and in effect the management of their farms reflects this concern. Their soil preparation and cultural practices in general, show a minimum amount of tillage, which decreases the deterioration rate of their resources, especially when one considers their quality. Besides, these practices are in accordance with the scarcity of capital and labor.

Those technological aspects, plus the minimum dependence on modern inputs, are, at the same time, a source of learning for the technicians concerned with finding adequate low-cost and independent inputs derived from petroleum technologies for food production.

Any attempt to solve the problem of compensation and conservation of natural resources at the small farmers' level, as the one observed, implies a cost that the farmers can not afford without help. It is society's responsibility and concern to think in terms of long term solutions in contrast to the actions of the farmer which may be, by necessity, short term solutions. At the same time the existing

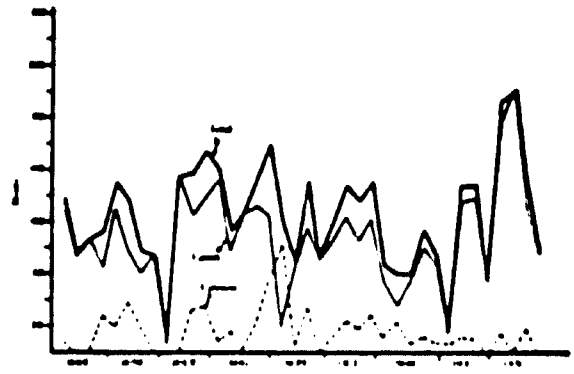

Fig. 3. Number of hours worked by family and laborers each week on the farm. (Don Victor, case study, 1976–1977)

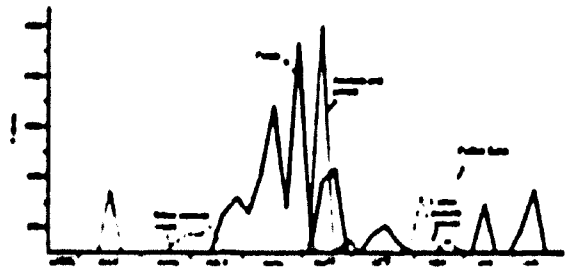

Fig. 1. Weekly flow of cash income from different sources. (Don Victor, case study, 1976–1977)

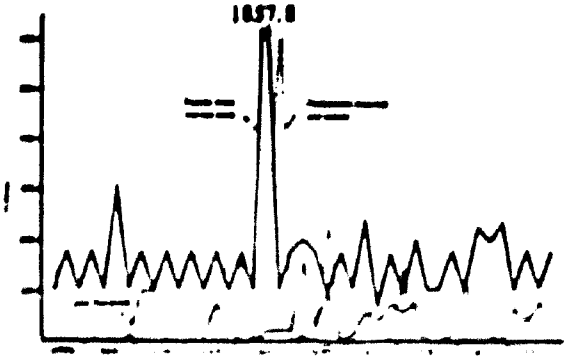

Fig. 2. Weekly flow of different types of cash expenditures. (Don Victor, study, 1976–1977)

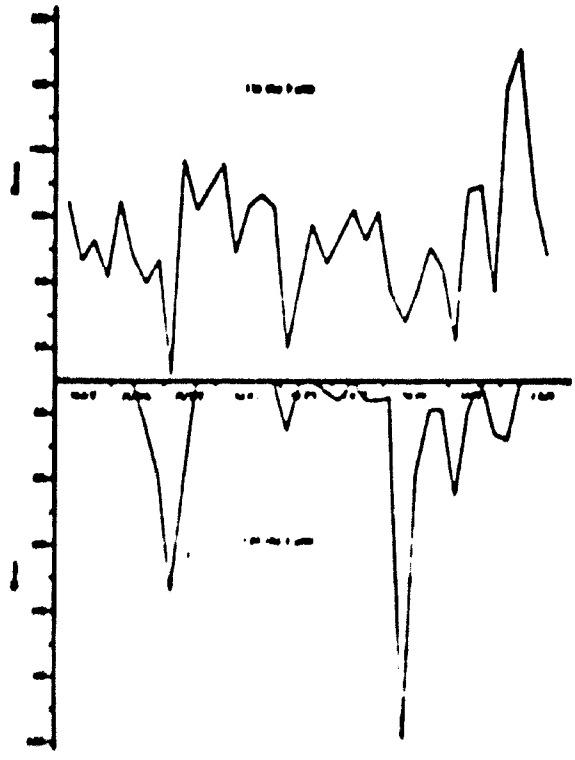

Fig. 4. Number of hours per week worked by the family on and off the farm. (Don Victor, case study, 1976–1977)

conflict should be considered by most technicians and planners, who in all their eagerness for developing technologies, are looking only for an immediate increase in food production. On the contrary, the attempt should be to attain better production that provides more income, at less cost, in a continuous way over the years, considering the limitation of existing resources and their possible deterioration. Possibilities for this kind of approach are, partly, in appropriate research, well directed technical assistance and credit programs which consider the actual constraints of clients.

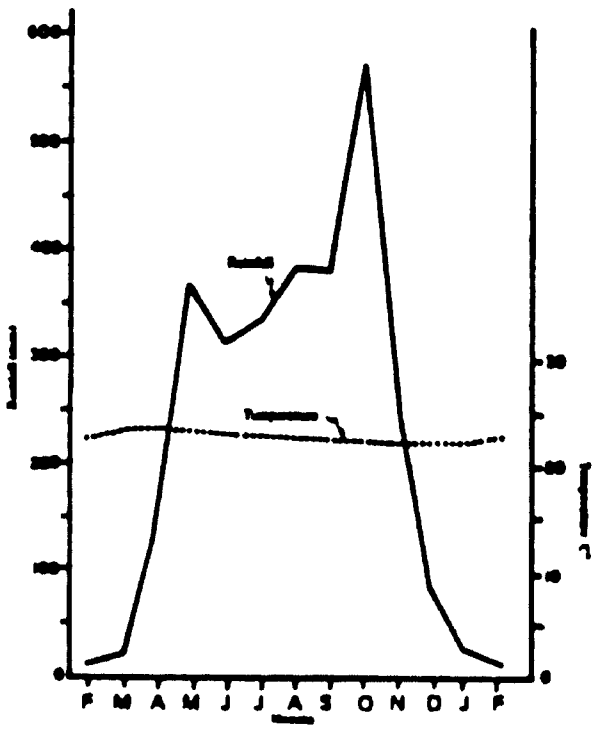

Fig. 3. Monthly climatic parameters based on 20 years of data. San Isidro de El General, Costa Rica.

Altitude: 202 meters above sea level; 10°1'N Lat; 84°4' Long; average annual rainfall: 2944 mm; average annual temperature: 22.8°C

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MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING • MICHIGAN • 48824

December 22, 1978

FROM: D. H. Wallace, Bean/Cowpea Planning Coordinator

TO: Title XII representatives of institutions with manifest interest in a Collaborative Research Support Program for Beans/cowpeas

RE: Delivery of the following to your scientists

1. For each cowpea worker there is a letter suggesting that the cowpea workers organize.

2. For all scientists there is a letter requesting assistance in identifying potential authors for the State of the Art manuscript that we must write.

   This letter also provides an update of bean/cowpea planning activities.

3. For each bean/cowpea worker a copy of a proposed outline for the State of the Art manuscript is enclosed.

4. There will be about two more mailings of this type to all scientists indicating manifest interest. First, a copy of a questionnaire relative to the major constraints to bean/cowpea production and use will be supplied in January. Second, a request for research proposals will be sent to your office in March. Thank you for your assistance.

   PLEASE DELIVER ENCLOSURES IMMEDIATELY TO THE INDICATED SCIENTISTS.

DHW:kc

Enc.

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING • MICHIGAN • 48824

December 20, 1978

FROM: D. H. Wallace, Bean/Cowpea Coordinator
for
A Title XII Collaborative Research Support Program

TO: U.S. cowpea workers

RE: Organizing U.S. cowpea workers

I strongly encourage you to organize a cowpea group in the very near future to represent all U.S. cowpea workers. An appropriate time would seem to be at the Southernpea (Cowpea) Workshop that will be held at the Southern Region Meeting of the American Society of Horticultural Science. This workshop will be at 12:45 P.M. on Monday, February 5, 1979 at the Downtown Howard Johnson Motel, New Orleans, Louisiana. An organizational meeting could be held after this workshop, if necessary.

Reasons for suggesting a cowpea organization are as follows:

1. For the planning of a Title XII Collaborative Research Support Program (CRSP), beans/cowpeas have been tied together by the Board for International Food and Agricultural Development.

2. For the past 20 years, bean scientists have been meeting every other year under the auspices of an informal organization, the Bean Improvement Cooperative. Many U.S. bean workers are currently formally linked together under a regional project [W-150; Genetic Improvement of Beans (Phaseolus vulgaris L.) for Yield, Pest Resistance, and Nutritional Value].

3. Because of the above organization bean researchers are able to coordinate and jointly plan these U.S. efforts, as well as input into the bean/cowpea CRSP.

4. Lack of organization leaves cowpea researchers poorly represented and virtually unable to coordinate and jointly plan.

DHW:kc

cc: Title XII representatives of institutions with manifest interest in cowpeas

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING • MICHIGAN • 48824

December 22, 1978

FROM: D. H. Wallace, Bean/Cowpea Planning Coordinator
for a Title XII Collaborative Research Support Program

TO: All Scientists with manifest interest

RE: (1) Request for guidance and help on a State of the Art Manuscript
(2) An update of progress to date

Request for guidance and help on the State of the Art (SOTA) Manuscript. A proposed outline is enclosed. Please send by February 1, your suggestions of the most competent author (or authors) and also peer reviewers for individual chapters of the SOTA. I need your suggestions now so that the authors can be asked to do their part by mid February, and so that the first drafts can be completed within 6 months, i.e. by about September 1, 1979.

An update of progress to date. (1) The enclosed outline for a State of the Art manuscript speaks for itself. I believe that our joint efforts on this book will be a very valuable contribution.

(2) Manifest interest has been indicated by 35 institutions and about 213 scientists. The interests of the scientists are as follows:

Breeding and Genetics	23	Plant Physiology	20
Plant Pathology	19	Production Practices	15
Agricultural Economics	12	Seed Programs	10
Entomology	8	Sociology	10
Food Science and Nutrition	49	Soils	6
Nitrogen/Rhizobium	29	Weed Control	5
		Total	213

(3) A letter has been sent from this office to all cowpea workers, suggesting that they organize on an informal basis (like the Bean Improvement Cooperative) or on a more formal basis (through a regional research project). The bean workers already have both organizations, and organization is also needed for the cowpea workers—to provide a channel of communication with this office, and to assist the cowpea workers in cooperating, collaborating, and coordinating efforts.

(4) During January and February and perhaps early March, four teams of 2 or 3 scientists each will be visiting: A., Centr. America and the Caribbean; B., South America; C., East Africa; and D., West Africa. The purposes are (i) to make initial contacts and (ii) to determine what the major constraints to higher bean/cowpea production and use are in the LDC's.

(5) About February 20, a workshop will be held in Africa and another in South America to: Achieve concensus among U.S., LDC and other scientists as to the ordering of constraints that limit bean/cowpea production and use, and of the priority of research that should be directed toward solving these constraints.

(6) During the month of March, each station will receive a request for research proposals to be based around the constraint list and its priorities. The prime goal of all proposals must be to assist the small bean/cowpea farmer of the LDC. Additional criteria for judging among the proposals will be provided with the request for proposals. The proposals will be due one month to six weeks after the request is delivered to the Title XII representative of your experiment station.

(7) As soon as the questionnaire for determining constraints is fully completed, a copy will be forwarded to your Title XII representative. I will ask your Title XII representative to distribute the questionnaire to you, so that you can have input into the determining of constraints to higher bean/cowpea production and use by small farmers of the LDC's.

DHW:kc

Enc.

BEAN AND COWPEA PRODUCTION: A STATE OF THE ART ANALYSIS

Appendix IX.1

The Board for International Food and Agricultural Development, (BIFAD), its Joint Research Committee (JRC), and the United States Agency for International Development (USAID) have requested a State of the Art (SOTA) manuscript as part of the planning effort for the bean/cowpea program. We first considered a more rapidly completed effort by a limited number of authors. It has been decided that a thorough effort involving all available expertise on a world-wide basis, in a common effort of authoring and peer review would: (1) give a more thoroughly researched, and objectively written and complete manuscript. (2) give a manuscript that could be published as a book, and (3) provide a state of the art analysis that could be generally accepted by all bean/cowpea scientists and (4) initiate the kind of collaborative efforts that should enter into the collaborative research support program that is being planned.

Attached is a proposed outline for such a book: Note the following main headings:

I. Introduction
II. Production Statistics
III. Cultural Practices
IV. The Role of Nitrogen in Bean/Cowpea Production
V. The Problems of Diseases and Pests
VI. Breeding to Overcome Production and Usage Constraints
VII. Seed Production and Technology
VIII. Traditional Utilization and New Product Development
IX. Storage, Distribution, and Marketing of Edible Beans/Cowpeas
X. Supportive Basic Research
XI. The Role of Institutional Infrastructures
XII. The Role of Values and Policies
XIII. Prioritized Listing of Constraints to Production and Use
XIV. Recommended Research Priorities
XV. Listing of Institutions Conducting Bean/Cowpea Research

Note also the following headings for the four major subdivisions that are included within most of the main headings I to XV:

A. Beans in LDC's
B. Beans in developed countries
C. Cowpeas in LDC's.
D. Cowpeas in developed countries

The intent of A and C is presentation of thorough and complete coverages of the state of the art and state of the science in the lesser developed countries as related to beans and cowpeas, respectively. The intent of B and D is an as-brief-as-possible summarization of the state of the art and state of the science for developed countries as related to beans and cowpeas, respectively. This is for contrast of the LDC situation with that of developed countries. The summarizations for developed countries should cite only the major, usually latest and most thoroughly integrative references.

The sections for the LDC's should be much more complete in scope and cite more references. The intended audience includes scientists, engineers, administrators of agricultural and biological programs in all countries, social scientists and their administrators, and other non-technically trained people including farmers. For these reasons, the language should be as precise and non-technical as possible, and the small-farmer state of the art, his problems and his needs should receive the major attention.

A Proposed Outline for:

[illegible]: A STATE OF THE ART ANALYSIS

Assignment to review literature and prepare a chapter--including list authors and peer reviewers

_____

Chapter No.	Subject Matter Area, Constraint, or Need
1	I. Introduction
	A. Role of beans/legumes
	B. Need for more production of beans/legumes
	C. Subsistence farmer and rural and urban poor (the target population).
	D. The contrast with developed country technology
	II. Production Statistics
2	A. Beans
	1. Acreages and Yields/Ha
	a. Latin America - By country
	b. Africa - By country
	c. Asia - By country
	d. Australia
	e. Europe
	f. Oceania
	g. North America
	h. Near East
	2. World Averages and Considerations
3	B. Cowpeas
	1. Acreages and Yields/Ha
	a. Latin America - By country
	b. Africa - By country
	c. Asia - By country
	d. Australia
	e. Europe
	f. Oceania
	g. North America
	h. Near East
	2. World Averages and Considerations
4	C. Summary on World Ranges of Beans/Cowpeas
	III. Cultural Practices
5	A. Beans - In LDC's
	1. Soil & Fertility Considerations & Practices
	a. Soil selection
	b. Soil preparation procedures
	c. Planting Methods, Procedures, dates
	d. Tillage Practices
	e. Fertilization Practices
	f. Fertilizer Needs
	Macro elements
	Micro elements
	Mineral toxicities
	g. Soil acidity and liming
	h. Moisture stress
	i. Excess Water
	2. Cultural Procedures for:
	a. Weed control
	b. Disease control
	c. Insect control
	3. Harvesting procedures, threshing
	4. The role of intercropping and Multiple Cropping
6	B. Beans - In developed countries
	1. Soil & Fertility Considerations & Practices
	a. Soil selection
	b. Soil preparation procedures
	c. Planting Methods, Procedures, dates
	d. Tillage Practices
	e. Fertilization Practices
	f. Fertilizer Needs
	Macro elements
	Micro elements
	Mineral toxicities
	g. Soil acidity and liming
	h. Moisture stress
	i. Excess Water
	2. Cultural Procedures for:
	a. Weed control
	b. Disease control
	c. Insect control
	3. Harvesting procedures, threshing
	4. The role of intercropping and Multiple Cropping
7	C. Cowpeas - In LDC's.
	1. Soil & Fertility Considerations & Practices
	a. Soil selection
	b. Soil preparation procedures
	c. Planting Methods, Procedures, dates
	d. Tillage Practices
	e. Fertilization Practices
	f. Fertilizer Needs
	Macro elements
	Micro elements
	Mineral toxicities
	g. Soil acidity and liming
	h. Moisture stress
	i. Excess Water
	2. Cultural Procedures for:
	a. Weed control
	b. Disease control
	c. Insect control

Assignment to review literature and prepare a chapter--including list authors and peer reviewers

_____

Appendix IX.1

Chap-ter	Subject Matter Area, Countries, or Need	Assignment to review literature and prepare a chapter--including list authors and peer reviewers
	3. Harvesting procedures, threshing	
	4. The role of Intercropping and Multiple Cropping	
	B. Cowpea - in developed countries	
	1. Soil & Fertility Considerations & Practices	
	a. Soil selection	
	b. Soil preparation procedures	
	c. Planting Methods, Procedures, dates	
	d. Tillage Practices	
	e. Fertilization Practices	
	f. Fertilizer Levels	
	Macro elements	
	Micro elements	
	Mineral toxicities	
	g. Soil acidity and liming	
	h. Rhizobia culture	
	i. Inoculum Level	
	2. Cultural Procedures for:	
	a. Weed control	
	b. Disease control	
	c. Insect control	
	3. Harvesting procedures, threshing	
	4. The role of Intercropping and Multiple Cropping	
III.	The Role of Nitrogen in Beans/Cowpea Production	
	A. Beans in LDC's	
	1. Growing beans with fertilizer-N	
	2. Growing beans without fertilizer-N	
	a. Growing without Rhizobium Inoculation	
	b. Growing with Rhizobium Inoculation	
	c. Rhizobium strains	
10	B. Beans in developed countries	
	1. Growing beans with fertilizer-N	
	2. Growing beans without fertilizer-N	
	a. Growing without Rhizobium Inoculation	
	b. Growing with Rhizobium Inoculation	
	c. Rhizobium strains	
11	C. Cowpeas in LDC's	
	1. Growing cowpeas with fertilizer-N	
	2. Growing cowpeas without fertilizer-N	
	a. Growing without Rhizobium Inoculation	
	b. Growing with Rhizobium Inoculation	
	c. Rhizobium strains	

Chap-ter	Subject Matter Area, Countries, or Need	Assignment to review literature and prepare a chapter--including list authors and peer reviewers
12	D. Cowpeas in developed countries	
	1. Growing cowpeas with fertilizer-N	
	a. Growing without Rhizobium Inoculation	
	b. Growing with Rhizobium Inoculation	
	c. Rhizobium strains	
IV.	The Problems of Diseases and Pests	
13	A. Beans - in LDC's	
	1. Diseases	
	a. Fungi	
	b. Bacterial	
	c. Virus	
	2. Insects	
	3. Nematodes	
	4. Weeds	
14	B. Beans - in Developed Countries	
	1. Diseases	
	a. Fungi	
	b. Bacterial	
	c. Virus	
	2. Insects	
	3. Nematodes	
	4. Weeds	
15	C. Cowpeas - in LDC's	
	1. Diseases	
	a. Fungi	
	b. Bacterial	
	c. Virus	
	2. Insects	
	3. Nematodes	
	4. Weeds	
16	D. Cowpeas - in Developed Countries	
	1. Diseases	
	a. Fungi	
	b. Bacterial	
	c. Virus	
	2. Insects	
	3. Nematodes	
	4. Weeds	

Chap-ter No.	Subject Matter Area, Countries, or Zone	Assignment to review literature and prepare a chapter--including lit cutters and peer reviewers

VI. Breeding to Overcome Production and Usage Constraints

A. Beans - Status, Accomplishments and Needs in LDC's

1. Breeding for Disease Resistance

a. Fungi caused
b. Bacteria caused
c. Virus caused

2. Breeding for Insect Resistance

3. Breeding for Nematode Resistance

4. Breeding for Higher Yield Potential

a. Physiological and Morphological characteristics
b. Adaptation to Environment
i. Daylength - temperature
ii. Drought
iii. Excess water
iv. Soil competition
v. Salt and saline conditions

5. Breeding for Protein and Cooking Quality

a. Quality
b. Quantity
c. Availability

6. Improving Beans/Cowpea Breeding Methods

7. Antimetabolites

8. Organoleptic Factors

9. Application of Modern Genetic Techniques

a. Mutagenic alteration of genetic variability
b. Tissue culture, protoplast fusion
c. Interspecific gene transfer
d. Cytogenetics

10. Ongoing Yield Trials and Breeding Programs

B. Beans - Status, Accomplishments and Needs in Developed Countries

1. Breeding for Disease Resistance

a. Fungi caused
b. Bacteria caused
c. Virus caused

2. Breeding for Insect Resistance

3. Breeding for Nematode Resistance

4. Breeding for Higher Yield Potential

a. Physiological and Morphological characteristics
b. Adaptation to Environment
i. Daylength - temperature
ii. Drought
iii. Excess water
iv. Soil competition
v. Salt and saline conditions

Chap-ter No.	Subject Matter Area, Countries, or Zone	Assignment to review literature and prepare a chapter--including lit cutters and peer reviewers

5. Breeding for Protein and Cooking Quality

a. Quality
b. Quantity
c. Availability

6. Improving Beans/Cowpea Breeding Methods

7. Antimetabolites

8. Organoleptic Factors

9. Application of Modern Genetic Techniques

a. Mutagenic alteration of genetic variability
b. Tissue culture, protoplast fusion
c. Interspecific gene transfer
d. Cytogenetics

10. Ongoing Yield Trials and Breeding Programs

C. Cowpea - Status, Accomplishments and Needs in LDC's

1. Breeding for Disease Resistance

a. Fungi caused
b. Bacteria caused
c. Virus caused

2. Breeding for Insect Resistance

3. Breeding for Nematode Resistance

4. Breeding for Higher Yield Potential

a. Physiological and Morphological characteristics
b. Adaptation to Environment
i. Daylength - temperature
ii. Drought
iii. Excess water
iv. Soil competition
v. Salt and saline conditions

5. Breeding for Protein and Cooking Quality

a. Quality
b. Quantity
c. Availability

6. Improving Beans/Cowpea Breeding Methods

7. Antimetabolites

8. Organoleptic Factors

9. Application of Modern Genetic Techniques

a. Mutagenic alteration of genetic variability
b. Tissue culture, protoplast fusion
c. Interspecific gene transfer
d. Cytogenetics

10. Ongoing Yield Trials and Breeding Programs

Appendix IX.1

Appendix IX.1

Chapter	Subject Matter Area, Constraint, or Need	Assignment to review literature and prepare a chapter—including 1st authors and peer reviewers
20	B. Cowpeas - Status, Accomplishments and Needs in Developed Countries	
	1. Breeding for Disease Resistance	
	a. Fungal caused	
	b. Bacterial caused	
	c. Virus caused	
	2. Breeding for Insect Resistance	
	3. Breeding for Nematode Resistance	
	4. Breeding for Higher Yield Potential	
	a. Physiological and Morphological characteristics	
	b. Adaptation to environment	
	i. Daylength - temperature	
	ii. Drought	
	iii. Excess water	
	iv. Soil compaction	
	v. Salt and saline conditions	
	5. Breeding for Protein and Cooking Quality	
	a. Quality	
	b. Quantity	
	c. Availability	
	6. Improving Bean/Cowpea Breeding Methods	
	7. Antimetabolites	
	8. Organoleptic Factors	
	9. Application for Modern Genetic Techniques	
	a. Mutagenic alteration of genetic variability	
	b. Tissue culture, protoplast fusion	
	c. Interspecific gene transfer	
	d. Cytogenetics	
	10. Ongoing Yield Trials and Breeding Programs	
	VII. Seed Production and Technology	
21	A. Beans in LDC's	
	1. Growing seed for planting	
	2. Freedom from disease	
	3. Freedom from genetic impurity	
	4. Seed storage and handling	
	5. Seed certification	
	6. Seed distribution	
22	B. Beans - In developed countries	
	1. Growing seed for planting	
	2. Freedom from disease	
	3. Freedom from genetic impurity	
	4. Seed storage and handling	
	5. Seed certification	
	6. Seed distribution	
23	C. Cowpeas - In LDC's	
	1. Growing seed for planting	
	2. Freedom from disease	
	3. Freedom from genetic impurity	
	4. Seed storage and handling	
	5. Seed certification	
	6. Seed distribution	
24	D. Cowpeas - In developed countries	
	1. Growing seed for planting	
	2. Freedom from disease	
	3. Freedom from genetic impurity	
	4. Seed storage and handling	
	5. Seed certification	
	6. Seed distribution	
	VIII. Traditional Utilization and New Product Development	
25	A. Beans - In LDC's	
	1. Commercial—Cooking quality, color preferences, nutritional quality, energy & time	
	2. Small farmer—Cooking quality, color preferences, nutritional quality, energy & time	
	3. Rural vs. urban usage	
26	B. Beans - In developed countries	
	1. Commercial—Cooking quality, color preferences, nutritional quality, energy & time	
	2. Small farmer—Cooking quality, color preferences, nutritional quality, energy & time	
	3. Rural vs. urban usage	

Assignment to review literature and prepare a chapter--including list authors and peer reviewers

Chapter No.	Subject Matter Area, Constraint, or Need
10	c. Grapes - In LDC's
	1. Commercial--Cooking quality, color preferences, nutritional quality, energy & time
	2. Small farmer--Cooking quality, color preferences, nutritional quality, energy & time
	3. Retail vs. urban usage
11	b. Grapes - In developed countries
	1. Commercial--Cooking quality, color preferences, nutritional quality, energy and time
	2. Small farmer--Cooking quality, color preferences, nutritional quality, energy & time
	III. Storage, Distribution and Marketing of Edible Beans/Grapes
12	A. Beans - In LDC's
	1. In the home
	2. Commercial
13	B. Beans - In developed countries
	1. In the home
	2. Commercial
14	C. Grapes - In LDC's
	1. In the home
	2. Commercial
15	D. Grapes - In developed countries
	1. In the home
	2. Commercial
16	IV. Supportive Basic Research
17	V. The Role of Institutional Infrastructures
18	A. For Beans and Grapes in LDC's
	1. Marketing system
	2. Transportation
	3. Credit
	4. Education
	5. Extension
	6. Industrial Development & Availability of Inputs
	7. Labor and employment situation
	8. Political stability

Assignment to review literature and prepare a chapter--including list authors and peer reviewers

Chapter No.	Subject Matter Area, Constraint, or Need
19	B. For Beans and Grapes in Developed Countries
	1. Marketing system
	2. Transportation
	3. Credit
	4. Education
	5. Extension
	6. Industrial development & availability of inputs
	7. Labor and employment situation
	8. Political stability
	III. The Role of Values and Policies
20	A. For Beans and Grapes in LDC's
	1. Governmental
	a. General-development policies b. In relation to small farmers c. Public works
	2. Sociological
	a. Regional or community practices--dietary preferences, customs, beliefs b. Small farmer's specific needs--risk evaluation, willingness to adopt new technologies. c. Individuals--educational goals, status
	3. Technological
	a. Energy vs. Labor b. Self-sufficiency c. Capital intensity
	4. Environmental Management
21	B. For Beans and Grapes in Developed Countries
	1. Governmental
	a. General-development policies b. In relation to small farmers c. Public works
	2. Sociological
	a. Regional or community practices--dietary preferences, customs, beliefs b. Small farmers' specific needs--risk evaluation, willingness to adopt new technologies. c. Individuals--educational goals, status

Appendix IX.1

Chap-ter Sec	Subject Matter Area, Constraint, or Need	Assignment to review literature and prepare a chapter--including list authors and peer reviewers
	3. Technological	
	a. Energy vs. labor b. Skill-multiplicity c. Capital intensity	
	4. Environmental Management	
	III. Prioritized Listing of Constraints to Production and Use	
38	A. Beans - In LDC's	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Research constraints	
	5. Extension	
39	B. Beans - In Developed Countries	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Research constraints	
	5. Extension	
42	C. Cowpeas - In LDC's	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Research constraints	
	5. Extension	
43	D. Cowpeas - In Developed Countries	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Research constraints	
	5. Extension	

Chap-ter Sec	Subject Matter Area, Constraint, or Need	Assignment to review literature and prepare a chapter--including list authors and peer reviewers
	IV. Recommended Research Priorities	
43	A. Beans - In LDC's	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Interface with extension	
	5. Collaboration and networks	
43	B. Beans - In Developed Countries	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Interface with extension	
	5. Collaboration and networks	
44	C. Cowpeas - In LDC's	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Interface with extension	
	5. Collaboration and networks	
45	D. Cowpeas - In Developed Countries	
	1. Production	
	2. Economic	
	3. Socio-cultural	
	4. Interface with extension	
	5. Collaboration and networks	
	V. List of Institutions Conducting Bean/Cowpea Research	
	A. Beans Institution	Project
	B. Cowpeas Institution	Project

Appendix IX.1

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING · MICHIGAN · 48824

January 29, 1979

TO: Title XII representatives at institutions with manifest interest in the bean/cowpea CRSP
and to
Scientists with interest

FROM: D. H. Wallace, Bean/Cowpea Planning Coordinator

RE: I. Questionnaire regarding constraints to bean/cowpea production by small farmers in LDCs.

II. Criteria for acceptance and rejection of bean/cowpea research or research-training proposals.

III. Format for proposal preparation.

IV. Update of planning progress.

I. THE QUESTIONNAIRE. (Included in this interim report as Appendix III)

Attached is a copy of the Questionnaire that is being used to ascertain the constraints to increased production of beans/cowpeas by the small farmers of developing countries and/or the constraints to more use of beans/cowpeas by the poor people of these countries. Each scientist who feels qualified is requested to answer the Questionnaire. Please mail the completed Questionnaire to:

Dr. D. H. Wallace
Bean/Cowpea Planning Coordinator
Crop and Soil Sciences Department
Michigan State University
East Lansing, Michigan 48824

II. CRITERIA FOR ACCEPTANCE AND REJECTION OF BEAN/COWPEA RESEARCH OR RESEARCH-TRAINING PROPOSALS.

Attached is a draft copy of the forepart of a GUIDE TO PROPOSAL PREPARATION FOR THE BEAN/COWPEA COLLABORATIVE RESEARCH PROGRAM. Please note that this is a draft that is subject to change. If we do not hear from you, we will assume that the current draft is acceptable to you and this draft will accompany the request for bean/cowpea proposals.

** INSTRUCTION TO TITLE XII REPRESENTATIVES:

Please deliver these immediately to your scientists!

Also, you may want to send copies to:

social scientists, agricultural scientists and home economists for whom we have not provided a copy!!

III. FORMAT FOR BEAN/COWPEA PROPOSAL PREPARATION. [The Grant format is in the interim report as Appendix VIII-1]

A precise format is not presented, but we are currently planning to use the format of the USDA/SEA Competitive Grants. Your research office will have a copy of the guidelines for this. An additional item that we will request, is an indication of the LDC institution(s) and scientist(s that you are proposing that your collaborative research be linked with. Since everything is only at the proposal stage, no final linkages are possible when your proposal is submitted. But, your proposal should present your proposed linkages with the research and research-training institutions of the LDCs in particular, but also with other U.S. and developed-country institution(s) and scientist(s). The past linkages and experience of your institution in international agriculture will be requested.

IV. UPDATE.

1. During late January, Wallace and Adams will be consulting with Centro Internacional de Agricultura Tropical (CIAT) at Cali, Colombia. The objective is to obtain CIAT's input into planning of the CRSP, their suggested constraints, their input into the State of the Art (SOTA) outline, their input into the planning of the Questionnaire, and their general agreement for co-editing, co-authoring and co-planning the bean/cowpea program.

2. During early February a similar trip with the same objectives as those for the CIAT visit, except that cowpeas will be emphasized, will be made to the International Institute of Tropical Agriculture at Ibadan, Nigeria.

3. The CIAT and IITA visits detailed above, must be followed by a team visit to each of Latin America and the Caribbean, South America, West Africa and East Africa. The goal of these visits is to determine the constraints to bean and cowpea production by small farmers of the developing countries and to use of beans/cowpeas by the rural and urban poor. A further objective is to evaluate potential LDC sites of collaborations. In turn, the team visits must be followed by workshops conducted with developing-country scientists and research administrators to obtain their agreement of the priority ordering of the constraints.

4. All of the above interactions with the international institutions and developing countries are occurring about one month later than we originally planned. Therefore, you will probably receive the request for bean/cowpea proposals in April rather than March, as previously announced.

GUIDE TO PROPOSAL PREPARATION
FOR
BEAN/COWPEA COLLABORATIVE RESEARCH PROGRAM

Bean/Cowpea Planning Office
Crop and Soil Sciences Department
Michigan State University
East Lansing, Michigan 48824

TABLE OF CONTENTS

FOREWORD

In July, 1978, the Board for International Food and Agricultural Development (BIFAD) and the Agency for International Development (AID), under provisions of Title XII of the International Development and Food Assistance Act of 1975 and in accordance with recommendations made by the Joint Research Committee, gave priority to planning a dry bean/cowpea Collaborative Research Support Program (CRSP). Michigan State University (MSU) has contracted with USAID to plan and submit a Collaborative Research Support Proposal.

BIFAD invited representatives from eleven Experiment Stations concerned with dry bean/cowpea research to meet in Chicago on August 7, 1978. These representatives authorized MSU, acting on behalf of all interested Agricultural Experiment Stations, to submit a planning grant proposal to AID. The proposal was submitted August 28, and the planning grant was awarded to MSU, effective October 1, 1978. Dr. Donald H. Wallace, now at MSU and on leave from Cornell University, has been appointed as the planning coordinator.

I. BACKGROUND INFORMATION

1. Objectives of the bean/cowpea CRSP. The overall objectives of the CRSP, which should also be the overall goals of each research or research-training proposal, are: (1) to develop that technology which can maximize production and use of beans/cowpeas in those LDCs where beans or cowpeas are the major protein supplying staple of the diet. (2) to place this technology with those LDC scientists and administrators who can and will extend it to the small farmers. (3) to train LDC scientist(s) and improve the scientific capability of the LDCs (4) to, over many years, link U.S. scientists and U.S. scientific output with the needs of LDCs. (5) to provide U.S. institutions with the program improvement derivable from combining an international component with their state- or regional-directed bean/cowpea research.
2. Definition of research within the bean/cowpea CRSP. The CRSP will support collaborative research and/or training for research. Research may range from laboratory to field work. The research may, and ultimately should, include field trials conducted by scientist(s) on the small farms of LDCs. The research may also, and ultimately should, include field trials conducted by the small farmer on his farm—with supervision provided by the scientist(s). This continuum from basic through applied field research is to provide for full development of that technology which can give increased bean/cowpea yield and/or use. Extension, or information transfer, which will not be supported by the CRSP, begins after full development and testing of the technology.

3. Collaborative linkages with LDC institutions and scientists. Three levels of LDC collaboration with U.S. institutions are envisioned: (1) Primary LDC sites for collaboration will be institutions with on-going bean/cowpea research and with host-governments that have a strong interest in increasing bean/cowpea production and use. LDC scientists will work directly with U.S. scientists in the CRSP program. (2) Secondary LDC collaboration sites are where beans/cowpeas are somewhat less important crops, institutional capability is less adequate, and/or where the LDC government designates beans and cowpeas at a lower priority. Small scale trials or programs will be conducted with cooperation between the LDC scientist and U.S. scientists. (3) Tertiary level collaboration will provide only for receipt of research information by the LDC institution. (4) The management entity will have funds for general technical service consulting opportunities that may arise. For primary and secondary collaboration sites, it is expected that the LDC host governments would provide their facilities and local staff time as their share of contributions. The CRSP would fund U.S. personnel, and can fund other costs in the LDCs, including some LDC staff, facilities and equipment as needed, project related training, and some commodities. The extent of such U.S. funding would have to be worked out in each case.

4. Training activities that may be supported by the bean/cowpea CRSP. Training falls within four categories: (1) Short training courses which are of a non-degree type designed to increase capability in bean and cowpea production, field plot design, and other appropriate study areas. (2) Degree training activities for LDC personnel will be supported as appropriate for B.S., M.S., Ph D. studies in relevant programs in the CRSP. The degree activities should be consistent and complementary to host country training plans. (3) Postdoctoral programs may be developed to refine a collaborating scientist's capability in working in pertinent specialized areas of research. (4) Professional exchange activities where the U.S. scientist and LDC scientist may exchange responsibilities in order to add depth to their programs.

II. WHO MAY SUBMIT PROPOSALS?

Requests for research or research-training proposals will be sent from the bean/cowpea planning office at Michigan State University to the Title XII representatives of selected educational and research institutions. Receiving institutions will be those that have indicated a manifest interest in the bean/cowpea CRSP, in response to the October letter from Director Sylvan H. Wittwer of the Michigan State Agricultural Experiment Station. Each Title XII officer is responsible at his institution for distributing the request for proposals to all scientists that may have interest in preparing a proposal for the bean/cowpea CRSP.

III. HOW MANY PROPOSALS SHOULD AN INSTITUTION SUBMIT?

The CRSP intent is a balance of interacting disciplinary activities on beans/cowpeas at the national (U.S.) and international levels. Each scientist or small group of scientists representing highly-interactive disciplines should submit a separate proposal. Proposals representing highly interactive disciplines are encouraged. Integration of all disciplines represented at an institution for submission of one intra-institutionally integrated proposal is definitely discouraged. Priority for acceptance into the CRSP will depend on its being complementary to the total needs and balance of the CRSP.

IV. WHEN AND WHERE TO SUBMIT PROPOSALS

This request for bean/cowpea CRSP proposals was mailed from the planning office on_____, 1979. Proposals are due_____, 1979. The administrative office of your institution should forward 20 copies of each proposal to:

Dr. Donald H. Wallace
Bean/Cowpea Planning Coordinator
Crop and Soil Sciences Department
Michigan State University
East Lansing, Michigan 48824

V. CRITERIA FOR ACCEPTANCE OF RESEARCH AND RESEARCH-TRAINING PROPOSALS

1. Mechanics for Judging the Proposals

a. Peer review panel and advisors.

Recommendation of acceptance, suggested modification, or rejection of proposals will be by a peer review panel. Panel members will not be from programs or departments with participatory interest, as indicated by a submitted proposal for the bean/cowpea CRSP. In addition to the Michigan State University and Cornell University personnel who are implementing the planning, a representative from 3 institutions with participatory interest in cowpeas plus 2 with interest in beans plus 2 administrators from institutions with manifest interest will attend the panel meetings as advisors. Membership of the review seven-member panel, and of the advisors with participatory interest, shall represent a range of institutions and of scientific and social disciplines. IITA and CIAT will each have one representative on the review panel.

b. First and second meetings of the review panel.

The peer panel and its advisory members will meet within three to four weeks after the due date for receipt of the bean/cowpea CRSP proposals. This first panel meeting will make preliminary recommendations of acceptance, suggested modification or rejection. It will also indicate any additional proposals needed for completing a blanced CRSP. After the suggested proposal modifications and any requested additional proposals have been received, the panel will meet a second time to make its final recommendations.

c. Acceptance of the peer panel's recommendations.

Approval or rejection of the peer review panel's recommendations lies with, in the following respective order: (1) The Joint Research Committee (JRC), (2) The Board for International Food and Agricultural Development (BIFAD), and (3) The United States Agency for International Development (USAID).

2. Criteria for Accepting or Rejecting Proposals

a. Objective: Solving constraints for production or use of beans/cowpeas in LDCs. For acceptance the proposed research and/or research-training must be directed toward solving one or more of the problems on the attached list (Appendix?) of LDC-endorsed constraints to small-farmer production of beans or cowpeas in LDCs, or directed toward solving constraints to more usage of beans or cowpeas by rural and urban poor people in LDCs, or directed toward solving socio-economic constraints to acceptance and adoption of appropriate solutions.

b. Priority of constraints and research or research-training.

For acceptance, proposed research or research-training must be a desirable to an essential component of an integrated and balanced bean/cowpea Collaborative Research Support Program (CRSP). Acceptance, recommended proposal revision, and rejection of proposals by the peer review panel will all be based largely on the extent that the proposed effort meets: (1) the priority implied by "must be a desirable to an essential component of the CRSP". (2) estimates of the sponsoring institution's and principal investigator's demonstrated (past) and/or current capabilities for successful implementation of the proposed research or research-training. (3) estimates of the short and/or long range potential of the proposed research or research-training for solving the constraints. (4) evidence that funding of the proposed research or research-training will lead to effective linkages between the U.S. institution(s) and scientist(s) and counterparts in the LDCs. (5) evidence that appropriate work will be done in the LDCs.

c. Effect of ultimate levels of CRSP funding on acceptance.

JRC, BIFAD and USAID have asked that three CRSP bean/cowpea plans be developed and defended, one each for high-, medium- and low-level funding. Essentiality of the proposed research or research-training may be modified by the ultimate level of funding, so funding level may significantly affect the recommendation that a proposal be accepted, recommended for modification, or rejected.

d. The JRC guidelines being developed indicate that, on average, 25% of the CRSP must be supported by funds from the participating institutions. Except for participatinng federal institutions, this 25% cannot consist of federal funds. An institution's financial participation in its proposals will influence their acceptance vs. rejection.

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING • MICHIGAN • 48824

March 14, 1979

FROM: D. H. Wallace, Dan Wallace
Planning Coordinator for a Bean/Cowpea CRSP

TO: Title XII Representatives of institutions with manifest interest in the bean/cowpea CRSP

RE: GETTING READY FOR PREPARATION OF PROPOSALS

A. This update is being sent only to the Title XII Representative of each institution. It is up to him/her to duplicate this communication and distribute it to that institution's scientists who have manifest interest in the bean/cowpea CRSP.

B. About April 1, a request for proposals will be sent in this same way--only to the Title XII Representative. It will be up to the Title XII Representative:

1. To duplicate the appropriate number of copies of the received GUIDE TO PROPOSAL PREPARATION FOR THE BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM. This guide may be 60-75 pages in length. About one-third of this will be suggested reading material which should be read by every scientist, although he may not need a personal copy. As received, however, it will be directly attached to the essential pages of the GUIDE.

2. To distribute the duplicated copies to scientists with manifest interest.

3. To, after the scientists have had opportunity to review the guidelines and suggested reading, call all appropriate scientists and administrators together for a discussion of the institution's total commitment to and involvement in the bean/cowpea CRSP. This meeting should consider how the institution can focus all relevant disciplines on beans/cowpeas in order to assist the CRSP to increase production and use of these protein-rich legume grains by small farmers in the LDCs. It should also consider how the institution will back the commitment to support about 25% of the funding of its proposals for the bean/cowpea CRSP.

4. To include in the above discussion and in proposal preparation scientists who may not immediately respond to a call relative to beans and cowpeas, but whose scientific expertise is relevant to one or more of the constraints that will be indicated in the GUIDE. Your statements of manifest interest are considered as representing your institution and not individuals, so scientists not previously named may submit proposals.

5. To collect and approve, or have your research office do so, the proposals from the principal investigators, and to submit them to the Bean/Cowpea CRSP Planning Office by May 15, 1979.

DHW:kc

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING • MICHIGAN • 48824

April 1, 1979

FROM: D. H. Wallace - Planning Coordinator for:
A Bean/Cowpea Collaborative Research Support Program
Alternative title:
SOCIO-ECONOMICS AND BIOLOGY
OF BEAN/COWPEA PRODUCTION AND
USE IN DEVELOPING COUNTRIES

TO: Title XII Representatives of
Institutions with manifest interest

RE: I. REQUEST FOR PROPOSALS
II. UPDATE RELATIVE TO TEAM VISITS TO LDCs
III. UPDATE RELATIVE TO WORKSHOPS
IV. CONTINUING SCHEDULE OF PLANNING ACTIVITIES
V. INVOLVING ALL RELEVANT DISCIPLINES
VI. RELEVANT READING MATERIALS

I. REQUEST FOR PROPOSALS

1. A copy is enclosed of: GUIDE TO PROPOSAL PREPARATION FOR THE BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM.

2. You should make a copy of the GUIDE for: (a) all of your scientists with manifest interest and (b) for department chairmen with such scientists or whose scientists should/could have such an interest. (See V, INVOLVING ALL RELEVANT DISCIPLINES.)

3. Note the due date of May 15 for the proposals, and your institution's administrative responsibilities relative to approval and submission of proposals.

4. Please bring this proposal request and the GUIDE to the attention of all appropriate subject matter disciplines as discussed in detail under V.

II. TEAM VISITS TO DEVELOPING COUNTRIES

Previous announcements have indicated that these would occur prior to the request for proposals. For reasons similar to those under III, they have not been completed. Four teams, each consisting of two biologists and a socio-economist, are currently being assembled. Each team will visit one of the following locations: (1) West Africa (2) East Africa (3) Caribbean Countries (4) South America. The reports of these teams and earlier visits will present a brief summary of the activities and scientists of all LDC institutions that are interested in collaborating with the bean/cowpea CRSP.

We are aware that the above list would be helpful to all of you in preparing proposals. However, we cannot now present a complete list, so we are providing none. This list will be available to the peer review committee and will be forwarded to you at about that same time (June-July).

Please note that several stages of feedback and acquaintance-making between US scientists and LDC scientists are provided in the planning procedures presented to you.

III. UPDATE RELATIVE TO WORKSHOPS

Previous updates announced workshops to be held in the LDCs prior to the request for proposals. The workshops were to discuss the constraints to bean/cowpea production and use in the LDCs and to prioritize them. These workshops have been postponed until October and November (See IV).

The delay is because:

1. IITA and experience assured us that at least 6 months and preferably a year of preplanning is required to facilitate attendance by invitees from African countries.

2. FAO conducted a workshop with similar objectives in February in the Dominican Republic. It did not seem appropriate to schedule another workshop on top of this recently concluded similar one which dealt with the constraints for all grain legume crops.

3. IITA and CIAT have each invited us to hold our <u>seminar</u> (to distinguish from their workshops) before or after their fall of 1979 workshops which are scheduled, respectively:

IITA: October 22-26. The subject will be insect problems of cowpeas.

CIAT: November 12-15. The subject will be disease problems of beans.

4. The bean/cowpea CRSP has a major need to facilitate acquaintances between US scientists and the potential collaborating counterpart scientists in the developing countries. This can be facilitated by maximizing the attendance of US scientists at the cowpea insect and bean disease workshops, and by encouraging the US scientists attending to visit the institutions of potential LDC collaborating scientists. The planning office will strive to facilitate this international travel by US scientists.

IV. CONTINUING SCHEDULE OF PLANNING ACTIVITIES

These schedules are as per the deadline dates listed on the following page.

PROPOSED DEADLINE DATES FOR PLANNING BEAN/COWPEA CRSP

Complete visits to Latin America.....June 15, 1979

Request for CRSP Proposals circulated.....April 1, 1979

Complete visits to Africa.....June 15, 1979

Due date for CRSP Proposals.....May 15, 1979

1st peer-review panel meeting.....June 25, 1979

Receipt of modified CRSP Proposals.....August 6, 1979

2nd peer-review panel meeting.....August 27, 1979

Request institutional statements re interest in serving as management entity.....September 4, 1979

Draft of bean/cowpea CRSP plan.....September 17, 1979

Institutional board meeting re draft of plan and management entity.....October 8, 1979

Technical Committee meeting re plan, priorities, coordination, balance.....October 8, 1979

Workshop sponsored by IITA (Insect problems of cowpeas)..... October 22, 1979

Seminar sponsored by bean/cowpea CRSP planning.....(before or after IITA workshop)

Workshop sponsored by CIAT (Disease problems of beans).....November 12-15, 1979

Seminar sponsored by bean/cowpea CRSP planning.....November 16-17, 1979

Complete bean/cowpea CRSP plan.....December 15, 1979

PROPOSED DEADLINE DATES FOR PREPARING BEAN/COWPEA SOTA MANUSCRIPT

Outline of SOTA completed.....March 10, 1979

All requests for substantive input forwarded to knowledgeable scientists asking for their assistance.....April 15, 1979

Receipt of outlines for substantive-input writings.....June 1, 1979

Receipt of substantive-input writings.....September 1 thru 30, 1979

Completion by the editors of 1st draft of SOTA.....March 31, 1980

Reviews of 1st draft of SOTA completed.....June 30, 1980

Revised draft of SOTA ready for publication.....March 31, 1981

V. INVOLVING ALL RELEVANT DISCIPLINES

Our project is commonly called the Bean/Cowpea Collaborative Reseach Support Program.

We are concerned that this title may not attract social scientists and others whose disciplines are relevant and essential to the CRSP. Please inform your scientists and departments that the following title is also applicable. Please do all you can to facilitate proposal preparation by all relevant disciplines.

An appropriate alternate title is:

SOCIO-ECONOMICS AND BIOLOGY OF BEAN/COWPEA PRODUCTION AND USE IN THE DEVELOPING COUNTRIES

VI. RELEVANT READING MATERIALS

To provide scientists with improved understanding of the context in which the bean/cowpea CRSP is being implemented, the GUIDE includes two articles on farming systems.

Two very recent articles which also merit reading are:

1. Nicholson, Heather J. and Ralph L. Nicholson. 1979. Distant Hunger—Agriculture, Food and Human Values Purdue University Press

2. FARMING SYSTEMS RESEARCH AT THE INTERNATIONAL AGRICULTURAL RESEARCH CENTERS THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH TECHNICAL ADVISORY COMMITTEE (Printed at the World Bank, Washington, D.C., U.S.A.) September 1978

DHW:kc

Enc.

UNCLASSIFIED

DS/AGR/FCP, JMYOHE/CL
12/29/78 235/1497
DS/AGR, DFPETERSON

DS/AGR/FCP, KMBYERGO
LAC/DR/RD, RHUGHES {SUBSTANCE}

LAC/DR/RD, VCUSAMANO {SUBSTANCE}

PRIORITY LIST L

AIDAC

E.O. 11652: N/A

TAGS:

DFP
JMY
KMB
VC
RH

SUBJECT: SUMMARY OF PROPOSED COLLABORATIVE RESEARCH SUPPORT GRANT ON COMMON BEANS AND COWPEAS {BEAN AND COWPEA CRSP}

SUMMARY: THIS CABLE PRESENTS {A} A SUMMARY OF THE BEAN/COWPEA CRSP INCLUDING RATIONALE, PURPOSE, AND PROGRESS TO DATE; {B} CURRENT ACTION REQUIRED; {C} FUTURE ACTIONS TO BE TAKEN. END OF SUMMARY.

A. PROGRESS TO DATE.

1. COMMON BEANS AND COWPEAS ARE EXTREMELY IMPORTANT FOOD LEGUME CROPS IN MANY LDCS. MORE THAN 67 PER CENT OF THE PRODUCTION FROM 24.8 MILLION HECTARES OF COMMON BEANS AND 96 PER CENT OF THE PRODUCTION FROM 6.1 MILLION HECTARES OF-COWPEAS ARE GROWN IN LDCS. MOST OF THE BEANS AND COWPEAS AR OF COWPEAS ARE GROWN IN LDCS. MOST OF THE BEANS AND COW-PEAS ARE GROWN ON SMALL LOW INCOME SUBSISTANCE FARMS IN BOTH THE HUMID AND ARID TROPICS ON POOR SOILS. BEANS AND COWPEAS ARE A STAPLE IN THE DIET OF POOR PEOPLE IN THESE AREAS.

MICHIGAN STATE UNIVERSITY RECEIVED A GRANT FROM A.I.D. TO-CARRY OUT THE INITIAL DESIGN AND PLANNING PROCESS

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TO CARRY OUT THE INITIAL DESIGN AND PLANNING PROCESS FOR THE BEAN/COWPEA CRSP. TO DATE THEY HAVE (A) SOLICITED EXPRESSIONS OF INTEREST FOR PARTICIPATION FROM THE U. S. COMMUNITY, BOTH PRIVATE AND PUBLIC; (B) AN OUTLINE FOR PREPARATION OF A STATE-OF-THE-ART STATEMENT ON BEAN/COWPEA RESEARCH HAS BEEN DEVELOPED; AND (C) A QUESTIONNAIRE ON IDENTIFICATION OF CONSTRAINTS WILL BE USED AS A DISCUSSION DOCUMENT IN A LDC WORKSHOP TO BE CONVENED IN LATE FEBRUARY, 1979 (LOCATION TO BE ANNOUNCED). THE PURPOSE OF THE WORKSHOP WILL BE TO OBTAIN LDC CONSENSUS FROM BOTH LDC POLICY/ADMINISTRATORS AND SCIENTISTS ON WHAT THE MAJOR CONSTRAINTS TO INCREASED PRODUCTION AND UTILIZATION OF BEANS AND COWPEAS ARE. THE RESULTS OF THIS CONFERENCE WILL BE USED AS THE FRAMEWORK AROUND WHICH THE CRSP WILL BE DEVELOPED.

2. THE PURPOSE OF THE CRSP IS TO FACIITATE COLLABORATION AMONG SELECTED U. S. UNIVERSITIES, INTERNATIONAL CENTERS, AND LDC INSTITUTIONS IN A COMMON RESEARCH AND DEVELOPMENT EFFORT TO IMPROVE PRODUCTION AND CONSUMPTION OF BEANS AND COWPEAS AMONG POOR LDC POPULATIONS. TO ACHIEVE THIS, THE BEAN/COWPEA CRSP IS DESIGNED TO PROVIDE LONG-TERM COLLABORATIVE RESEARCH ON THE MAJOR CONSTRAINTS TO IMPROVE BEAN/COWPEA PRODUCTION, DISTRIBUTION, STORAGE, MARKETING, AND CONSUMPTION. THIS RESEARCH IS JOINTLY SUPPORTED BY A.I.D. AND THE COLLABORATING INSTITUTIONS. THE PARTICIPATING U. S. INSTITUTIONS WILL CONTRIBUTE TO THE CRSP SUBSTANTIALLY FROM THEIR OWN RESOURCES. THIS IS JUSTIFIED TO THEIR BOARDS OF DIRECTORS BECAUSE OF THE VALUE OF THE RESEARCH TO THEIR DOMESTIC CLIENTELE. THIS PROGRAM WILL BUILD ON THE EXISTING EXPERIENCE AND ONGOING RESEARCH AND TRAINING ACTIVITIES AMONG U. S. AND LDC PARTICIPATING INSTITUTIONS. THE PARTICIPATING UNIVERSITIES WILL CONTRIBUTE A MINIMUM OF 25 PER CENT OF THE TOTAL RESOURCES REQUIRED IN THE PROGRAM. A.I.D. WOULD CONTRIBUTE THE OTHER 75 PER CENT IN GRANTS TO THE PARTICIPATING UNIVERSITIES AND TO LDC COLLABORATORS THROUGH A MANAGEMENT ENTITY YET TO BE SELECTED.

3. PRIMARY SITES FOR COLLABORATING INSTITUTIONS WILL BE IDENTIFIED ON THE BASIS OF INSTITUTIONAL CAPABILITY, IMPORTANCE OF BEANS AND COWPEAS AND INTEREST OF HOST GOVERNMENTS. COLLABORATION WILL BE ACHIEVED BY INTEGRATING ONGOING, LOCAL RESEARCH AND TRAINING PROGRAMS FOR BEANS AND COWPEAS WITH THE CRSP. LOCAL SCIENTISTS WILL WORK DIRECTLY WITH U.S. SCIENTISTS IN THE PROGRAM.

SECONDARY COLLABORATION SITES WILL ALSO BE IDENTIFIED WHERE BEANS AND COWPEAS ARE SOMEWHAT LESS IMPORTANT CROPS, INSTITUTIONAL CAPABILITY IS LESS ADEQUATE, AND/OR THE LDC DESIGNATES BEANS AND COWPEAS AT A LOWER PRIORITY. FOR SUCH CASES FIELD TRIALS AND PROGRAMS WILL BE INITIATED TO THE EXTENT POSSIBLE.

FOR EACH OF THE ABOVE CASES, IT WOULD BE EXPECTED THAT HOST GOVERNMENTS WOULD PROVIDE THEIR FACILITIES AND LOCAL STAFF TIME AS THEIR SHARE OF CONTRIBUTIONS. THE CRSP WOULD FUND U. S. PERSONNEL, OTHER LOCAL COSTS, INCLUDING SOME LOCAL STAFF, FACILITIES, AS NEEDED, PROJECT RELATED TRAINING, AND SOME COMMODITIES. THE EXTENT OF SUCH U. S. FUNDING WOULD HAVE TO BE WORKED OUT IN EACH CASE.

A TERTIARY LEVEL OF COLLABORATION WOULD BE AVAILABLE FOR COUNTRIES WITH CONSIDERABLY LOWER LEVELS OF BEANS AND COWPEAS IMPORTANCE, INSTITUTIONAL CAPABILITY, AND/OR INTEREST. THIS WOULD INVOLVE PRIMARILY RECEIPT OF INFORMATION ON RESEARCH RESULTS, GERM PLASM DISTRIBUTION ON REQUEST, AND TECHNICAL GUIDANCE AND TRAINING FROM COLLABORATING INSTITUTIONS WHERE DERIVED FROM OTHER THAN PROJECT FUNDS.

4. TYPES OF TRAINING ACTIVITIES ENVISIONED FALL WITHIN FOUR CATEGORIES: (1 SHORT TRAINING COURSES WHICH ARE OF A NON-DEGREE TYPE DESIGNED TO INCREASE CAPABILITY IN BEAN AND COWPEA PRODUCTION, FIELD PLOT DESIGN, AND OTHER APPROPRIATE STUDY AREAS; (2) DEGREE TRAINING ACTIVITIES WILL BE SUPPORTED AS APPROPRIATE FOR B.S., M.S., PH.D. STUDIES IN RELEVANT PROGRAMS IN THE CRSP. THE DEGREE ACTIVITIES SHOULD BE CONSISTENT AND COMPLEMENTARY TO HOST COUNTRY TRAINING PLANS; (3) POSTDOCTORAL PROGRAMS MAY BE DEVELOPED TO REFINE A COLLABORATING SCIENTISTS CAPABILITY IN WORKING IN PERTINENT SPECIALIZED AREAS OF RESEARCH; (4) PROFESSIONAL EXCHANGE ACTIVITIES WHERE THE U. S. SCIENTIST AND LDC SCIENTIST MAY EXCHANGE RESPONSIBILITIES IN ORDER TO ADD DEPTH TO THEIR PROGRAMS.
PROGRAMS.

A TECHNICAL SERVICES CONCEPT IS CONCEIVED AS PROVIDING TO REQUESTING COUNTRIES TECHNICAL AND LIMITED SERVICES RELATED TO BEANS AND COWPEAS TO IMPROVING BEAN AND COWPEA RESEARCH, PRODUCTION, AND UTILIZATION.

5. ACTIVITIES ARE YET TO BE IDENTIFIED THROUGH THE CONSTRAINT IDENTIFICATION PROCESS. THESE ARE ANTICIPATED TO ADDRESS PROBLEMS RELATED TO INCREASED PRODUCTION AND UTILIZATION OF BEANS AND COWPEAS. THIS WOULD INCLUDE ACTIVITIES IN THE BIOLOGICAL SCIENCE AREA AND THE SOCIO-ECONOMIC INTERRELATIONSHIPS.

THE PROGRAM WILL BUILD ON EXISTING EXPERIENCE AND ONGOING RESEARCH AND TRAINING ACTIVITIES IN PARTICIPATING UNIVERSITIES. THESE, COMBINED WITH DEVELOPMENT OF EFFECTIVE LDC INSTITUTION LINKAGES, WILL CONTRIBUTE TO COST EFFECTIVENESS, SOCIAL SOUNDNESS, AND TECHNICAL FEASIBILITY OF THE PROGRAM.

6. IT IS ANTICIPATED THAT THE MAJOR INPUT FROM MISSIONS ELECTING TO PARTICIPATE WILL ASSIST IN ESTABLISHING LDC INSTITUTIONAL LINKAGES. IN MOST INSTANCES, MISSIONS PROBABLY WILL WANT TO INTEGRATE MISSION SUPPORTED ACTIVITIES IN BEAN/COWPEA RESEARCH WITH THE CRSP.

THE INTENT OF THE CRSP IS TO FOSTER A LONG-TERM RELATIONSHIP BETWEEN THE PARTICIPATING U. S. INSTITUTIONS AND APPROPRIATE LDC INSTITUTIONS IN A MANNER WHICH WILL PERPETUATE THIS RELATIONSHIP ON A SELF-SUSTAINING BASIS FOR MANY YEARS TO COME.

B. CURRENT ACTION REQUIRED.

1. AID/W WOULD LIKE TO DETERMINE PRELIMINARY LEVELS OF COUNTRY INTEREST IN THE CRSP. TO THIS END WOULD LIKE A RESPONSE BY COB JANUARY 20 WITH RESPECT TO YOUR COUNTRIES: (A) INTEREST IN PARTICIPATION; (B) LEVEL OF PARTICIPATION E.G., PRIMARY SITE LEVEL, SECONDARY SITE LEVEL, TERTIARY SITE LEVEL (SEE PARAGRAPH 3); (C) FOR COUNTRIES INTERESTED IN PRIMARY SITE LEVELS OF PARTICIPATION, MICHIGAN STATE UNIVERSITY WOULD LIKE TO SEND A CONSTRAINT IDENTIFICATION TEAM FOR INFORMATION AND DATA GATHERING PURPOSES IN PREPARATION FOR DEVELOPING THE DISCUSSION DOCUMENT FOR THE WORKSHOP TO BE HELD IN LATE FEBRUARY (SEE PARAGRAPH A-6). FOR THIS PURPOSE, PLEASE CABLE TEAM CLEARANCE AND IDENTIFY INSTITUTIONS AND/OR INDIVIDUALS THEY SHOULD CONTACT.

C. FUTURE ACTION REQUIRED.

FOR COUNTRIES INTERESTED IN PRIMARY SITE LEVEL OF PARTICIPATION, PLEASE NOMINATE TWO PERSONS TO ATTEND THE WORKSHOP TO BE HELD IN LATE FEBRUARY 1979. ONE NOMINEE SHOULD BE A

UNCLASSIFIED 1 5

BEAN/COWPEA RESEARCH SCIENTIST. THE SECOND NOMINEE SHOULD BE A POLICY/ADMINISTRATOR TYPE PERSON, E.G., DIRECTOR OF NATIONAL AGRICULTURAL RESEARCH, NATIONAL PLANNING OFFICE, ETC. MISSION REPRESENTATIVES, E.G., RDOS, FOOD AND AGRICULTURAL OFFICERS, AGRICULTURAL PROGRAM ECONOMISTS ARE ENCOURAGED TO ATTEND ALSO. THE POLICY/ADMINISTRATOR NOMINEE SHOULD BE A PERSON WHO CAN INITIATE DISCUSSIONS ON SPECIFIC LINKAGES WITH THE CRSP.

TRAVEL AND PER DIEM FOR NON-A.I.D. PARTICIPANTS WILL BE FUNDED UNDER MICHIGAN STATE UNIVERSITIES' BEAN AND COWPEA CRSP PLANNING GRANT, NO. AID/DSAN-G-0066. THE NUMBER OF NOMINATIONS RECEIVED WILL AFFECT WHETHER OR NOT ALL NOMINATIONS CAN BE ACCEPTED DUE TO AVAILABILITY OF FUNDS.
VV

Appendix X.2

DRAFT

TO: USAID Missions

RE: Planning for the Bean/Cowpea CRSP

1. If bean/cowpea teams have not already visited your sites, they will do so during April, May or June, if your LDC institutions have requested primary level participation.

2. Via mail you will receive shortly a copy of the Guide for Preparation for bean/cowpea CRSP proposals. This was distributed to U.S. institutions on April 1. A schedule of continuing planning activities will also be included.

3. Please provide us with the information requested in this telegram by June 1, 1979. I. will be used in the first cut at beginning to match LDC and U.S. institutions for collaboration.

We need to know in which of the following areas each of your institutions wishes to collaborate. The Guide to Proposal Preparation may help them to answer these questions, but in any event we need a response by June 1. Reply by naming the LDC institution, the discipline areas that it wishes to collaborate in and their suggestions for possible U.S. scientists or institutions to be their collaborating partner(s).

Broadly presented, some possible subject matter areas for collaboration are as follows: Research on:

Breeding for (many possibilities)
Yield trials
Adaptation trials
Diseases (which)
Insects (which)
Cultural practices
Soils and plant nutrition
Water relationships
Harvesting
Storage
Cooking
Marketing
Nutritional merit
Associated plantings
Socio-economic concerns
Other

The GUIDE TO PROPOSAL PREPARATION will help you identify additional broad areas and also more specific areas.

A Proposed Outline for a

Title: BEAN AND COWPEA PRODUCTION AND USE: A STATE OF THE ART ANALYSIS

Assignment to review literature and prepare a segment—including 1st authors and peer reviewers

Book Section I: INTRODUCTION

I. Introduction

- A. Role of beans/cowpeas
- B. Function of beans/cowpeas in human diets
- C. Function of beans/cowpeas in farming systems
- D. Subsistence farmer and rural and urban poor (the target populations).
- E. The contrast with developed country technology
- F. Need for more production of beans/cowpeas

Book Section II: PRODUCTION AND CONSUMPTION OF BEANS/COWPEAS

II. Production-Consumption Statistics and Trends

- A. Beans
  - 1. Hectarages and yields/ha
    - a. Latin America - by country
    - b. Africa - by country
    - c. Asia - by country
    - d. Australia
    - e. Europe
    - f. Oceania
    - g. North America
    - h. Near East
  - 2. World averages and considerations

NOTE: The outline as presented is separated more for beans vs cowpeas and for LDCs vs DCs than is intended for the book. The separation here is to facilitate the gathering of pertinent information from specialists.

2.

II. Production-Consumption Statistics and Trends - cont.

Assignment to review literature and prepare a segment—including 1st authors and peer reviewers

- B. Cowpeas
  - 1. Hectarages and yields/ha
    - a. Latin America - by country
    - b. Africa - by country
    - c. Asia - by country
    - d. Australia
    - e. Europe
    - f. Oceania
    - g. North America
    - h. Near East
  - 2. World averages and considerations

III. Farming Systems

- A. Beans in LDCs
  - 1. Effects upon selected (current) system(s) of:
    - a. Geography
    - b. Topography
    - c. Climate
    - d. Social attitudes and factors
    - e. Government policy
    - f. Technological advances
    - g. Local and national markets
  - 2. Diversity of systems used
  - 3. Description of some common farming systems
  - 4. Role of beans/cowpeas in farming systems
  - 5. Farming system as framework for focusing research
- B. Beans in developed countries
  - 1. Effects upon selected (current) system(s) of:
    - a. Geography
    - b. Topography
    - c. Climate
    - d. Social attitudes and factors
    - e. Government policy
    - f. Technological advances
    - g. Local and national markets
  - 2. Diversity of systems used
  - 3. Description of some common farming systems
  - 4. Role of beans/cowpeas in farming systems
  - 5. Farming system as framework for focusing research
- C. Cowpeas in LDCs
  - 1. Effects upon selected (current) system(s) of:
    - a. Geography
    - b. Topography
    - c. Climate
    - d. Social attitudes and factors
    - e. Government policy
    - f. Technological advances
    - g. Local and national markets
  - 2. Diversity of systems used
  - 3. Description of some common farming systems
  - 4. Role of beans/cowpeas in farming systems
  - 5. Farming system as framework for focusing research
- D. Cowpeas in developed countries
  - 1. Effects upon selected (current) system(s) of:
    - a. Geography
    - b. Topography
    - c. Climate
    - d. Social attitudes and factors
    - e. Government policy
    - g. Local and national markets
  - 2. Diversity of systems used
  - 3. Description of some common farming systems
  - 4. Role of beans/cowpeas in farming systems
  - 5. Farming system as framework for focusing research

204

Appendix XI.1

3\.

Assignment to review literature and prepare a summary—including key authors and their addresses

[illegible]

E. [illegible]

IV. Genetic Resources and Breeding Methods

A. Beans in LDCs
   1. Origins of germplasm
   2. Effect of traditional selection
   3. Effect of modern breeding
   4. Status of current cultivars
   5. Status of current breeding efforts
   6. Potential for improved breeding methods
   7. Maintenance of germplasm

B. Beans in developed countries
   1. Origins of germplasm
   2. Effect of traditional selection
   3. Effect of modern breeding
   4. Status of current cultivars
   5. Status of current breeding efforts
   6. Potential for improved breeding methods
   7. Maintenance of germplasm

C. Cowpeas in LDCs
   1. Origins of germplasm
   2. Effect of traditional selection
   3. Effect of modern breeding
   4. Status of current cultivars
   5. Status of current breeding efforts
   6. Potential for improved breeding methods
   7. Maintenance of germplasm

D. Cowpeas in developed countries
   1. Origins of germplasm
   2. Effect of traditional selection
   3. Effect of modern breeding
   4. Status of current cultivars
   5. Status of current breeding efforts
   6. Potential for improved breeding methods
   7. Maintenance of germplasm

E. Past, present and future utilization of [illegible] germplasm

F. Modern genetic techniques - Potential usage for improving genetic resources
   1. Mutagenic alteration of genetic variability
   2. Tissue culture, protoplast fusion
   3. Interspecific gene transfer
   4. Cytogenetics

G. Breeding procedures and potential for improvement
   1. Selection
   2. Pedigree
   3. Backcrossing
   4. Population improvement
   5. National and international yield trials, disease nurseries
   6. [illegible] of collaboration

4\.

Assignment to review literature and prepare a summary—including key authors and their addresses

V. Diseases and Pests

V. Diseases and Pests

A. Beans in LDCs
   1. Diseases—problem and control
      a. Fungi
      b. Bacterial
      c. Virus
   2. Insects—problem and control
   3. Nematodes—problem and control
   4. Weeds—problem and control
   5. Breeding for disease resistance
      a. Fungi
      b. Bacterial
      c. Virus
   6. Breeding for insect resistance
   7. Breeding for nematode resistance
   8. Breeding for weed resistance

B. Beans in developed countries
   1. Diseases—problem and control
      a. Fungi
      b. Bacterial
      c. Virus
   2. Insects—problem and control
   3. Nematodes—problem and control
   4. Weeds—problem and control
   5. Breeding for disease resistance
      a. Fungi
      b. Bacterial
      c. Virus
   6. Breeding for insect resistance
   7. Breeding for nematode resistance
   8. Breeding for weed resistance

C. Cowpeas in LDCs
   1. Diseases—problem and control
      a. Fungi
      b. Bacterial
      c. Virus
   2. Insects—problem and control
   3. Nematodes—problem and control
   4. Weeds—problem and control
   5. Breeding for disease resistance
      a. Fungi
      b. Bacterial
      c. Virus
   6. Breeding for insect resistance
   7. Breeding for nematode resistance
   8. Breeding for weed resistance

V. Diseases and Pests - cont.	Assignment to review literature and prepare a segment—including lst authors and peer reviewers

- B. Crops in developed countries
  - 1. Diseases—problem and control
    - a. Fungi
    - b. Bacterial
    - c. Virus
  - 2. Insects—problem and control
  - 3. Nematodes—problem and control
  - 4. Weeds—problem and control
  - 5. Breeding for disease resistance
    - a. Fungi
    - b. Bacterial
    - c. Virus
  - 6. Breeding for insect resistance
  - 7. Breeding for nematode resistance
  - 8. Breeding for weed resistance
- C. Summary of Impacts of:
  - 1. Diseases
    - a. Need for control - chemical, physical, biological, farming system
    - b. Appropriate control measures
    - c. Potential of breeding
  - 2. Insects
    - a. Need for control - chemical, physical, biological, farming system
    - b. Appropriate control measures
    - c. Potential of breeding
  - 3. Nematodes
    - a. Need for control - chemical, physical, biological, farming system
    - b. Appropriate control measures
    - c. Potential of breeding
  - 4. Weeds
    - a. Need for control - chemical, physical, biological, farming system
    - b. Appropriate control measures
    - c. Potential of breeding

VI. Soils and Mineral Nutrition

- A. Beans in LDCs
  - 1. Soil type vs crop adaptation
  - 2. Drainage effect on crop
  - 3. Topography effect on crop
  - 4. Soil compaction effect on crop
    - a. Potential soil amendment
    - b. Potential for genetic improvement
  - 5. pH effect on crop
    - a. Potential for soil amendment
    - b. Potential for genetic improvement
  - 6. The role of nitrogen
    - a. Growing beans with fertilizer-N
    - b. Growing beans without fertilizer-N
      - (1.) Growing without *Rhizobium* inoculation
      - (2.) Growing with *Rhizobium* inoculation
      - (3.) *Rhizobium* specificity vs nonspecificity
    - c. Potential for soil amendment
    - d. Potential for genetic improvement

VI. Soils and Mineral Nutrition - cont.	Assignment to review literature and prepare a segment—including lst authors and peer reviewers

- 7. The role of phosphorous
  - a. Growing beans with fertilizer P
  - b. Growing beans without fertilizer P
    - (1.) Growing without mycorhiza inoculation
    - (2.) Growing with mycorhiza inoculation
  - c. Potential for soil amendment used
  - d. Potential for genetic improvement for phosphorous use
    - (1.) Plant
    - (2.) Microbe
- 8. The role of other macro nutrients
  - a. Knowledge
  - b. Potential for fertilizer amendment
  - c. Potential for genetic improvement
- 9. The role of micro nutrients
  - a. Knowledge
  - b. Potential for fertilizer amendment
  - c. Potential for genetic improvement
- 10. Excess salts and salinity
  - a. Knowledge
  - b. Potential for amendment
  - c. Potential for genetic improvement

- B. Beans in developed countries
  - 1. Soil type vs crop adaptation
  - 2. Drainage effect on crop
  - 3. Topography effect on crop
  - 4. Soil compaction effect on crop
    - a. Potential soil amendment
    - b. Potential for genetic improvement
  - 5. pH effect on crop
    - a. Potential for soil amendment
    - b. Potential for genetic improvement
  - 6. The role of nitrogen
    - a. Growing beans with fertilizer-N
    - b. Growing beans without fertilizer-N
      - (1.) Growing without *Rhizobium* inoculation
      - (2.) Growing with *Rhizobium* inoculation
      - (3.) Rhizobium specificity vs nonspecificity
    - c. Potential for soil amendment
    - d. Potential for genetic improvement
  - 7. The role of phosphorous
    - a. Growing beans with fertilizer P
    - b. Growing beans without fertilizer P
      - (1.) Growing without mycorhiza inoculation
      - (2.) Growing with mycorhiza inoculation
    - c. Potential for soil amendment
    - d. Potential for genetic improvement for phosphorous use
      - (1.) Plant
      - (2.) Microbe
  - 8. The role of other macro nutrients
    - a. Knowledge
    - b. Potential for fertilizer amendment
    - c. Potential for genetic improvement

VI. Soils and Mineral Nutrition - cont.	Assignment to review literature and prepare a segment—including 1st authors and peer reviewers

9. The role of micro nutrients
   a. Knowledge
   b. Potential for fertilizer amendment
   c. Potential for genetic improvement
10. Excess salts and salinity
   a. Knowledge
   b. Potential for amendment
   c. Potential for genetic improvement

C. Cowpeas in LDCs
1. Soil type vs crop adaptation
2. Drainage effect on crop
3. Topography effect on crop
4. Soil compaction effect on crop
   a. Potential soil amendment
   b. Potential for genetic improvement
5. pH effect on crop
   a. Potential for soil amendment
   b. Potential for genetic improvement
6. The role of nitrogen
   a. Growing cowpeas with fertilizer-N
   b. Growing cowpeas without fertilizer-N
      (1.) Growing without *Rhizobium* inoculation
      (2.) Growing with *Rhizobium* inoculation
      (3.) Rhizobium specificity vs nonspecificity
   c. Potential for soil amendment
   d. Potential for genetic improvement
7. The role of phosphorous
   a. Growing cowpeas with fertilizer P
   b. Growing cowpeas without fertilizer P
      (1.) Growing without mycorhiza inoculation
      (2.) Growing with mycorhiza inoculation
   c. Potential for soil amendment
   d. Potential for genetic improvement for phosphorous use
      (1.) Plant
      (2.) Microbe
8. The role of other macro nutrients
   a. Knowledge
   b. Potential for fertilizer amendment
   c. Potential for genetic improvement
9. The role of micro nutrients
   a. Knowledge
   b. Potential for fertilizer amendment
   c. Potential for genetic improvement
10. Excess salts and salinity
   a. Knowledge
   b. Potential for amendment
   c. Potential for genetic improvement

D. Cowpeas in developed countries
1. Soil type vs crop adaptation
2. Drainage effect on crop
3. Topography effect on crop
4. Soil compaction effect on crop
   a. Potential soil amendment
   b. Potential for genetic improvement

VI. Soils and Mineral Nutrition - cont.	Assignment to review literature and prepare a segment—including 1st authors and peer reviewers

5. pH effect on crop
   a. Potential for soil amendment
   b. Potential for genetic improvement
6. The role of nitrogen
   a. Growing cowpeas with fertilizer-N
   b. Growing cowpeas without fertilizer-N
      (1.) Growing without *Rhizobium* inoculation
      (2.) Growing with *Rhizobium* inoculation
      (3.) *Rhizobium* specificity vs nonspecificity
   c. Potential for soil amendment
   d. Potential for genetic improvement
      (1.) Plant
      (2.) Microbe
7. The role of phosphorous
   a. Growing cowpeas with fertilizer P
   b. Growing cowpeas without fertilizer P
      (1.) Growing without mycorhiza inoculation
      (2.) Growing with mycorhiza inoculation
   c. Potenqtial for soil amendment
   d. Potential for genetic improvement
      (1.) Plant
      (2.) Microbe
8. The role of other macro nutrients
   a. Knowledge
   b. Potential for fertilizer amendment
   c. Potential for genetic improvement
9. The role of micro nutrients
   a. Knowledge
   b. Potential for fertilizer amendment
   c. Potential for genetic improvement
10. Excess salts and salinity
   a. Knowledge
   b. Potential for amendment
   c. Potential for genetic improvement

E. Summary:
1. Soils considerations
2. Mineral nutrition considerations
3. Amendment potential
4. Potential for crop response improvement

VII. Cultural Procedures, Manual and Mechanized

A. Needs in LDCs
1. Soil and fertility considerations and practices
   a. Soil selection
   b. Soil preparation procedures
   c. Planting methods, procedures, dates
   d. Tillage practices
   e. Fertilization practices
   f. Fertilizer needs and procedures
      (1.) Macro elements
      (2.) Micro elements
      (3.) Mineral toxicities
   g. Soil acidity and liming
   h. Moisture stress, irrigation
   i. Excess water
   j. Mulching

VII. Cultural Procedures, Manual and Mechanized	Assignment to review literature and prepare a segment--including lot authors and year assigned
3. Cultural procedures for:	
a. Weed control	
b. Disease control	
c. Insect control	
3. Harvesting procedures, threshing	
4. Relationships to intercropping and multiple cropping	
B. Items in developed countries	
1. Soil and fertility considerations and practices	
a. Soil selection	
b. Soil preparation procedures	
c. Planting methods, procedures, dates	
d. Tillage practices	
e. Fertilization practices	
f. Fertilizer needs and procedures	
(1.) Macro elements	
(2.) Micro elements	
(3.) Mineral toxicities	
g. Soil acidity and liming	
h. Moisture stress, irrigation	
i. Excess water	
j. Mulching	
2. Cultural procedures for:	
a. Weed control	
b. Disease control	
c. Insect control	
3. Harvesting procedures, threshing	
4. Relationships to intercropping and multiple cropping	
C. Changes in LDCs	
1. Soil and fertility considerations and practices	
a. Soil selection	
b. Soil preparation procedures	
c. Planting methods, procedures, dates	
d. Tillage practices	
e. Fertilization practices	
f. Fertilizer needs and procedures	
(1.) Macro elements	
(2.) Micro elements	
(3.) Mineral toxicities	
g. Soil acidity and liming	
h. Moisture stress, irrigation	
i. Excess water	
j. Mulching	
2. Cultural procedures for:	
a. Weed control	
b. Disease control	
c. Insect control	
3. Harvesting procedures, threshing	
4. Relationships to intercropping and multiple cropping	

VII. Cultural Procedures, Manual and Mechanized	Assignment to review literature and prepare a segment--including lot authors and year assigned
B. Changes in developed countries	
1. Soil and fertility considerations and practices	
a. Soil selection	
b. Soil preparation procedures	
c. Planting methods, procedures, dates	
d. Tillage practices	
e. Fertilization practices	
f. Fertilizer needs and procedures	
(1.) Macro elements	
(2.) Micro elements	
(3.) Mineral toxicities	
g. Soil acidity and liming	
h. Moisture stress, irrigation	
i. Excess water	
j. Mulching	
2. Cultural procedures for:	
a. Weed control	
b. Disease control	
c. Insect control	
3. Harvesting procedures, threshing	
4. Relationships to intercropping and multiple cropping	
D. Summarization of manual and mechanized cultural practices, procedures--trends, needs, etc.	
VIII. Physiological Processes and Responses of the Plant	
A. Items in LDCs	
1. Plant responses to environmental factors	
a. Mineral nutritional inputs (See: Soils and Mineral Nutrition)	
b. Diseases and pests (See: The Problems of Diseases and Pests)	
c. Temperature (Intensity, quality, duration)	
(1.) Knowledge of plant response	
(2.) Potential for environmental selection or amendment (Consider temperature vs altitude)	
(3.) Potential for genetic improvement	
d. Daylength (Intensity, quality, duration	
(1.) Knowledge of plant response	
(2.) Potential for environmental selection or amendment	
(3.) Potential for genetic improvement	
e. Radiant energy (Intensity, quality, duration)	
(1.) Knowledge of plant response	
(2.) Potential for environmental selection or amendment	
(3.) Potential for genetic improvement	

11.

VIII. Physiological Processes and Responses of the Plant - cont.	Assignment to review literature and prepare a segment--including lot authors and peer reviewers

f. Water excess (intensity, quality, duration)
(1.) Knowledge of plant response (Knowledge of process of water assimilation)
(2.) Potential for environmental selection or amendment (Consider drainage)
(3.) Potential for genetic improvement

g. Water deficit (intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider irrigation)
(3.) Potential for genetic improvement

h. Crop densities and arrangements
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

i. Interactions on growing with other crops
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

2. Component processes of plant growth

a. Nitrogen, phosphorous, mineral assimilation (See: Soils and Mineral Nutrition)

b. Germination and emergence
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

c. Photosynthesis
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

d. Flower and pod set vs. abortion
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

e. Protein accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

f. Yield accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

g. Duration of growth (intensity and use of time)
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

12.

VIII. Physiological Processes and Responses of the Plant - cont.	Assignment to review literature and prepare a segment--including lot authors and peer reviewers

3. Beans in developed countries

1. Plant responses to environmental factors

a. Mineral nutritional inputs (See: Soils and Mineral Nutrition)

b. Diseases and pests (See: The Problem of Diseases and Pests)

c. Temperature (intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider temperature vs altitude)
(3.) Potential for genetic improvement

d. Daylength (intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

e. Radiant energy (intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

f. Water excess (intensity, quality, duration)
(1.) Knowledge of plant response (Knowledge of process of water assimilation)
(2.) Potential for environmental selection or amendment (Consider drainage)
(3.) Potential for genetic improvement

g. Water deficit (intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider irrigation)
(3.) Potential for genetic improvement

h. Crop densities and arrangements
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

i. Interactions on growing with other crops
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

2. Component processes of plant growth

a. Nitrogen, phosphorous, mineral assimilation (See: Soils and Mineral Nutrition)

b. Germination and emergence
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

c. Photosynthesis
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

d. Flower and pod set vs abortion
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

VIII. Physiological Processes and Responses of the Plant - cont.

Assignment to review literature and prepare a segment--including lot outlines and paper reviewers

e. Protein accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
f. Yield accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
g. Duration of growth (Maturity and use of time)
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

C. Crops in LDCs

1. Plant responses to environmental factors

a. Mineral nutritional inputs (See: Soils and Mineral Nutrition)
b. Diseases and pests (See: The Problems of Diseases and Pests)
c. Temperature (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider temperature vs altitude)
(3.) Potential for genetic improvement
d. Daylength (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement
e. Radiant energy (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement
f. Water excess (Intensity, quality, duration)
(1.) Knowledge of plant response (Knowledge of process of water oscialation)
(2.) Potential for environmental selection or amendment (Consider drainage)
(3.) Potential for genetic improvement
g. Water deficit (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider irrigation)
(3.) Potential for genetic improvement
h. Crop densities and arrangements
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement
i. Interactions on growing with other crops
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement

VIII. Physiological Processes and Responses of the Plant - cont.

Assignment to review literature and prepare a segment--including lot outlines and paper reviewers

2. Component processes of plant growth

a. Nitrogen, phosphorous, mineral assimilation (See: Soils and Mineral Nutrition)
b. Germination and emergence
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
c. Photosynthesis
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
d. Flower and pod set vs abortion
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
e. Protein accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
f. Yield accumulation
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement
g. Duration of growth (Maturity and use of time)
(1.) Knowledge of the process
(2.) Potential for process amendment
(3.) Potential for genetic improvement

D. Crops in developed countries

1. Plant responses to environmental factors

a. Mineral nutritional inputs (See: Soils and Mineral Nutrition)
b. Diseases and pests (See: The Problems of Diseases and Pests)
c. Temperature (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment (Consider temperature vs altitude)
(3.) Potential for genetic improvement
d. Daylength (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement
e. Radiant energy (Intensity, quality, duration)
(1.) Knowledge of plant response
(2.) Potential for environmental selection or amendment
(3.) Potential for genetic improvement
f. Water excess (Intensity, quality, duration)
(1.) Knowledge of plant response (Knowledge of process of water oscialation)
(2.) Potential for environmental selection or amendment (Consider drainage)
(3.) Potential for genetic improvement

Appendix XI.1

210

VIII. Physiological Processes and Responses of the Plant - cont.

Assignment to review literature and prepare a segment--including list authors and peer reviewers

- g. Water deficit (Intensity, quality, duration)
  - (1.) Knowledge of plant response
  - (2.) Potential for environmental selection or amendment (Consider irrigation)
  - (3.) Potential for genetic improvement
- h. Crop densities and arrangements
  - (1.) Knowledge of plant response
  - (2.) Potential for environmental selection or amendment
  - (3.) Potential for genetic improvement
- i. Interactions on growing with other crops
  - (1.) Knowledge of plant response
  - (2.) Potential for environmental selection or amendment
  - (3.) Potential for genetic improvement

2. Component processes of plant growth

- a. Nitrogen, phosphorous, mineral assimilation (Root Soils and Mineral Nutrition)
- b. Germination and emergence
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement
- c. Photosynthesis
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement
- d. Flower and pod set vs abortion
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement
- e. Protein accumulation
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement
- f. Yield accumulation
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement
- g. Duration of growth (Maturity and use of time)
  - (1.) Knowledge of the process
  - (2.) Potential for process amendment
  - (3.) Potential for genetic improvement

E. Summary of physiological considerations

1. Knowledge of processes and responses
2. Potentials for environmental or process amendment
3. Potentials for genetic improvement

IX. Storage, Distribution and Marketing of Beans/Cowpeas

A. Beans in LDCs

1. In the home - methods, losses
2. Commercial - farmer, trader, losses, costs

B. Beans in developed countries - methods losses

1. In the home - methods, losses
2. Commercial - farmer, trader, losses, costs

IX. Storage, Distribution and Marketing of Beans/Cowpeas

Assignment to review literature and prepare a segment--including list authors and peer reviewers

C. Cowpeas in LDCs

1. In the home - methods, losses
2. Commercial - farmer, trader, losses, costs

D. Cowpeas in developed countries

1. In the home - methods, losses
2. Commercial - farmer, trader, losses, costs

E. Summary

X. Seed Production and Technology

A. Beans in LDCs

1. Saving vs. buying seed
2. Freedom from disease
3. Freedom from genetic impurity
4. Seed storage and handling
5. Seed certification
6. Seed distribution

B. Beans in developed countries

1. Saving vs. buying seed
2. Freedom from disease
3. Freedom from genetic impurity
4. Seed storage and handling
5. Seed certification
6. Seed distribution

C. Cowpeas in LDCs

1. Saving vs. buying seed
2. Freedom from disease
3. Freedom from genetic impurity
4. Seed storage and handling
5. Seed certification
6. Seed distribution

D. Cowpeas in developed countries

1. Saving vs. buying seed
2. Freedom from disease
3. Freedom from genetic impurity
4. Seed storage and handling
5. Seed certification
6. Seed distribution

Book Section VI: SOCIO-ECONOMIC RELATIONSHIPS

XI. Quality of Beans/Cowpeas

A. Beans

1. Cooking quality
   - a. Commercial - color preferences
   - b. Commercial - seed size
   - c. Commercial - energy and time usages
   - d. Household - color preferences
   - e. Household - seed size
   - f. Household - energy and time usages
   - g. Rural vs urban re: cooking quality
   - h. LDCs vs developed countries re: cooking quality
   - i. Potentials for amending cooking quality
   - j. Potential for genetic improvement of cooking quality

XI. Quality of Beans/Cowpeas	Assignment to review literature and prepare a segment—including 1st authors and next reviewers
2. Organoleptic quality	
a. Commercial considerations	
b. Household - small farmer, consumer	
c. Taste preference for beans vs for local staple foods	
d. Rural vs urban acceptance	
e. LDC vs developed country acceptance	
f. Potential for amendment of flavor, texture, etc.	
g. Genetic potential for improving or decreasing flavor, texture, etc.	
3. Flatulence production by beans	
a. Commercial considerations	
b. Household - small farmer, consumer	
c. Rural vs urban considerations	
d. Potential for amendment of flatulence	
e. Potential for genetic improvement of flatulence	
4. Nutritional quality	
a. Protein	
(1.) Quantity	
(2.) Amino acid balance	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
b. Carbohydrates	
(1.) Quantity	
(2.) Molecular constituents	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
c. Fats	
(1.) Quantity	
(2.) Molecular constituents	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
d. Minerals	
(1.) Quantity	
(2.) Mineral elements	
(3.) Use by human body	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
e. Antimetabolites	
(1.) Hemagglutinins	
(2.) Tannins	
(3.) Toxins	
(4.) Other	
(5.) Potential for amendment	
(6.) Potential for genetic improvement	
f. Nutritional considerations in LDCs vs developed countries (Also: Rural vs urban considerations)	
B. Cowpeas	
1. Cooking quality	
a. Commercial - color preferences	
b. Commercial - seed size	
c. Commercial - energy and time usage	
d. Household - color preferences	
e. Household - seed size	
f. Household - energy and time usage	
g. Rural vs urban for cooking quality	
h. LDCs vs developed countries for cooking quality	
i. Potential for amending cooking quality	
j. Potential for genetic improvement of cooking quality	

XI. Quality of Beans/Cowpeas	Assignment to review literature and prepare a segment—including 1st authors and next reviewers
2. Organoleptic quality	
a. Commercial considerations	
b. Household - small farmer, consumer	
c. Taste preference for cowpeas vs for local staple foods	
d. Rural vs urban acceptance	
e. LDC vs developed country acceptance	
f. Potential for amendment of flavor, texture, etc.	
g. Genetic potential for improving or decreasing flavor, texture, etc.	
3. Flatulence production by cowpeas	
a. Commercial considerations	
b. Household - small farmer, consumer	
c. Rural vs urban considerations	
d. Potential for amendment of flatulence	
e. Potential for genetic improvement of flatulence	
4. Nutritional quality	
a. Protein	
(1.) Quantity	
(2.) Amino acid balance	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
b. Carbohydrates	
(1.) Quantity	
(2.) Molecular constituents	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
c. Fats	
(1.) Quantity	
(2.) Molecular constituents	
(3.) Digestibility	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
d. Minerals	
(1.) Quantity	
(2.) Mineral elements	
(3.) Use by human body	
(4.) Potential for amendment	
(5.) Potential for genetic improvement	
e. Antimetabolites	
(1.) Hemagglutinins	
(2.) Tannins	
(3.) Toxins	
(4.) Other	
(5.) Potential for amendment	
(6.) Potential for genetic improvement	
f. Nutritional considerations in LDCs vs developed countries (Also: Rural vs urban considerations)	
C. Summary of quality considerations for beans and cowpeas	

Appendix XI.1

19.

XII. Utilization and Product Development

Assignment to review literature and prepare a expose—including 1st authors and some reviewers

XII. Utilization and Product Development
- A. Beans in LDCs
  - 1. Traditional recipes and products
    - a. Alone
    - b. With other foods
  - 2. Rural vs urban usage
  - 3. Need and potential for product development
- B. Beans in developed countries
  - 1. Traditional recipes and products
    - a. Alone
    - b. With other foods
  - 2. Rural vs urban usage
  - 3. Need and potential for product development
- C. Cowpeas in LDCs
  - 1. Traditional recipes and products used
    - a. Alone
    - b. With other foods
  - 2. Rural vs urban usage
  - 3. Need and potential for product development
- D. Cowpeas in developed countries
  - 1. Traditional recipes and products
    - a. Alone
    - b. With other foods
  - 2. Rural vs urban usage
  - 3. Need and potential for product development

XIII. Roles of Institutional Infrastructure
- A. For beans and cowpeas in LDCs
  - 1. Marketing systems local, national, international, prices
  - 2. Transportation, all year or part
  - 3. Credit and its cost
  - 4. Education
  - 5. Extension
  - 6. Industrial development and availability of inputs
  - 7. Labor and employment situation
  - 8. Political stability - local, national
  - 9. Land tenure, tenancy arrangements
  - 10. Off farm employment
- B. For beans and cowpeas in developed countries
  - 1. Marketing systems local, national, international, prices
  - 2. Transportation, all year or part
  - 3. Credit and its cost
  - 4. Education
  - 5. Extension
  - 6. Industrial development and availability of inputs
  - 7. Labor and employment situation
  - 8. Political stability - local, national
  - 9. Land tenure, tenancy arrangements
  - 10. Off farm employment

20.

XIV. Roles of Values and Policies

Assignment to review literature and prepare a expose—including 1st authors and some reviewers

XIV. Roles of Values and Policies
- A. For beans and cowpeas in LDCs
  - 1. Governmental
    - a. General-development policies
    - b. In relation to small farmers
    - c. Public works
  - 2. Sociological
    - a. Regional or community practices—dietary preferences, customs, beliefs
    - b. Small farmer's specific needs—risk evaluation, willingness to adopt new technologies, cooperatives
    - c. Individuals—education goals, status
    - d. Roles of men vs. women
  - 3. Technological
    - a. Energy vs labor
    - b. Self-sufficiency
    - c. Capital intensity
  - 4. Environmental management
- B. For beans and cowpeas in developed countries
  - 1. Governmental
    - a. General-development policies
    - b. In relation to small farmers
    - c. Public works
  - 2. Sociological
    - a. Regional or community practices—dietary preferences, customs, beliefs
    - b. Small farmer's specific needs—risk evaluation, willingness to adopt new technologies, cooperatives
    - c. Individuals—educational goals, status
    - d. Roles of men vs. women
  - 3. Technological
    - a. Energy vs. labor
    - b. Self-sufficiency
    - c. Capital intensity
  - 4. Environmental management

Each Section 2: PRIORITIZED LISTING OF CONSTRAINTS

XV. Prioritization of Constraints to Production
- A. Beans in LDCs
  - 1. Production
  - 2. Economic
  - 3. Socio-cultural
  - 4. Research constraints
  - 5. Extension
- B. Beans in developed countries
  - 1. Production
  - 2. Economic
  - 3. Socio-cultural
  - 4. Research constraints
  - 5. Extension

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING · MICHIGAN · 48824

This letter is to request your assistance in preparing the substantive contents of a manuscript entitled -

BEAN AND COWPEA PRODUCTION AND USE: A STATE OF THE ART ANALYSIS

The U.S. Board of International Food and Agricultural Development (BIFAD) has asked that this State of The Art (SOTA) manuscript be prepared as a part of planning and implementing a Collaborative Research Support Program (CRSP) for beans and cowpeas. It has been decided that the SOTA should be published as a book. It should present a well documented, thoroughly peer-reviewed analysis of the current practices and procedures used throughout the world in bean and cowpea production, especially in developing countries. It should also present the current state of knowledge of all scientific disciplines that could have an impact on improving the production and use of beans and cowpeas, and it should suggest the most pertinent research goals and procedural improvements. The emphasis is to be on knowledge of beans and cowpeas for the developing countries. Procedures and knowledge for developed countries are to be included for completeness and contrast.

The book will be edited by Dr. D. H. Wallace, a bean breeder/physiologist from Cornell University; Dr. M. W. Adams, a bean breeder from Michigan State University; Dr. P. H. Graham, a microbiologist from the bean program of the Centro Internacional de Agricultura Tropical at Cali, Colombia; Dr. P. R. Goldsworthy, leader of the cowpea improvement program of the International Institute of Tropical Agriculture at Ibadan, Nigeria; Dr. W. W. Hare, a cowpea pathologist/breeder from Mississippi State University; Dr. J. C. Miller, a cowpea breeder/physiologist from Texas A & M University; and Dr. S. Bradfield, an economic anthropologist from Kalamazoo College, Michigan.

The editors will write the first complete draft of all chapters of the book, using the substantive writings that you and others with detailed knowledge of specific subject-matter areas are being asked to write. Your efforts will provide the appropriate and relevant substantive subject-matter content for the book; this subject-matter substance must come from highly knowledgeable people like you. Similarly, the overall writing by the editors is essential to achieving the flow of subject matter and concepts, balance and cohesiveness that is required for this State of The Art Analysis. It is expected that the SOTA book will provide the benchmarks of knowledge from which future progress with bean and cowpea production, use and science will be measured.

You and other contributors of detailed subject-matter content will be given opportunity to review, to the extent you desire, all chapters to which you have made a contribution. You will probably also have opportunity to review other chapters.

A meeting called by BIFAD was held August 7, 1978, in Chicago. Scientists and Directors of Research (or Directors' representatives) from eleven experiment stations attended. This group agreed that on behalf of all U.S. workers and institutions interested in the international aspects of beans and cowpeas, Michigan State University should request a planning grant from USAID. This grant was given to Michigan State University, effective October 1, 1978. Dr. M. Wayne Adams is assisting, and Dr. Donald H. Wallace who is on leave until June 30, 1979 from Cornell is currently coordinator of this Title XII planning effort. BIFAD's request for the SOTA, involvement of Drs. Adams and Wallace, and our request for assistance from you are all derived from this background of events.

Our specific request from you is presented at the end of this letter. It is also indicated on the enclosed outline for the SOTA.

The following are also enclosed to assist you in your writing:

1. A copy of: GUIDELINES ON A METHODOLOGY FOR PREPARING STATE OF THE ART ANALYSES, DOCUMENTS, AND HANDBOOKS FOR WORLD FOOD PROBLEMS

2. Outline for: BEAN AND COWPEA PRODUCTION AND USE: A STATE OF THE ART ANALYSIS. The extensive outline provided has incorporated all feedback received after distributing an earlier version with the December 22, 1978 communication from this office. The extensiveness of the outline included is primarily for defining and dividing the desired acquisitions of inputs from the subject matter experts such as you. In writing the SOTA, the editors will condense, modify the outline or emphasize the knowledge for beans vs cowpeas and developing vs developed countries in the manner that flows best and is most cohesive.

To facilitate completion, by March 31, 1980, of the first draft of the SOTA, please send to this office:

1. By June 1, 1979, an outline for your proposed writing.

2. By September 1, 1979, or not later than September 30, 1979, your completed written materials, as herein requested.

Remember: The target audience to be assisted is the small farmer and the rural and urban poor. Persons who will read the SOTA, and to whom you should direct your writing will be scientists, engineers, administrators, government officials, and others having no specialized training in the subject matter.

Follow steps 1-5 of: IV. Preparation of SOTA..On pages 6 and 7 of: GUIDELINES ON METHODOLOGY FOR..SOTA....FOR WORLD FOOD PROBLEMS.

Considering the audience being addressed, usage of technical words should be minimized, or clear definitions given. Do cite sources as you would for a scientific journal. We will need the complete citation, so please provide these ciations in the form indicated by the following hypothetical citations:

Author, D.R. 1978. Growing beans in the highland tropics. Crop Production 6:35-42.

Author, D.R. and C.B. Osana. 1977. Growing cowpeas in the tropical lowlands. pp 36-60. In: Wilks, A.B., Ed. Tropical Legume Production. Rhinefeldt Publishers. Amsterdam. 700 pp.

We will not suggest a given number of pages. Please write to be all inclusive in terms of ideas, pro and con considerations, etc. The editors will be responsible for condensing or filling out your written material. Therefore, a thoroughly polished statement is not required. Rather, it is a thorough presentation of pertinent facts, concepts, ideas, potential merits, difficulties, etc. that is needed.

Please send me a letter indicating your willingness to accept or your inability to fulfill the assignment indicated below.

Thank you for your willingness to assist. We look forward to working with you. Let me or Dr. Adams, or another editor, know if we can be helpful to you. The office telephone at Michigan State University is 517/355-4693.

Sincerely,

D. H. Wallace
Bean/Cowpea Planning Coordinator

DHW:kc

Enc.

THE REQUEST FOR ASSISTANCE FROM YOU IS AS FOLLOWS:

GUIDELINES ON A METHODOLOGY

FOR PREPARING STATE-OF-THE-ART ANALYSES,

DOCUMENTS, AND HANDBOOKS FOR WORLD FOOD PROBLEMS

Prepared by

Donald L. Plucknett, Chief,
Soil and Water Mgt. Division

Frank Viets, Consultant

Raymond E. Kitchell, Consultant[1]

Office of Agriculture
Technical Assistance Bureau
Agency for International Development
Washington, D.C. 20523

January 1976

[1] Gilbert Corey, Senior Water Management Specialist, and Tejpal Gill, Senior Soil Management Specialist, provided valuable suggestions and help in preparing these guidelines.

CONTENTS

HELPING THE SMALL and/or MARGINAL FARMER IN LDCs

State-of-the-Art Analyses

Critical Question

In attacking the world food problem and ameliorating the plight of the rural and urban poor, what current knowledge–used in both high and low technology agriculture–is or can be meaningful for the small, subsistence, family farmer in developing countries?

The AID Approach

Like many other bilateral and multilateral development agencies, the United States Agency for International Development is giving serious attention to the above question and its implications. Recognizing that: (1) an organized knowledge base, focusing on existing practices and their modification into a technological package appropriate to the needs and constraints of the majority of farmers in most developing countries simply does not exist in many, if not most, cases; and (2) the principles and practices developed in temperate climates are not usually applicable to the tropics where most of the poorest developing countries are located and the potential for increased production is greatest–AID has developed a new instrument which it calls state-of-the-art analysis (SOTA). This instrument is the focus of a new programming and analytical approach which seeks: (1) to develop guides as to what should *and* should not be "delivered" to the targeted farmer; (2) provides guidance for testing the application of known principles and practices; and (3) identifies critical knowledge gaps requiring investigation. The guidelines for preparing SOTA analyses and the expected products are attached for your information.

Why Our Approach Should Interest You

While the attached guidelines on an appropriate methodology for SOTA work are designed primarily for use by AID grantees and contractors, (i.e., principally U.S. Land-Grant institutions who are interested in the food problems of developing countries), they require a cooperative relationship among themselves and with scientists from developing countries, other developed countries with tropical

interests and experience, and international and regional agricultural research centers, in a problem-oriented effort of *mutual benefit*. For this reason, the results of SOTA work are intended to be of multi-use, in both developed and developing countries, by governments, institutions, scientists, scholars, extension agents, etc., in improving the quantity and quality of food production in the developing world. They should also be of interest to other bilateral, multilateral and private donor organizations, particularly for pre-investment analysis regarding research projects, production loans, etc.

Some Current Examples

During the calendar year 1975, SOTA work has been initiated on several problems and/or opportunities in the sub-sector of water management. These include: (1) water harvesting methods, (2) irrigation methods, and (3) low cost/low cost pumping plants. Work is also in progress on several important problems in aquaculture including: (1) institutional constraints to small scale fisheries, (2) marketing systems as an impediment to fisheries development, (3) maximum-input aquaculture, and (4) knowledge transfer methodology for small scale fisheries. A major effort is also underway on soil erosion.

During 1976, work is expected to begin on tropical soil liming practices, phosphorus fixation in tropical soils, land use planning, low cost processing of soybeans for food, and others.

Participation and Inquiries Invited

Universities, research institutions, individual scientists and engineers—from both developing and developed countries—as well as potential donors, who are interested in participation in a specific study, the exchange of information, suggesting priority problems for analysis, improving the methodology, assisting in the dissemination of results, or with additional copies of the guidelines, should write to:

Dr. Leon Hesser (Attn: SOTA)
Director, Office of Agriculture
Technical Assistance Bureau
U.S. Agency for International Development
Washington, D.C. 20523
U.S.A.

GUIDELINES ON A METHODOLOGY

FOR PREPARING STATE-OF-THE-ART ANALYSES,

DOCUMENTS, AND HANDBOOKS ON WORLD FOOD PROBLEMS

I. Problem

AID and the U.S. Land-Grant institutions have long been engaged in a partnership to assist developing countries in increasing agricultural production. In recent years, the trend has shifted from a concentration on institution-building and the education and training of developing country nationals to a more problem-oriented focus, accelerated by the recent evidence of a "world food crisis" and Congressional mandates.

Increasing concern with the small farmer, the quality of life for the rural and urban poor, and such factors as the energy crisis, ecological balance, and the requirements for a systematic approach to the production, delivery and consumption of food necessitate a new concept of development assistance which is more than just the simple transfer or adaptation of sophisticated agricultural technology so characteristic of the developed world.

Many U.S. land grant universities have a long history of involvement in development assistance and have acquired a great deal of knowledge about developing countries. Unfortunately this knowledge is often confined to a single region or country, is not focused on the problems of small family farmers and the constraints within which they must operate, and is all too often based on broad generalizations from a limited amount of information. An organized knowledge base, focusing on existing knowledge and its modification to a technology for the small LDC farmer, simply does not exist in most cases even though many of the critical problems and limiting factors have already been identified and at least partial solutions are known. The primary issue, then, is: what do we know and what does it all mean?

In recognition of this problem, a group of universities involved in AID-supported programs in tropical soils, water management and aquaculture,* met in May, 1975, to discuss a common methodology for fulfilling this need in a state-of-the-art (SOTA) format. This meeting was the result of a growing concern that developed country scientists (particularly in the U.S.) who were experts in their own field simply did not know enough about the problems as they exist in the tropics and, therefore, could not recommend optimal solutions of general applicability. This became increasingly apparent in the comprehensive reviews of 211(d) grants whose major purpose was to strengthen U.S. institutional competence in priority problem areas.

The development of such a knowledge base is now one of the prime elements in all new 211(d) grants and the primary justification for the extension and revision of existing grants. It is also required in many research contracts and should be an essential part of any new programs authorized under Title XII of the FAA of 1961.

Because of the importance now being given to SOTA effort, AID believes it is necessary to develop mutually acceptable guidelines so that desired results are achieved, information is inter-changeable, and the emphasis is on the inventorying and analysis of practices appropriate for the developing countries and not solely or primarily academic or scientific treatises.

Obviously, there is more than "one" way to perform a SOTA review and/or to prepare a SOTA statement. The approach will also vary with: (a) the complexity and nature of the problem or subject; (b) the intended use of the results; (c) the money, time, and expertise available; (d) the availabiltiy of appropriate data and information; and (e) most important, the comprehension, ingenuity and innovativeness of the people involved.

The guidelines are *not* intended to be rigid. When a specific approach, methodology or format is "required", this will be negotiated in the appropriate funding agreement. The intent here is to explain the concept and suggest a general approach which is subject to adaptation and modification.

*Consortium for International Development (CID) - Univ. of Arizona, Utah State Univ., Colorado State Univ., Univ. of California-Riverside, and Oregon State Univ., Consortium on Soils of the Tropics (COST) - Cornell Univ., North Carolina State Univ., Prairie View A&M Univ., Univ. of Puerto Rico, and Univ. of Hawaii; and Auburn Univ.

III. Definition and Concept

What is State-of-the-Art?

As used here, "state-of-the-art" is a keenly analytical review of the knowledge accumulated by research and practice on either a narrow or broad subject setting forth the established principles, how and where they can be used, and identifying the gaps in knowledge needing research for establishment of better principles. If there is no practical or economic solution to the problem for a specific area, crop, or other subdivision, alternatives should be suggested. Some conventional "reviews" meet these standards, but most do not. SOTA is not an anthology, a book of abstracts, and should not attempt to cite all of the accumulated literature. Emphasis must be on the principles and how they can be applied. Not a recipe book, it is a *guide on diagnosis and solution of a problem* with the emphasis on simplicity and economy.

Purpose

Preparation of a SOTA paper serves several useful purposes in the application of knowledge, including research. For those involved, its preparation forces them to critically examine the literature, distill out the principles, and crystallize usable and researchable hypotheses. For those not involved in the effort but working in the area, it provides an authoritative background and guidance for further investigations. Far too much work is undertaken without a critical review of the literature before-hand with the result that enormous amounts of effort are wasted, i.e., study of problems already solved or of low priority.

In application of knowledge (extension, education, delivery systems) "state-of-the-art" products are the guide as to what should be and what should not be delivered. This is an important point. Much information, for example, on soil and water management developed in temperate climates with temperate-zone cropping systems cannot be extended to the tropics and to do so is dangerous. "State-of-the-art" *targeted* at developing country problems and to the tropics are particularly important to what can be and should be extended. For guidance of research and development where principles have been established, but their application is being tested, the "state-of-the-art" effort should offer a guide for testing these principles with a minimum of effort, cost, and time.

There are other results expected, not the least of which is the involvement of U.S. agricultural scientists in a *cooperative relationship* with scientists from developing countries and regional research centers in a problem-oriented effort of *mutual benefit*. The very process of doing a SOTA study is expected to strengthen both the domestic (U.S.) and international networks.

When, How, Who?

A "state-of-the-art" effort should be undertaken when there is a definite need and some person, group or institution is available with the ability to conduct it. Since the emphasis is on critical analysis of accumulated knowledge, preparation time might well take one to two years or more of part-time work. The greater the experience and accumulated knowledge of the analysts, theoretically the less time required. From the standpoint of the Technical Assistance Bureau, negotiations for "state-of-the art" papers can be a part of a grant, cooperative agreement and/or research contract. More expensive modes, where expertise is not otherwise available, are through special contracts with individuals, research centers or consultants. Since the emphasis is on critical analyses and quality, scientists must be carefully screened as to ability and interest. Authorship can be single or multiple, but individual responsibility is clearly needed for analytical thinking. To the extent feasible, participation in selected parts of the effort should include scientists from outside the designated institution, e.g., sister institutions, international research centers, cooperating country institutions, etc.

All manuscripts should be reviewed by peer scientists, including those of developing countries, for adequacy, accuracy and logic of interpretation and within AID for applicability. This may warrant one of more workshops during the course of preparation and final review.

The objective in publication of the final products should be its availability to a wide spectrum of readers at reasonable cost for a period of five to ten years. AID will publish and disseminate SOTA handbooks and bulletins to the development community. Other publication alternatives are review series such as Advances in Agronomy or experiment station bulletins, but such alternatives may be more desirable for specific products flowing from the SOTA paper, e.g., bulletins on applicable practices.

The style and language should be simple, commensurate with adequate communication of the subject matter. The audience should be regarded not only as scientists or engineers, but government officials and others having no specialized training in the subject matter.

Utilization

How should "state-of-the-art" papers help food production in developing countries? First, they would supply authoritative sources of information relevant to the topics to teachers and students at the University level, to scientists and engineers conducting research pertinent to production problems, and to persons preparing education and extension materials for use in the development process. For example, there is now no authoritative guide on the behavior of phosphorus when applied to tropical soils in terms of its critical role for crop response—yield, quality, etc.

Second, and equally important, such papers would be a valuable text for guidance of developing country scientists in their research and extension programs. Of course they would make adaptations for their specific situations.

Finally, they would be used by national governments, regional and international agricultural research centers, and bilateral and multilateral donors as an important input in determining priorities, training requirements, land-use patterns, improved practices, research and a host of other needs with which administrators are often forced to deal with limited information.

Selection of Problem

Subject matter can range from very narrow to very broad depending upon the selected problem. Obviously, no attempt should be made to cover all problems pertinent to increasing food production in the developing countries. By the time the last SOTAs are written the first one will be outdated. Overlap between subjects should be minimized, but some is essential. Nature and the production problems related to its variations and limitations were not put in neat little boxes. Subject matter, by definition, should not be directed at a single country* but should be written for world-wide or general application to similar soils, climates and constraints. The extent of applicability should be specifically stated insofar as known from the world literature, soil maps, climate data, authoritative literature, and other sources.

In fact, the prevalence of the problem in the developing world and its susceptibility to a joint cooperative approach by the international network of agricultural insitutuions will be the prime criterion of SOTA selection by AID. Also, the relevance of U.S. competence and experience to the problem and AID's ability to contribute will be another important factor.

In most cases AID, in close cooperation with its field mission and developing country officials, CGIAR, the regional and international agricultural research centers, FAO, USDA, IBRD, and the U.S. land-grant community, will select the problems or subjects it believes have priority and warrant funding, either through grants, contracts or otherwise. However, universities, private organizations and individuals from the U.S. and elsewhere are invited to propose topics, including a proposed plan for carrying out a SOTA effort, the expected results, and most importantly, their impact on the solution of problems impeding development.

*However, a modified SOTA approach can be applicable to site-specific problems.

In negotiations with participants and institutions, AID will solicit their viewpoints on needs and subject matter for subsequent determinations of competence and sufficient enthusiasm to give the SOTA effort high priority.

IV. Preparation of SOTA

Consideration of the Technical Facets

There is no set way to do a comprehensive, state-of-the-art as defined herein. Nevertheless, there is a logic which can and should be applied to assure a useful product, i.e., the SOTA paper itself and its eventual utilization. It includes:

1. Define the problem
   - describe and set in the context of developing countries and focused on the family farmer
   - determine separable components of the problem (include environmental, socio-economic and energy components in addition to breakdown of technical problem)
2. By *each* major component
   - determine state-of-the-science and its application/relevance to the developing world
   - inventory and analyze current and past principles and practices in terms of their usefulness to the developing countries
   - determine critical variables, e.g., demography, climate, rainfall, soil, etc.
3. Develop statement of knowledge gap
   - determine criticality to desired end-result
   - relate to other on-going SOTA work.
   - specify additional knowledge/data required
4. Specify steps to complete inventory
   - more literature review or data exchange
   - inputs from "outside" experts
   - field surveys
5. Evaluate
   - determine critical variables, constraints, etc, for each component
   - integrate components and analyze interrelationships
   - prepare statement on "what it all means," e.g.,
     - recommend practices
     - training needs
     - knowledge gaps
     - research priorities
6. Prepare outputs
   - publications, bulletins, etc.
   - seminars, outreach activity
   - new proposals for R&D

Planning the Approach

A complete, comprehensive and successful SOTA effort usually starts long before the consideration of technical facets by a designated institution and can continue after the actual work is completed and published by extending the work to another approximation, participating in workshops, or other follow-up and outreach activity. Illustrative milestone events are:

1. Subject and institution selected
   - AID determines SOTA effort it wishes to finance according to program priorities
   - at AID request, individual, institution or group of universities agrees to take on responsibility
   - appropriate agreements negotiated and executed
2. Preliminary work-plan prepared
   - SOTA leader selected
   - problem components determined
   - staff selected or identified
   - technical facets considered
   - tasks assigned
   - work-plan and budget approved

3. SOTA work begins
   - literature review, worldwide or regional, as required (the main principle here is scope and completeness)
   - consultation, correspondence, workships
   - field visits to obtain current practices and experience
   - when necessary, confirming laboratory or field measurements may be required in order to evaluate or understand previous or on-going work.
   - evaluation, synthesis and identification of transferable information, gaps, etc.

4. Completion of SOTA and follow-on determined
   - final document(s)
   - symposium to disseminate SOTA information
   - determine need for additional SOTA on problem, a critical component of problem or interrelated problem
   - recommend outreach/extension follow-on
   - recommend new research, training, etc.

Planning the Work

Detailed workplans should be developed, with AID participation and/or approval, for two year periods. When SOTA is designed for more than two years, summary workplans are acceptable for that period *beyond* the first two years. In order to assure some consistency and completeness, the outline below should be followed whenever a workplan is appropriate for a particular sub-category, i.e., problem component. While these workplans will not be included as part of the grant or contract agreement itself, it will be considered an informal understanding on substantive detail and schedules and be made available at appropriate progress reviews. The institutions will be encouraged to keep such workplans up-to-date and revise them at least once a year when their annual report is submitted to the sponsoring technical office. *(See next page for components.)*

1. *First major component* (of the problem)
   - Activity or work to be performed
   - Staff to be involved
   - Scheduled events/targets
   - Expected results and/or end-of-work status indicators
   - Estimated cost and man-months of effort
   - Summary of work expected for remaining grant or contract applicable)

2. *Second major component* (of the problem)
   - Activity or work to be performed
   - Staff to be involved
   - etc.