

PDAAQ 959

Amendment PDAAQ-959
ATTACHMENT I ISN 39031

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE

C
A = Add
C = Change
D = Delete

Amendment Number

DOCUMENT CODE

3

COUNTRY/ENTITY
Worldwide

2. PROJECT NUMBER
931-1254

4. BUREAU/OFFICE
S&T/AGR 10

3. PROJECT TITLE (maximum 40 characters)
CRSP - Sorghum/Millet

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)
MM DD YY
01 9 31 0 8 7

7. ESTIMATED DATE OF OBLIGATION
(Under "B." below, enter 1, 2, 3, or 4)
A. Initial FY 79 B. Quarter 3 C. Final FY 86

8. COSTS / \$000 OR EQUIVALENT \$1 =

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AD Appropriated Total	5,000		5,000	27,750		27,750
(Grant) S&T Bureau	()	()	()	()	()	(25,750)
*(Grant) Mission/Req. Bureau	()	()	()	()	()	(2,000)
Other L						
U.S. 2 Non-Federal						5,600
Host Country						1,000
Other Donor(s)						
TOTALS	5,000		5,000	27,750		34,350

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION PURPOSE	B. PRIMARY CODE	C. PRIMARY TECH. CODE	D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
			1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ARDN	141	963	18,150		7,600		25,750	
(2)								
(3)								
(4)								
TOTALS			18,150		7,600		25,750	

10. SECONDARY TECHNICAL CODES (maximum 5 codes of 3 positions each)

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)
A. Code R/AG
B. Amount 25,750

13. PROJECT PURPOSE (maximum 480 characters)
To increase sorghum/millet production, utilization and to improve research capability in LDCs through collaborative research between U.S. and LDC institutions.

14. SCHEDULED EVALUATIONS
Initial MM YY 0 4 8 7 Final MM YY

15. SOURCE/ORIGIN OF GOODS AND SERVICES
 000 941 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of 5 page PP Amendment)
To extend the project for two years and increase the authorized life-of-project total cost from \$18,150,000 to \$25,750,000 and provide up to \$2.0 million regional bureau and mission contributions.

*The estimated regional bureau and mission contributions are not included in this authorization. It is anticipated that they will be contributing to the grant under separate project authorities.

17. APPROVED BY

Signature J.S. Robins
Title J.S. Robins
Agency Director for S&T/FA

Date Signed MM DD YY
05 13 85

18. DATE DOCUMENT RECEIVED BY ADIW. OR FOR ADIW DOCUMENTS, DATE OF DISTRIBUTION:
MM DD YY

Project Authorization

Entity: Bureau for Science and Technology

Project Title: CRSP - Sorghum/Millet

Project Number: 931-1254

A. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, the centrally funded Sorghum/Millet CRSP project was authorized on July 1, 1979 and amended on June 29, 1984. That authorization is hereby further amended as follows:

1. The authorized final year of obligation is extended from FY 1985 to FY 1987.

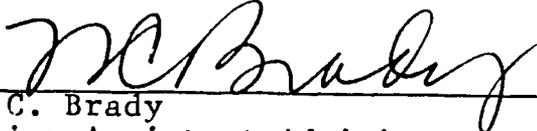
2. The authorized life-of-project S&T Bureau funding is increased from \$18,150,000 to \$25,750,000 to help in financing the foreign exchange and local currency costs of the project. A new total of up to \$27,750,000 of A.I.D. appropriated funds is approved for use in this project in anticipation that regional bureaus and missions may contribute up to \$2.0 million, under various project authorities, to supplement the funds provided by the S&T bureau and ensure an adequate level of technical assistance services to meet their needs.

3. Source and Origin of Goods and Services

a. Each developing country where training or other assistance takes place under this program shall be deemed to be a cooperating country for the purpose of permitting local currency financing.

b. Goods and services, except for ocean shipping, financed by A.I.D. under the project shall have their source and origin in the cooperating country or in the United States except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the program shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

B. The authorization cited above remains in force except as herein amended.



N. C. Brady
Senior Assistant Administrator
Bureau for Science and Technology
Date: 5/16/85

Clearance:
S&T/AGR: ARBertrand WNY Date 5/3/85
S&T/AGR: F. Li FL Date 5/2/85
SER/CM: PCasteel PCasteel Date 5/6/85
S&T/PO: ERoche ERoche Date 5/10/85
S&T/PO: GEaton GEaton Date 5/10/85
S&T/FA: JSRobins JSRobins Date 5/13/85

Drafted: S&T/AGR/AP: RI Jackson: mro: 4/11/85: FXT: 235-1497
Revised: MBlakeney: lsl: 4/17/85: WD 0394f

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

MAY 7 1985

MEMORANDUM

TO: S&T/AGR/AP, R. I. Jackson
FROM: CM/COD/AN, Phillip Casteel *Phillip Casteel*
SUBJECT: Sorghum/Millet CRSP Extension
REFERENCE: S&T/AGR Action Memorandum of April 25, 1985

I have concurred, as requested, in the Action Memorandum to Dr. Brady. The concurrence is based on the following:

1. USAID Mission contributions to the CRSP effort must be appropriate to a grant relationship. All USAID Mission requirements for contractual research will be handled separately, in accordance with the CRSP Guidelines. Mission funds under CRSP agreements will not be accounted separately.
2. Since USAID Mission contributions are not covered by the S&T Authorization, all PIO/Ts received from the Missions must be accompanied by USAID approved waivers of source, origin and nationality. The source, origin and nationality waiver accompanying the authorization applies to core funding only. This also applies to "ineligible" commodities.
3. S&T/AGR, SER/CM, and the University will establish an amount of funds which may be used for local currency purchases from core funds. This amount will be included in the CRSP grant document. USAID Mission PIO/Ts must also provide for local currency purchases.
4. We will attempt to process the extension expeditiously. However, we need to draft a new grant agreement and will need to determine, based on pipeline analysis, when the new grant will take effect. The PIO/T should include the Program Description and budget for the extension period.

As soon as the extension has been approved, please let us know and we will begin working with U/Nebraska on the extension.

If you have any questions regarding this Memorandum, please feel free to contact me or Clem Bucher on 235-9137.

W

April 23, 1985

ACTION MEMORANDUM FOR THE SENIOR ASSISTANT ADMINISTRATOR FOR
SCIENCE AND TECHNOLOGY

THRU : S&T/FA, J. S. Robins *JSR*
FROM : *AB* S&T/AGR, Anson R. Bertrand *ARB*
SUBJECT: Sorghum/Millet Collaborative Research Support Program
(CRSP), Number 931-1254

Problem: Your approval is requested for a two-year extension and increased funding authorization for the subject project.

Discussion: The Sorghum/Millet CRSP began in FY 1978. As detailed in Attachment 3, the CRSP now involves seven U.S. institutions working in 14 LDCs under the overall direction of the Management Entity (ME) for the project, the University of Nebraska (U/N). The current Grant Agreement expires on June 30, 1985.

In February 1984 an in-depth review of the subject project was conducted and the team recommended that a number of actions be addressed. U/N requested a one-year extension which was granted, to implement these recommendations. The actions were to: 1) reevaluate and prioritize constraints on sorghum/millet production, processing, marketing and consumption; 2) select principal countries (covering a range of geographic-ecological regions) for a fully integrated interdisciplinary program; 3) develop a global plan; 4) select secondary countries to form regional collaborative networks with international and regional agricultural research centers; and 5) prepare a report covering the first five years of implementation. These recommendations were carried out satisfactorily by U/N and form the basis of the extension request. See accomplishments in Attachment 3.

Review and Evaluation: U/N has submitted a request for a three year extension, through June 30, 1988 (Attachment 2). A joint review by the CRSP Panel of the Joint Committee on Agricultural Research and Development (JCARD) and the Agriculture Sector Council Subcommittee recommended extending the Sorghum/Millet CRSP for two years instead of the requested three. In addition, the JCARD recommended approval of the new five year global plan. The plan restructures the CRSP and consolidates research in critical countries whose institutional research capability promise successful collaboration. BIFAD endorsed

the recommendations of JCARD. Authorization for extension of funding for the full three-year period will be contingent on a favorable evaluation by the External Evaluation Panel during April 1987, showing that the new plan is being satisfactorily implemented.

Funding: The funding requested is consistent with the guidelines given to the CRSP in November 1982. S&T/AGR plans to budget funds to support the Sorghum/Millet CRSP core activities at a level of \$3.8 million per year from FY 1985 through FY 1986. The S&T authorization level will be increased to \$25,750,000. In addition, S&T/AGR anticipates missions and regional bureaus will contribute or "buy-in" a total of \$2.0 million for additional country activities within the overall scope of this project. These additional funds will be separately authorized under various mission or regional bureau projects, but will require an increase in the approved grant ceiling to \$27.75 million.

Recommendation: That you sign the attached project authorization to extend the Sorghum/Millet CRSP for two years and increase the authorized life of project cost from \$18.15 million to \$25.75 million. The approved grant ceiling will be increased to \$27.75 million to accommodate up to \$2.0 million of regional bureau or mission buy-ins.

Attachments:

1. Project Authorization and Data Sheet
2. Grantee's Request for Extension
3. Background, Accomplishments and Directions
4. BIFAD Recommendation
5. Global Plan
6. Revised Logical Framework
7. Summary Budget Plan

Clearance:

S&T/AGR:RIJackson draft Date: 4/25/85
S&T/AGR: F. Li fl Date: 5/2/85
SER/CM :PCasteel PCasteel Date: 5/6/85
S&T/PO:GEaton KW Date: 5/10/85
S&T/PO:ERoche ER Date: 5/10/85

Drafted:S&T/AGR/AP:RIJackson:mro:4/10/85
Revised:MBlakeney:lsl:4/17/85:4/22/85:WD 0391f

ROUTING AND TRANSMITTAL SLIP

Date 5-15

TO: (Name, office symbol, room number, building, Agency/Post)

- 1. NCB
- 2. _____
- 3. _____
- 4. _____
- 5. _____

J. E. [Signature]
N. C. Brady

15 MAY 1985

Nyle C. Brady

Action	File
Approval	For Clearance
As Requested	For Correction
Circulate	For Your Information
Comment	Investigation
Coordination	Justify

REMARKS

I say "yes!"
One of best CRSPA.
Sensible plan.
J. E.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
	Phone No.

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206



INTSORMIL--Sorghum/Millet International Research

International Programs
 THE UNIVERSITY OF NEBRASKA-LINCOLN
 Institute of Agriculture and Natural Resources
 241 Keim, East Campus, Lincoln, NE 68583-0723

Phone (402) 472-6032

Telex: 438087 UN INTPRG LCN

January 9, 1985

Dr. Robert Jackson
 S&T/AGR/FCP, Room 411, SA-18
 Agency for International Development
 Washington, D.C. 20523

Dear Bob:

The purpose of this letter is to request a meeting for the Sorghum/Millet CRSP (Grant AID/DSAN/XII-G-0149) to make a five year report, present a three year global plan of collaborative research, and request a three year program extension for the CRSP for Years 7-9, July 1, 1985 through June 30, 1988.

As we have discussed, INTSORMIL representatives will schedule to be in AID/W S&T/AGR on February 14, 1985 with the first session starting at 8:45 a.m. Present plans are for the INTSORMIL group to include: The Chair of the EEP, Chair of the Board of Directors, Chair of the Technical Committee, or their representatives, a representative from the Prime Site Coordinators group, and Vollmar and Yohe from the INTSORMIL ME.

We will send materials for the review including reports, a three year global plan of research, projected budgets and other relevant materials to you for on or about February 1, 1985 arrival.

If you can give us any counsel regarding the review beyond that already given to us, we would appreciate it.

Best regards,

Sincerely,

Glen J. Vollmar
 Program Director
 INTSORMIL

GJV:dls

cc: Dr. Anson Bertrand, AID/W
 Dr. W. F. Johnson, BIFAD
 Dr. Rodney Foil
 Dr. John Yohe
 INTSORMIL Institutional Representatives

Background, Accomplishments And Future Directions
Of The Sorghum/Millet CRSP

Development of the S/M - CRSP: Sorghum and Millet were chosen as a CRSP subject by BIFAD in 1977 and the University of Missouri - Columbia (UMC) was selected as the planning entity in August of that year. Their complete plan was approved by the JRC in early 1979 and AID signed the grant agreement July 1, 1979 with the University of Nebraska (U/N) as the Management Entity (ME).

A Technical Committee (TC), responsible for research development and implementation, and a Board of Directors (BD), concerned with budgets and policy, were formed to assist the ME. Originally, twelve institutions established research projects. However, in response to an administrative request to reduce the number of participating institutions and because of the level of funds available for the CRSP, four of the institutions with lower priority research projects were eliminated prior to the effective date of the grant. Currently, seven U.S. institutions have research projects on campus and are working with fourteen countries and four IARC sorghum and millet programs.

These projects follow, generally, the major sorghum and millet production, processing and utilization constraints identified by the planning entity. These are: breeding, soil fertility, agronomy, physiology, pest management, training, processing/utilization, nutrition, socio-economics.

Accomplishments to Date:

1. Funding and institutional resources have been organized to conduct the necessary research and training. An information and resource exchange network has been developed that maintains contact between the major sorghum and millet producing countries and research institutions, in the developed and developing countries, of the world.
2. More productive and efficient germplasm has resulted from research on yield enhancement, pest and stress resistance and improved nutritional and processing quality. This material is being used in breeding programs throughout the world and has resulted in new improved varieties of sorghum in Mexico, Honduras, and elsewhere. The new drought-tolerant varieties of

sorghum that have recently been released in Sudan and Mali originate in part from research done under this CRSP. These breeding lines are also making a favorable impact on U.S. sorghum production.

3. Socio-economic studies have been conducted in Honduras, Mexico, Burkina Faso and Sudan. These guide biological research and provide basic material for future evaluations.

4. Formal degree training (495 participants), workshops (1500 attendees), study tours (25) and on-the-job training with counterparts make up the program training activity. This is developing a critical mass of trained staff on which to build self-sustaining research institutions in the LDCs.

Issues on Management and Research Priorities:

1. The constraints to increased sorghum and millet production and utilization, listed in paragraph 3 of the preceding background discussion, were identified during the early stages of the CRSP. They have been reevaluated by the EEP and ME. The constraints have been prioritized and there is now a shift in emphasis from straight disciplinary research to research to determine ways of reducing the constraints. At the same time, more work will be done on millet than there was in the past. It is planned that the more serious restrictions on sorghum and millet production and utilization will be addressed.

2. Based on the above constraint reevaluation and prioritization, a global plan has been developed and accepted by the Board of Directors of the CRSP, BIFAD and AID. LDCs have been selected which will be the prime sites based on varying ecological and geographic regions. The plan stresses a fully integrated, interdisciplinary approach with linkages to provide an in-depth communication network to allow for regular exchanges of research findings.

Primary sites will have a complete interdisciplinary team to work on sorghum and millet production and utilization while at the secondary sites, research will focus on selected high priority research problems for their area. Networking will provide for appropriate exchanges of information applicable to other regions.

Drafted: S&T/AGR/AP:RIJackson:mro:4/11/85:EXT:235-1497
Revised: MBlakeney:lsl:4/17/85:4/22/85:WD 0395f

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BOARD FOR INTERNATIONAL FOOD AND AGRICULTURAL DEVELOPMENT
INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Agency for International Development
Washington, D.C. 20523

March 25, 1985

vj DUE: 4/18/85
ACTION: AA/S&T for McPherson signature
INFO: R/logs, BIFAD, SCI, AA/FVA,
AA/PPC

Mr. M. Peter McPherson
Administrator
Agency for International Development
Washington, D. C. 20523

Dear Peter:

This is to inform the Agency of the action taken by the Board for International Food and Agricultural Development (BIFAD) at its meeting on March 7, 1984 on the proposal to extend the Sorghum/Millet Collaborative Research Support Program (S/M CRSP) for three years. The Board reviewed the proposal and acted favorably on the recommendations of the Joint Committee on Agricultural Research and Development (JCARD). JCARD had recommended approval of the new five-year global plan with authorization for extension of funding for two years instead of the requested three years. Authorization for extension of funding for the full three-year period will be contingent on a favorable evaluation by the External Evaluation Panel during the two years, showing that the new plan is being satisfactorily implemented. The new plan restructures the CRSP and consolidates research in critical countries offering institutional research capability for successful collaboration.

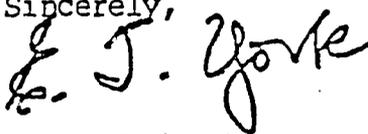
The Board was impressed with the scientific achievements made by the Sorghum/Millet CRSP to date in the development with ICRISAT of the Hageen Dura hybrid sorghum in Sudan, and the potential that research offers for the future, particularly in the molecular and bio-chemical research on the nutritional quality of these grains for human and animal consumption. This

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research has discovered ways for potential manipulation of the polyphenols in these grains through genetic engineering to reduce their toxicity and make the protein more digestible. The chairman of the External Evaluation Panel, Bruce Maunder, reported that a recent study of some fifty feed stations in the United States showed that protein utilization by cattle fed the crossed sorghum grain (crossed with an imported variety through CRSP research) showed that protein utilization had increased from 88 percent to 96 or 97 percent. The Board is pleased to recommend this CRSP for extension.

Sincerely,

A handwritten signature in cursive script that reads "E. T. York, Jr." The signature is written in dark ink and is positioned above the typed name.

E. T. York, Jr.
Chairman

FIGHTING HUNGER WITH RESEARCH - A TEAM EFFORT

A GLOBAL PLAN OF SORGHUM/MILLET CRSP RESEARCH

I. INTRODUCTION

A. AID/BIFAD OBJECTIVES.

In 1975 the Congress of the United States passed an amendment to the Foreign Assistance Act of 1961 known as "Title XII -- Famine prevention and freedom from hunger." The mandate of Title XII is to "___ improve the participation of these (the agriculturally related) universities in United States' governmental efforts internationally to apply agricultural sciences more effectively to increasing world food production and provide ___ support to the application of science to solving developing countries' food and nutrition problems". This legislation provided for a more important and more clearly defined role in foreign assistance activities for land grant and other universities in the U.S. who have demonstrated the capability and interest in working with developing host country agricultural institutions involved with expanding indigenous food production. Three key components mentioned in the legislation were 1) strengthening the capabilities of U.S. Universities to assist in increasing the agricultural production in developing countries; 2) institution building; and 3) research program grants. The legislation has the objective of providing mutuality of research benefit to the United States and host countries.

In order to implement the intent of the legislation, one provision provided for the establishment of the Board for

International Food and Agricultural Development (BIFAD) as an advisory board to the Agency for International Development. The BIFAD established two standing joint (AID and BIFAD) committees, the Joint Research Committee (JRC) and the Joint Country Agricultural Development Committee (JCAD). The JRC was to be responsible for research grants and would provide guidance to the BIFAD on all AID research programs. The JCAD Committee was responsible for guiding the role of the U.S. University community for assisting in increasing agricultural production in developing countries and for institution building in the LDCs. The JRC discharged part of its responsibility for research program grants by conceiving and establishing Collaborative Research Support Programs (CRSPs). The CRSPs are joint BIFAD/JRC/AID/University undertakings, being jointly financed, planned and managed. The objectives of AID/BIFAD through the CRSPs were to mobilize the research establishment of the U.S. higher education community to work in a collaborative fashion with the international agricultural research centers and even more importantly with the agricultural research institutions in the developing nations. The CRSP's were designed to mobilize the U.S. talent and to foster its role in high-payoff, problem oriented research programs on key food, nutritional and rural development problems which confront the developing world. The CRSPs are expected to assume effective interaction and complementarity with national, bi-national and multi-national agricultural development programs in developing countries.

B. COLLABORATION - HOST COUNTRY AND U.S., AMONG UNIVERSITIES AND AMONG DISCIPLINES.

"Collaborative Research Support" is the term given to programs, such as the Sorghum/Millet CRSP, which are jointly sponsored by BIFAD/JRC/AID and the U.S. University community. This research is jointly supported by A.I.D. and participating U.S. institutions. The term "participating institutions" is used to denote institutions contributing financially to the CRSP. The term "collaborating institutions" includes participating institutions plus all other U.S. and host country institutions collaborating significantly in the total CRSP effort. This program is a long term effort designed to bring together the research capabilities of participating universities, collaborating Title XII institutions and the USDA, appropriate host country institutions and international agricultural research centers (IARCs) into a comprehensive and coordinated effort in research and training, to generate and apply knowledge that can assist in alleviating principal constraints to improved production, marketing and the utilization of sorghum and millet. It is based on the assumption that there are large areas of overlap between U.S. and developing country needs for research, marketing and utilization of these two crops. Substantial mutual advantages are expected to result from joint research program efforts which cut across national boundaries and different levels of agricultural development. Within the program, collaboration is encouraged within and between disciplines. The objective is to have a multidisciplinary program with the different disciplines working together at prime host country sites.

The Sorghum/Millet CRSP defines principal investigator collaboration as follows:

An acceptable level of a Sorghum/Millet CRSP research activity has established collaboration in one of the prime, collaborative or potential sites identified in the Global Plan. The Memoranda of Agreement between INTSORMIL/Host Country Institutions/and possibly the USAID/Missions establish formats for collaboration. Annual research work plans identify the U.S. and host country collaborators. Collaborative activities include the following:

- * Joint program planning, joint implementation of research and joint publication of research results.
- * Joint planning and implementation of workshops and other networking activities.
- * STAFF Networking - Host country collaborating scientists visit U.S. research sites and U.S. collaborating scientists visit host country sites.
- * Collaborating scientists exchange students and research materials and advise graduate students. They exchange germ plasm and information as appropriate.
- * INTSORMIL funds provide in-country support for on site research.
- * Close collaboration is evidenced with other scientists including interdisciplinary collaboration.
- * It is an asset if the U.S. P.I. knows or is in process of developing competency in host country language(s).

C. AN OVERVIEW OF THE SORGHUM/MILLET CRSP, INTSORMIL.

INTSORMIL is a collaborative research program where United States scientists work jointly with scientists of other nations to improve sorghum and millet production and utilization. Land grant universities participating include: The University of Arizona, Florida A&M University, Kansas State University, University of Kentucky, Mississippi State University, Purdue University and Texas A&M University.^{1/}

INTSORMIL collaborative efforts include Host Countries, International Research Centers (IARCs) and the Agency for International Development (AID). Cooperating prime site and collaborating host countries include Mali, Sudan, Botswana, Mexico, CIAT/S. America, Niger, Burkina Faso, Egypt, Brazil, the Dominican Republic, Honduras and the Philippines. India has high priority as a potential prime site. The program thrust includes basic and applied research, the training of scientists and the exchange of information and germplasm and research institution strengthening.

The INTSORMIL research program is comprehensive. It includes research projects in Agronomy and Cultural Practices, Physiology, Sorghum/Millet Breeding, Entomology, Plant Pathology, Food Quality and Utilization and Socio-economics. Teams of project scientists include United States scientists, host country scientists and their students. The training of United States and

^{1/} The INTSORMIL Board of Directors approved at a meeting on January 3, 1985, to recommend that the University of Arizona and Florida A&M University be discontinued from the program.

host country scientists and students receives high priority as one way to strengthen sorghum research institutions.

INTSORMIL scientists cooperate in a world-wide exchange of sorghum seed selected from improved plants and the distribution of research information. The development of new varieties is speeded up since field trials are grown the year around where there are warm climatic conditions. INTSORMIL also supports research workshops where United States and host country scientists exchange information and plan research programs. Examples include workshops on sorghum diseases, weed control, sorghum insects, sorghum breeding, farming systems and sorghum food quality and utilization.

D. INTSORMIL'S OBJECTIVES.

Sorghum and Millet rank fourth in world food grain production following wheat, rice, and maize. They are especially significant sources of human food in South Asia, much of sub-Saharan Africa, and certain regions of Latin America and the Caribbean. In Africa alone, sorghum and millet are produced on 31,770,000 hectares. Together, these two crops constitute the "last resort" of crop production where the natural stress conditions of drought and heat predominate. Since much of the sorghum/millet is grown under stressful environmental conditions in the arid, semi-arid, tropical and sub-tropical regions of the world, yields are relatively low. Thus sorghum and millet, typically subsistence crops, are most important to the survival of low-income, low resource farmers. Because of this, these crops are not only important for nutritional and economic reasons

but also because of cultural, political, and anthropological aspects in the lives of many millions of people.

The purpose of the sorghum/millet CRSP is to organize and mobilize financial and human resources necessary for mounting a major, multi-institutional US - host country collaborative effort which in turn provides the knowledge base necessary to achieve significant advances in alleviating the principal constraints to improved production, marketing, and utilization of sorghum and pearl millet. A second purpose is to improve the capabilities of host country institutions to generate, adapt, and apply improved knowledge to local conditions.

II. COLLABORATING HOST COUNTRIES AND CONSTRAINTS

A. CRITERIA FOR THE SELECTION OF PRIME SITES AND COLLABORATING HOST COUNTRY SITES.

The following criteria were used by INTSORMIL to select prime sites and collaborating host country sites.

* AID Approved Countries

Attempts to develop collaboration and MOUs are undertaken only in AID approved countries, i.e. those countries approved by the Department of State, where AID funds can be expended. Further, if any country which had formerly been on the approved list is removed therefrom, the INTSORMIL MOU and collaborative work will be terminated.

* Importance of Sorghum/Millet.

It is almost axiomatic that sorghum/millet research should be conducted in countries where these crops are of economic importance. This is especially true for the prime sites. Some allowance was made for the size of the country, emphasis being placed on the importance of these crops to that country's total food crop production and consumption. However, the importance of the crops produced in a country vis-a-vis total world production was also considered. For example, India produced 57% of the world's output of millet in 1982 and was selected as a potential prime site.

* National Government Support.

It is vital that host country Governments support the Sorghum/Millet CRSP collaborative research concept, and that Governments' thrusts are compatible with that of INTSORMIL. The

host country should have some trained sorghum/millet scientists on site. It should be relatively easy to travel in and out of the country as well as within the country. Also, equipment should be moved without too much difficulty or delay through customs. The host country should make commitments with respect to collaborative staff, land, office space, and should assume some research support expenses. The host country should have the infrastructure and capacity necessary to make collaborative research viable and should have a goal of further improvement in research capacity.

* U.S. AID Mission Approval and Support.

USAID Missions' approval and support are vital to collaborative research success. It is not intended that the Missions will be expected to serve in "housekeeping" roles for the INTSORMIL programs, but their full cooperation is needed in almost all phases of operations.

INTSORMIL host country programs can be strengthened and made more productive if the Missions can provide "buy-in" financial support in addition to the Title XII core budget funding projected at 3.8 million dollars annually for Years 7, 8 and 9; 4.3 million for Year 10 and 4.6 million for Year 11. The additional support could come from either U.S. appropriated funds or from counterpart currencies. This additional funding would leverage to a considerable extent the effectiveness of collaborative research. Examples are already in progress in Botswana, Honduras, Dominican Republic and Sudan. The impact of

this leverage combines the USAID Mission and national sorghum research programs with INTSORMIL sorghum research into a collaborative research network.

* Opportunities for strengthening research in both the host countries and in the U.S. participating universities.

A unique feature of the CRSP is that there will be one overall program, with research taking place simultaneously in host countries and in U.S. Universities on common sorghum/millet production and utilization constraints. MOU's should be established only if there are apparent opportunities for strengthening research in the collaborating institutions, both in the U.S. and abroad.

* Collaborative Research Potential

Consideration needs to be given to the collaborative research potential in the host country, i.e. what are the potential outputs of a collaborative research program? Some research potential issues addressed in the selection of prime sites and collaborative site host countries are: growing sorghum/millet for food versus feed; political stability of the host country; private sector involvement; and USAID/Mission participation.

* Potential for Institutional Development

Before a country was designated as a prime site or collaborative site host country, the present situation and potential for institutional development was assessed.

The principal function of the CRSP is technology production. However, it would be difficult to make very much progress in this respect without concurrently strengthening host country research institutions. Also, U.S. Institutions are strengthened in respect to their capacities to respond and effectively collaborate with international research. Productive joint research results from scientists working with the necessary facilities such as suitable buildings, properly equipped laboratories, land, and sufficient funds for operations, such as supplies, labor and transportation. Most host country research scientists should be trained to the Ph.D. level to be fully effective and as a minimum to the Masters Degree level.

With adequate support from host country governments and the USAID Missions, U.S. Scientists can provide necessary counsel in bringing facilities and other undergirding segments of research into being. INTSORMIL has and will continue to pursue an active role in facilitating advanced training in U.S. Universities.

B. ECOGEOGRAPHIC ZONES AND HOST COUNTRY PRIME AND COLLABORATIVE RESEARCH SITES.

An important concept in the conduct of INTSORMIL Collaborative research is the designation of a Prime Site host country in each of six sorghum/millet ecogeographic zones with a Lead U.S. University identified for each Prime Site Host Country. See Table 1 and Figure 1.

The host country ecogeographic zones selected for sorghum/millet research concentration include: West Africa; East Africa; Southern Africa; Central America, Mexico, and the

TABLE 1
SORGHUM/MILLET CRSP (INTSORMIL)
ACTIVE AND POTENTIAL HOST COUNTRY COLLABORATIVE RESEARCH SITES AND U.S. UNIVERSITIES BY ECOGEOGRAPHIC ZONES, 1985

Ecogeographic Zone	PRIME SITES			COLLABORATIVE SITES		POTENTIAL SITES	
	Host Country	U. S. Universities Lead	U. S. Universities Collaborating	Host Country	U.S. Universities Collaborating	Host Country	U.S. Universities Collaborating
WEST AFRICA	Niger	Purdue	Texas Arizona Mississippi Kentucky	Mali Burkina Faso	Texas Purdue Nebraska Kansas	Senegal Cameroon	Nebraska
EAST AFRICA	Sudan	Purdue	Kansas(millet) Purdue Kentucky Nebraska Texas			Egypt ^{1/} Kenya Somalia Uganda Tanzania Yemen AR ^{1/}	Nebraska Texas
SOUTHERN AFRICA	Botswana	Kansas	Nebraska	SADCC Nations	Kansas Nebraska		
CENTRAL AMERICA, MEXICO AND THE CARIBBEAN	Honduras	Texas	Kentucky Mississippi	Mexico Dominican Republic ^{2/}	Texas Nebraska Kentucky Nebraska Texas	El Salvador	
SOUTH AMERICA	CIAT/ Northern South America	Mississippi	Nebraska Purdue Texas	Brazil	Texas	Venezuela Peru Colombia Paraguay	
ASIAN SUBCONTINENT	India ^{3/}	Nebraska		Philippines ^{4/}	Nebraska	Pakistan	Nebraska Texas Purdue

^{1/} Yemen AR and Egypt are in the AID Near East Bureau but for INTSORMIL program purposes they are included in the East Africa zone.

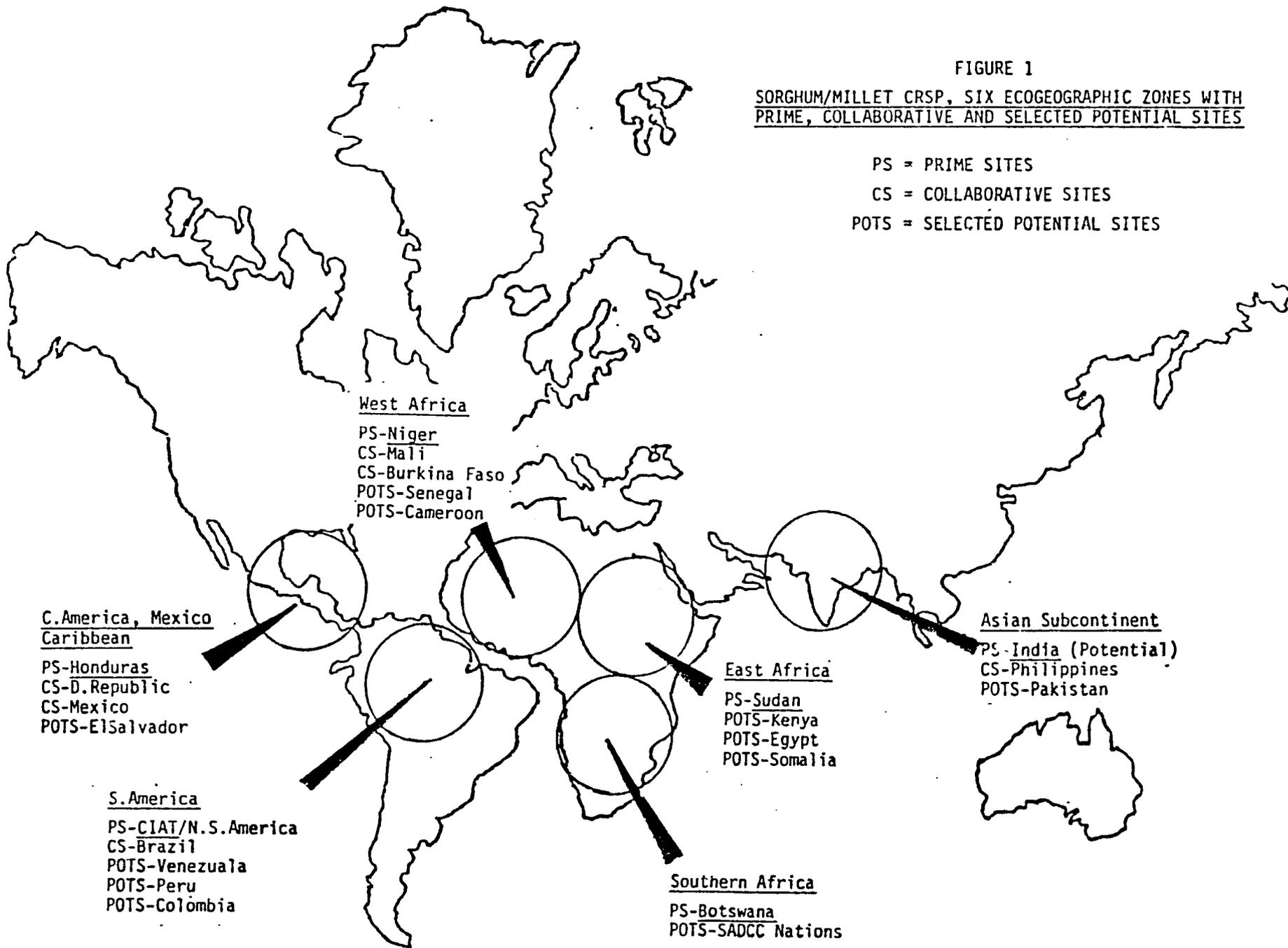
^{2/} The Dominican Republic Project funding will terminate at the end of Year 8, FY87.

^{3/} India has high priority as a potential prime site.

^{4/} INTSORMIL has a collaborative program underway in the Philippines. This project will be reduced in Year 7 and funding terminated at the end of FY86.

FIGURE 1
SORGHUM/MILLET CRSP, SIX ECOGEOGRAPHIC ZONES WITH
PRIME, COLLABORATIVE AND SELECTED POTENTIAL SITES

PS = PRIME SITES
 CS = COLLABORATIVE SITES
 POTS = SELECTED POTENTIAL SITES



Caribbean; and South America. The Asian subcontinent is considered as a high priority potential zone, with India as the prime site. Other sites are designated as Collaborative Site and Potential Site host countries. The CRSP's Global Plan is to provide collaborative research and training collaboration within the six ecogeographic zones and between zones as feasible.

All host country sites have a country coordinator. The country coordinator for the prime sites will be called a prime site country coordinator and will have leadership responsibilities with the joint planning of research and workshops and other activities within the ecogeographic zones with U.S. principal investigators and host country scientists who have an interest in collaborative research in the zone. The U.S. University assigned as the Lead University for each zone will name a prime site country coordinator. The INTSORMIL Board of Director Members from prime site U.S. Lead Institutions will assist as possible with joint research planning and other activities in each ecogeographic zone.

A Prime Site Country Coordinators Council (PSCCC) consisting of the six prime site coordinators plus one at large member named by the ME will provide program policy and budget input to the ME and the Board of Directors. The Technical Committee (TC) will be responsible for technical research content, project proposals and technical evaluation. Funds are budgeted for an annual technical research workshop and joint planning session for each ecogeographic zone with the exception of the Asian subcontinent.

When a prime site program becomes established with India, a similar practice will be considered for the Asian subcontinent.

Each zone will have an advisory committee made up of donor representatives and organizations with related programs in the zone.

It is proposed that Prime Site countries have sorghum/millet research support of at least \$100,000 to \$300,000 or more annually with 40 to 50 percent of the funds coming from USAID Mission "buy-ins" or other sources. An exception is India where as a potential prime site the collaborative program would consist mainly of research support in India and scientist travel at about \$20,000 to \$30,000 a year. Collaborative Sites are proposed to be funded at the level from \$50,000 to \$80,000 with the same percentage "buy-in" level as prime sites. The budget figures given as guidelines will change as INTSORMIL's budget and programs change and to the extent external funding such as Mission "buy-ins" are available.

The ecogeographic zone and prime and collaborative site concept is not to be interpreted as one of regional programs as developed by the International Centers. U.S. University country-to-country contacts with National research programs and other research institutions will be maintained; that is, the INTSORMIL efforts abroad will not be funneled through the Prime Site host countries, but will be handled directly with coordination of research planning and other activities. Host country collaborative research will have as one of its objectives the building of national research programs.

Further, designation of Host countries as either Prime or Collaborative, can change by changes in emphasis, changes in political situations, and other developments. Any such changes in designation of Host countries will be made by the INTSORMIL Board of Directors with recommendations from the PSCCC, with input from the ME, Country Coordinators, and the respective U.S. Universities involved. The Board of Directors will designate prime site lead U.S. institutions.

C. DUTIES AND RESPONSIBILITIES OF COUNTRY COORDINATORS FOR BOTH PRIME AND COLLABORATIVE SITES.

1. Jointly develop with collaborating scientists from the host country and with other INTSORMIL institutions Annual Work Plans with Budgets for the Country for presentation to the PSCCC.
2. Along with the Annual Plan of Work, jointly develop annually, specific sorghum/millet research objectives for the Country.
3. Coordinate all activities, U.S. research, travel, etc. in that country.
4. Work directly with National scientists and administrators in all aspects of collaborative sorghum/millet research activities in that country.
5. Cooperate with other Country Coordinators (and the Prime Site Country Coordinator, if applicable) in the ecogeographic zone to develop zonal goals and plans, and to encourage zonal cooperation regarding

objectives, travel, student training, workshops, and germplasm exchanges.

6. The Country Coordinators, in consultation with others, have the responsibility for responding to host country constraints by jointly formulating research objectives with host country scientists for their respective countries.

Additional Duties of Prime Site Country Coordinators

1. The Prime Site-Country Coordinator will assume informal coordination responsibilities for the ecogeographic zone. This does not mean responsibility for funds for host country, programs other than for the Prime Site.
2. Responsibilities of the Prime Site Country Coordinator, the U.S. institution responsible and the INTSORMIL Board of Director member from the institution include:
 - a. Planning and coordination responsibilities for the zone.
 - b. Chair a "Zonal Research Coordinating Committee" - composed of Country Coordinators with interests in the zone and host country PIs as deemed necessary to represent research programs, disciplines, or institutions involved in the ecogeographic zone.
 - c. Provide leadership in planning an annual workshop and planning session to:
 - (1) Evaluate collaborative research in the zone.
 - (2) Determine research and training needs.

- (3) Determine some overall zonal goals and objectives.
- (4) Encourage zonal cooperation, where applicable among National Program Researchers and INTSORMIL Researchers.
- (5) Assist with planning zonal workshops, field tours, and other research networking activities.
- (6) Establish and work with an Advisory Committee of other donors and organizations with programs in the zone.

The Prime Site Coordinators should take advantage of INTSORMIL PI meetings for additional meetings of researchers who have an interest in research in each zone.

D. DESCRIPTION OF THE ECOGEOGRAPHIC ZONES

The INTSORMIL ecogeographic zones as shown in Table 1 and Figure 1 include West Africa, East Africa, Southern Africa, Central America, Mexico and the Caribbean, South America, and the Asian Subcontinent. They have been selected to represent the principal sorghum/millet growing areas in the free world, the selection being made partially on the basis (1) of environmental conditions which influence the hectarages, yields and production of sorghum/millet; and (2) partially on the basis of geography. Production figures for selected countries are shown in Appendix Table 2.

Sorghum/millet are primarily food crops in the LDC's very important ones because they are among the only crops that

will produce under extreme conditions of heat and drought stress and low soil fertility. Most of the sorghum/millet grain production in the world is concentrated in the six designated ecogeographic zones and the United States. The host country ecogeographic zones have, in general, adverse growing conditions due to limited precipitation accompanied by high temperatures, at least during portions of the growing seasons. Under such adverse conditions, sorghum and millet generally produce higher and more stable yields than any other cereal crop. Production failures or near-failures occur with less frequency than is the case with other cultivated cereals.

The general characteristics and environmental conditions for each of the 6 ecogeographic zones are briefly presented as follows:

1. West Africa

a. General Characteristics

(1) Need for increased production very great --
semi-arid to arid conditions.

(2) Poverty and food shortages.

b. Environmental Conditions

Soils -

Vary with toposequence - sandy or rocky and shallow at top, gradually becoming heavier and deeper at bottom of slope. Top is infertile and very droughty, while bottom is more fertile with much superior water holding capacity. Upper areas favor millet, while sorghum performs best on lower areas. Many of the soils are poor with low

fertility. The lower rainfall areas tend to be sandier. Fallow system practiced if possible.

Rainfall -

Monsoon type rainfall, all falling during summer. Amounts range from 300mm in north to over 1100mm in south. The rainfall period is short in the north and longer in the south.

Elevation -

Generally low elevation

2. East Africa

a. General Characteristics

- (1) Great variation among countries. Food shortages.
- (2) Soils, mechanization, and educational facility conditions are much different in Sudan from those of western and southern African nations.
- (3) Much of the Sudanese production is on large farms and mechanized. There is need for sorghum/millet improvement on both small and large farms.
- (4) The possibility of establishment of sorghum/millet collaborative research in Kenya is being established. This collaborative site is needed to round out research on sorghum/millet in East Africa.
- (5) Potential for increased production in the Sudan.

b. Environmental Conditions

Soils -

Sandy in areas of Western Sudan in the low rainfall areas with a range of approximately 300 to 450mm annually. Black clay plain covers a vast area of the Sudan running east and west in much of the 550 to 700mm rainfall belt. The sandy soils are quite infertile while the clay soils are quite high in fertility. A considerable portion of the clay plain has been "mechanized" into large farms, many of which plant continuous sorghum. This leads to severe weed, striga, and volunteer sorghum problems.

Rainfall -

The rainfall is a monsoon type rainfall similar to West Africa, but the humidity is lower' resulting in few grain mold problems. Rainfall amounts range from 350mm in the rainfed north to 800mm in the southern part of clay plain. The irrigated Gezira area receives about 200-250mm rainfall annually. Southern Sudan has traditional agriculture, with greatly varying elevation, soils, and rainfall.

Elevation -

Low elevation except moderate elevation in the far South and far West.

Kenya has variable elevation, soils, and rainfall, with two periods of rainfall, one in May-July, with a second in the fall season.

Somalia has variable elevation, but considerable area in lower elevations. The rainfall is low, but with two peaks.

3. Southern Africa

a. General Characteristics

- (1) In the southern hemisphere. Geographically removed from West and East Africa. Food shortages.
- (2) Presence of ICRISAT/INTSORMIL program will assume responsibility for degree training of SADCC sorghum/millet researchers.
- (3) Drought and wide variation in annual rainfall.
- (4) Poor agronomic practices.
- (5) Lack of producer incentives because of inadequate pricing policies.
- (6) Lack of trained personnel, even at the baccalaureate level in some SADCC nations.

b. Environmental Conditions.

Soils -

Variable, depending on rainfall zones.

Rainfall -

Monsoon rainfall pattern with low amounts in the western areas to higher rainfall in the more central and eastern areas.

Elevation -

Moderate elevation in much of the area.

4. Central America, Mexico and the Caribbean

a. General Characteristics

- (1) Increasing importance of sorghum relative to maize.
- (2) Importance of sorghum in diets.
- (3) Large importers of food and feed grains.

b. Environmental Conditions

Soils -

There are many steep, well drained, lateritic soils. The fertility is low if continuously cropped. The Coastal areas and river valleys have heavier, more fertile soils.

Rainfall -

High rainfall, with peaks in May-June and again in September-October.

Elevation -

Lowlands in coastal areas and river valleys. Steep, sloping land is somewhat higher, but rarely over 1000m.

The steep, sloping land is the areas where maicillo criollos are interplanted with maize, while the coastal areas often consist of larger, mechanized farms where photoperiod insensitive combine-height sorghum varieties and hybrids are used.

In Mexico there are variable conditions with major production areas in the Northeast which are much like South Texas, and the central highlands where high yields are achieved. There is a wide range in rainfall, soils, and elevation.

5. South America

a. General Characteristics

- (1) Sorghum is increasing in importance.
- (2) Important consumer of grain.
- (3) Trained host country scientists.

b. Environmental Conditions

Soils -

The soils are variable, but many are acid in nature with aluminum toxicity problems.

Rainfall -

The rainfall is generally quite high and contributes to sorghum disease problems.

Elevation -

Most of the area is moderately high, but there are some lowlands. Days are short, due to the closeness to the equator. Commercial type hybrids are used in much of the area.

The interior of Northeast Brazil has a distinctly different climate with low rainfall.

6. Asian Subcontinent

a. General Characteristics

- (1) Asia has the largest hectarage of both sorghum and millet of any of the ecogeographic zones. More sorghum and pearl millet consumed in Asia than the whole of Africa.
- (2) Largest consumer of grain sorghum. 74.2 percent of the grain sorghum used for food. Forty percent of World's pearl millet is grown in India and Pakistan.
- (3) Extensive semi-arid, subtropical regions.
- (4) Extensive food-deficit areas.
- (5) There are well-established research programs and trained researchers in India.

b. Environmental Conditions in India.

Soils -

The soils are variable, from mixed texture to clay.

Rainfall -

India has monsoon rainfall, ranging from low in western areas to quite high in Southern India.

Elevation -

The elevation is moderately low, with some areas moderately high.

E. THE CONSTRAINTS TO SORGHUM/MILLET IMPROVEMENT

A discussion of the sorghum/millet situation in each host country and potential countries by ecogeographic zones follows.

Constraints are given for most of the host countries, but not for the potential countries. The production constraints of Striga and Quela birds are very important in most all areas of Africa and Asia where sorghum and millet are grown.

1. West Africa

a. Niger

(1) General

Niger is an important sorghum and millet producing country in West Africa. Sorghum and millet are the staple food grains for the majority of the people. Pearl millet is more important in Niger as a food source than sorghum. Purdue University has a bilateral research contract with AID for improving the research capabilities of INRAN. The five in-country staff help to provide logistical support for INTSORMIL collaborators. In Niger there are at the present one Nigerian Sorghum breeder, three millet breeders and three economists with graduate degrees. Twelve Nigerian students are in process with degree programs under the Purdue contract. A candidate has been identified by Mississippi staff for plant pathology degree training and Texas will have a graduate student in Nigeria working with entomology research. The research program in Niger will be closely tied in with sorghum/millet research in Mali and Burkina Faso.

(2) The Constraints

- * Drought Tolerance
- * Cultural Practices:
 - Stand Establishment
 - Seedbed Preparation
 - Plant Population
 - Soil Fertility
- * Striga Tolerance
- * Grain Quality:
 - Food Quality
 - Grain Mold (Weathering)
 - Storage Pests
- * Quela Birds
- * Socio-economics
- * Marketing and Pricing Policy
- * Farming Systems
- * Insects - Head Bug (Rhaguva - Millet)
- * Diseases (Downey Mildew - Millet)

b. Mali

(1) General

Mali relies on sorghum and millet as major food grain crops. The USAID Mission shows an interest in sorghum/millet improvement. Malian, ICRISAT and U.S. scientists have been collaborating in agronomy and breeding research. ICRISAT has a team in Mali which has regional responsibilities in sorghum research. A joint MOU between INTSORMIL-TROPSOILS (Soils CRSP) and

IER (Institute of Rural Economy) and the Additional Provisions to the MOU are in place. The Malian administrators and scientists have a strong interest in collaborative research. Malian research scientists have been active in U.S. training programs. The former Director of Malian Agronomic research, Mr. Moussa Traore, will complete a Ph.D degree in Agronomy at the University of Nebraska in 1985 and will return to Mali. There are networking possibilities with other nations in the region.

(2) The Constraints

- * Stand Establishment.
- * Soil infertility - low availability of fertilizers.
- * Drought as it impacts on seedlings and plant growth.
- * Head bugs (involves the grain mold/grain quality complex).
- * Grain quality and storage quality.
- * Socio-economics
- * Diseases, Grain Mold, Long Smut and Sooty Stripe.
- * Striga
- * Price incentives at the farm level.

c. Burkina Faso

The Constraints

- * Inferior cultural practices and soils.
- * Unimproved varieties - breeding programs for improvement are of little value unless agronomic practices improved concomittantly.

- * Insect problems include head bugs.
- * Long and extremely dry seasons, with low and undependable rainfall during the growing season.
- * Shortfalls in pricing and marketing policies.
- * Farmers generally cannot afford to buy fertilizers and chemicals.

d. Cameroon (Potential Site)

Cameroon is shown as growing considerable millet (see Appendix Table 1) but no sorghum. This statistic is incorrect since it is known that the country grows and consumes considerable sorghum. Cameroon is selected as a potential host country because climatically it represents a wide variety of conditions ranging from the very arid conditions on the south bank of Lake Chad to the rain forest in the southwest. Millet is the principal cereal grown in the extreme north. Going southward it gradually gives way to sorghum which in turn gives way to maize. The Cameroon fairly well parallels climatic conditions in the countries from Nigeria westward to the Atlantic. AID and the GOC have a contract with IITA for cereal research on millet, sorghum, maize, and rice. The Mission and the GOC are very cooperative. They would welcome the opportunity to collaborate with U.S. scientists. SAFGRAD also has an ACPO (Accelerated Crop Production Officer) staff person stationed in Cameroon who also would be cooperative.

e. Senegal (Potential Site)

Pearl Millet is the major cereal grain produced in Senegal. (See Appendix Table 1). It is considered as a potential host country because it has a stable government, a well-developed infrastructure, and a fairly strong agricultural research organization. USAID/Senegal has a contract with Experience, Inc. to conduct a "Millet Transformation Project". There have been a number of visits by INTSORMIL Teams and individuals to Senegal. An MOU has not been developed. A telegram sent by AID/W on May 21, 1984 included the following statement: "ST/AGR and CRSP-S/M agree with Mission (Senegal) and GOS that future collaboration possibilities should be explored....someone familiar with CRSP-S/M activities....should visit GOS and Mission for future plans." Plans are underway for the INTSORMIL ME to follow through with the development of an MOU. Professor David Andrews was in Senegal in January, 1985, to begin the process of establishing institutional and USAID/Mission relationships.

2. East Africa

a. Sudan

(1) General

The USAID/Sudan Mission is most cooperative as are the Agricultural Research Corporation (ARC), the University of Khartoum, and the Western Sudan Agricultural Research Project (WSARP). INTSORMIL research in Sudan and its presence have established a

base of collaborative research. Several Sudanese scientists have been trained or are in training in the United States. Sorghum and millet are major food crops in Sudan and the dry climate, insects, disease and other problems direct themselves to collaborative research possibilities. The development of new varieties and the hybrid sorghum seed program show considerable promise. The Sudanese government, ARC, and the University of Khartoum are also emphasizing Stored Insect Problems and Sorghum/Millet Food Quality research. There are networking possibilities with the sorghum/millet researchers in other east African nations.

The MOU and Additional Provisions documents between INTSORMIL and Sudan are in place.

(2) The Constraints

- * Stand establishment
- * Drought
- * Striga
- * Diseases - Long smut, Covered kernel smut, Charcoal Rot.
- * Weedy type sorghums in the mechanized farming areas.
- * Weeds
- * Cultural practices in both mechanized and traditional farming areas.
- * Lack of crops for rotation and intercropping.
- * Lack of Socio-economic information.

- * Markets and Pricing Policy.
- * Farming Systems.
- * Food Quality

b. Kenya and Somalia (Potential)

Sorghum and millet production is important in both of these countries. (See Appendix Table 1).

This is an excellent area in which to conduct sorghum research because all of the major sorghum ecological zones found worldwide are present in Eastern Africa. Texas researchers have assessed in some detail the widely varied environmental conditions and problems existing with respect to conducting sorghum research in Kenya.

Another reason for considering Kenya and Somalia for collaborative research is that conditions are considerably different than those in the Prime Site of Sudan. Also, Kenya is strategic because there is some consideration being given to the potential establishment of an East Africa Research Center with ICRISAT, INTSORMIL and SAFGRAD and others being involved. The establishment of the Center would help to round out the regional research program being pursued by SAFGRAD and ICRISAT for sorghum and millet (as well as for maize and cowpeas by SAFGRAD) in the SAHEL.

3. Southern Africa

a. Botswana

(1) General

Sorghum and pearl millet are important food crops in Botswana. The Government of Botswana and the USAID Mission are cooperative. Also, the MIAC (Mid-American International Agricultural Consortium) has a farming systems project in Botswana. Kansas State University has the leadership with this project. INTSORMIL has two Ph.D agronomists and one Ph.D graduate student on-site in Botswana.

(2) The Constraints

- * Limited Moisture. Extreme variation in the amount and distribution of rainfall from year to year.
- * Difficulty in establishing stands due to sandy high bulk density soils.
- * Insects - Sugar Cane Aphid on sorghum.
- * Sorghum and Millet diseases.
- * Price Policies

b. SADCC Nations

The nine Southern Africa Development Coordinating Conference (SADCC) Nations include Tanzania, Zambia, Zimbabwe, Angola, Mozambique, Botswana, Malawi, Lesotho, and Swaziland. The program is headquartered out of the AID regional office in Harare, Zimbabwe. The AID Grant for research and training and the improvement of sorghum/millet production and

utilization in the southern African nations was awarded to ICRISAT. The Degree training for sorghum/millet scientists has been sub-granted to INTSORMIL. Because of a close working relationship with ICRISAT it is a possibility that INTSORMIL will be involved with collaborative research in other SADCC nations in addition to Botswana. INTSORMIL involvement in other SADCC nations where feasible with collaborative research beyond information exchange, germplasm exchange and student training is regarded as potential at this time.

4. Central America, Mexico and the Caribbean

a. Honduras

(1) General

Honduras was selected as a Prime Site since it is in the center of the Maicillo Criollos (tall, photoperiod sensitive sorghums) growing area in Central America, and the only country that currently is sufficiently safe or otherwise acceptable for U.S. AID-INTSORMIL activities and travel. Sorghum is an important food cereal grain in Honduras. The Maicillo Criollo is a unique sorghum to the Western Hemisphere. Because of their unique adaptation to interplanting with maize on the steeply sloping hillsides and under specific daylengths, breeding work on them must be done in their area of adaptation. The non-Maicillo Criollo growing area of Central America is more diverse and

widespread but sorghums adapted to these areas can easily be selected for in Honduras. They can supplement some of the food-type tortilla quality sorghums being developed and evaluated in Mexico by INIA, INTSORMIL, and ICRISAT/CIMMYT.

(2) The Constraints

- * Diseases - Downy Mildew, Acremonium Wilt, Grain Mold.
- * Insects - Midge, Grain Storage Insects, Fall Armyworm and borers
- * Cultural Practices - Maicillos Criollos always intercropped, Land steeply sloping, Soil Fertility - Slash and burn is now used to restore fertility.
- * Grain Quality - Good tortilla making properties and grain storage quality are required.

b. Mexico

(1) General

Mexico is a collaborative research site because of its long-standing cooperation with U.S. sorghum scientists especially at Texas A&M University, its well organized and well staffed national sorghum program (INIA), and the application of the food type sorghums being developed for use in tortillas in Central America, the Caribbean Area, and northern South America.

(2) The Constraints

- * Drought in low rainfall areas

- * Grain Quality - Tortilla quality requirements, Grain Mold in humid regions.
- * Diseases - Downy Mildew, Fusarium Head Blight, Rust Leaf, Grey Leaf Spot, Leaf Blight, Charcoal Rot.
- * Insects - Midge, Greenbug, Fall Armyworm.
- * Relatively low temperatures in the upland areas.

c. Dominican Republic

Sorghum is a relatively new crop in the country and is expected to take over the dry areas of the country where maize is now grown but produces low yields. It is anticipated that increased sorghum production will move into human food, animal and poultry uses. The USAID/DR mission and the Dominican government are strongly interested in collaboration. Research done in the Dominican Republic has net working possibilities into other Caribbean nations such as Haiti. A collaborative research MOU is in place.

d. El Salvador

Considering its size, El Salvador is a major sorghum producing country. Adding El Salvador to the list of host countries would bring a good balance of collaborative sites in the Central America, Mexico and the Caribbean ecogeographic zone. Researchers in El Salvador have indicated an interest in INTSORMIL activities and there have been exchanges of germ plasma and information. However, the political and military

situation in El Salvador is such at present that it would not be wise to attempt a collaborative program at this time. El Salvador has historically had the strongest national sorghum improvement program of the Central American countries.

5. South America

a. CIAT, Northern South America.

(1) General

Sorghum is the fastest growing cereal grain in South America. CIAT has provided a logical facility for developing INTSORMIL collaborative research programs in Northern South America. In addition to winter nursery facilities, CIAT also provides an excellent site for development of sorghum germplasm which is tolerant to acid, high aluminum toxic soils.

(2) The Constraints

- * Soil is acid, high aluminum toxicity.
- * Drought Tolerance
- * Diseases - Anthracnose, Grain Molds, Head Blights and Charcoal Rot.
- * Insects - Fall Armyworm, Stem Borers, Sorghum Midge and Aphids.
- * Weeds
- * Marketing and Pricing Policy.
- * Food-Feed Production Policy.

b. Brazil

(1) General

Brazil has a strong national sorghum research program, especially in pathology and entomology. There has been a long history of collaboration with Texas A&M, University of Nebraska, and Purdue University scientists. Acid soil and other research is collaborative with the INTSORMIL collaborative research at CIAT.

Northeast Brazil is distinctly different from other parts of Brazil. The soils are semi-arid and less developed.

(2) The Constraints

- * Drought.
- * Acid Soil Conditions.
- * Diseases - Anthracnose, Rust, Charcoal Rot and foliar diseases
- * Insects - Midge and Greenbug

c. Venezuela (Potential)

In 1982, Venezuela ranked second among the countries of South America in the hectareage of sorghum harvested (Appendix Table 1). It has a well established agricultural research organization. The mutuality of benefits from a collaborative program would be high.

d. Peru (Potential)

The situation in Peru is somewhat similar to that in Venezuela, except that the hectareage of sorghum,

although increasing, is presently at a considerably lower level, and the agricultural research organization is not as fully developed.

6. Asian Subcontinent

a. India (Potential)

The most serious shortfall with respect to "prime sites" presently is India. India grows more hectares of both sorghum and millet than any other country in the world, and in fact more than either all of Africa, or all of the western hemisphere countries combined. In production it is exceeded in sorghum by the U.S. but it is the leader for millet. India grows 34 percent of the world's hectarage of sorghum and 42 percent of the world's hectarage of millet.

India is advanced with respect to research organizations and facilities with a large contingent of excellent scientists. Also, the USAID Mission in India has expressed an interest in working with the INTSORMIL collaborative research program. India offers excellent possibilities for "mutuality" of benefits for the sorghum/millet scientists from that country and from the U.S. Universities involved. The research would have wide networking possibilities.

b. Pakistan or Yemen AR (Potential)

Should an agreement with India fail to materialize, the second prime site choice to represent the Asian Subcontinent would be Pakistan and the third

choice Yemen AR (even though geographically it lies outside of the Asian subcontinent). Both sorghum and millet are fairly important crops in these countries. Pakistan has a reasonably strong ongoing research organization, and both countries are receptive to collaboration with U.S. scientists.

III. THE SORGHUM/MILLET CRSP GLOBAL COLLABORATIVE RESEARCH PLAN

A. PROPOSED SORGHUM/MILLET CRSP CHANGES.

The Sorghum/Millet CRSP (INTSORMIL) is at a turning point. Years 1-6 are one chapter in the international sorghum/millet collaborative research program. Proposed authorization and funding beyond Year 6 -- Years 7-11 are a new chapter. The Sorghum/Millet CRSP Board of Directors have approved significant program changes. As shown in Table 2, the Sorghum/Millet CRSP has established goals which serve as guidelines to program and budget planning.

A basic change from the first 6 years of INTSORMIL development and research activities is the focus on the Global Plan for Collaborative Research. The Global Plan clearly emphasizes Host Country sites and the collaboration of Host Country scientists and U.S. scientists with research on identified host country constraints. Mutuality of benefits to host countries and the U.S. is an important aspect of the program.

During the first six years of the CRSP, the host country programs and U.S. Institutional involvement was organized to emphasize collaborative discipline research. The changes proposed have changed this emphasis to where discipline research inputs and U.S. Institutional involvement support collaborative research on targeted Sorghum/Millet constraints in targeted Host Countries.

TABLE 2.
RELATIVE INTSORMIL GOALS - AID GRANT^{1/}
(PERCENTAGES)

I. GEOGRAPHIC ^{2/}	INTSORMIL GOALS	YEAR 6	BOARD OF DIRECTORS ACTIONS FOR YEAR 7 PROGRAM
Africa	<u>65</u>	<u>54.8</u>	<u>62.8</u>
C.A., S.A., Mexico, Caribbean	<u>25</u>	<u>36.9</u>	<u>30.4</u>
Asian Sub Continent	<u>10</u>	<u>8.2</u>	<u>6.8</u>
 II. COMMODITY			
Sorghum	<u>70</u>	<u>88.7</u>	<u>77.8</u>
Millet	<u>30</u>	<u>11.3</u>	<u>21.4</u>
 III. DISCIPLINES			
Breeding	<u>28</u>	<u>36.3</u>	<u>33.3</u>
Cultural Practices	<u>18</u>	<u>13.2</u>	<u>10.1</u>
Entomology	<u>10</u>	<u>6.3</u>	<u>10.5</u>
Plant Pathology	<u>10</u>	<u>10.9</u>	<u>10.1</u>
Socio Economics	<u>12</u>	<u>10.1</u>	<u>12.8</u>
Quality and Utilization	<u>12</u>	<u>10.9</u>	<u>13.4</u>
Physiology	<u>10</u>	<u>12.5</u>	<u>9.7</u>
 IV. DOMESTIC - INTERNATIONAL			
All International	<u>65</u>	<u>63.2</u>	<u>73.3</u>
All Domestic	<u>35</u>	<u>36.8</u>	<u>26.7</u>
All Host Country Based	<u>50</u>	<u>22.1</u>	<u>37.6</u>
All Domestic Based ^{3/}	<u>50</u>	<u>77.9</u>	<u>67.4</u>

^{1/} This analysis does not include University funding.

^{2/} Geographic Percentage Distribution excludes domestic based research.

^{3/} Domestic Based can be broken down into Domestic and International benefits.

The emphasis on host country collaborative research for Year 7 to 11 is illustrated as follows:

<u>Level of CRSP Program Emphasis</u>	<u>Years 1 to 6</u>	<u>Year 7 to 11</u>
(1) (HIGH)	Discipline Input	Host Countries (Sorghum/Millet Constraints)
(2)	U.S. Institutions	U.S. Institutions
(3)	Host Countries (Sorghum/Millet Constraints)	Discipline Input

Some changes in INTSORMIL's structure are proposed. These are directed at overall program and program management improvement. The changes evolved from EEP and the AID/W Management review recommendations, TC and Board Discussions, a meeting with Prime Site Country Coordinators on December 19, 1984, and discussions with individual INTSORMIL researchers, AID/W staff, USAID Mission staff, ME input and others and actions taken by the Sorghum/Millet CRSP Board of Directors.

The changes proposed from the first six years are based on the following objectives:

1. To increase Host Country emphasis following the Sorghum/Millet CRSP Global Plan of Research strategy.
2. To concentrate program resources with emphasis on priority ecogeographic areas and sorghum/millet production and utilization constraints as related to the Global Plan of Research as related.
3. To increase millet research relative to sorghum.
4. To strive for reallocation between disciplines in relation to constraint needs.

5. To emphasize programs in Africa with secondary emphasis to the Caribbean, Mexico, Central America, and South America and the Asian sub-continent.
6. To recommend a budget that will provide the best possible program of collaborative sorghum/millet improvement and utilization research with funding adequate for ecogeographic zone research planning and coordination, EEP reviews, ME program management, workshops and networking activities, publications, institution building and human resource development.

The specific changes proposed for implementing the Sorghum/Millet CRSP Global plan of research are:

*** Institutions^{1/}

- Discontinue the University of Arizona and Florida A&M University as part of the program.
- Florida A&M has been inactive since 1981-82. They were given the opportunity to submit Year 7-8-9 Research Plans and Budgets but did not submit a research plan.
- The program at Arizona has contributed with sorghum breeding and physiology research. It has tested germplasm under a gradient system for other researchers. The lead PI is leaving the program for three years. The gradient testing is duplicated at Texas and Nebraska. Arizona researchers have not

^{1/} Proposed changes in institutions and operating structure will require a recommendation to AID/W and BIFAD.

established an acceptable level of host country collaboration.

*** CRSP Internal Structure^{2/}

1. Merge the Administrative Council's responsibilities with those of the Board of Directors. Discontinue the Administrative Council. By having all participating institutions represented on the Board of Directors, the Administrative Council does not serve a purpose which merits a separate policy committee.
2. Reorganize the Technical Committee and establish a Prime Site Country Coordinator's Council.
 - Establish the TC as one which will concentrate its efforts on technical research and training matters such as technical reviews, technical reports and publications, review of research proposals and recommendations regarding the technical merit of project research.
 - Establish a Prime Site Country Coordinator's Council (PSCCC). This Council is to be made up of the Prime Site Country Coordinators plus one at large member to be appointed by the ME. The Prime Site Country Coordinators Council will have responsibility for overall program planning, policy and budget recommendations to the ME and Board of Directors as

^{2/} Ibid

they relate to the Global Plan of Research and training needs. The focus of the PSCCC would be with the six targeted ecogeographic zones and the constraints to sorghum/millet production and utilization in the zones. It is anticipated that each ecogeographic zone will have an advisory council of representatives from other organizations such as FAO, IFDC, IARCs, donor nations and others such as SAFGRAD, SADCC, CATIE as appropriate.

*** Changes in Research Projects from Year 6.

	<u>Available (Total)</u>	<u>Year 7 Available</u> ^{1/}
Arizona	AZ-1 Discontinue \$37,500 (Sorghum Breeding)	\$ 37,500
	AZ-1 Discontinue \$37,500 (Physiology)	
Kentucky	No Change	No Change
Kansas	KS-2 Discontinue \$48,000 (Physiology)	30,000
Mississippi	MS-6 Discontinue \$35,000 (Pathology)	35,000
Nebraska	NE-8 Discontinue \$25,000 (Cultural Practices)	10,000
	NE-15 Discontinue \$50,000 Ross 1/2 (Sorghum Breeding)	32,000
	NE-16 Reduce \$35,000 (Physiology)	35,000
	NE-10 Discontinue \$40,000 (Pathology)	20,000
	NE-21 Reduce \$10,000 ^{2/} (Cultural Practices)	10,000
Purdue	PR-4 Discontinue \$30,000 (Food Quality/Utilization)	30,000
	PR-6 Discontinue \$50,000 (Pathology)	25,000
Texas	TX-21 Discontinue Jordan \$20,000 (Pathology)	20,000
	TX-23 Discontinue Peterson \$30,000 (Sorghum Breeding)	30,000
	TX-27 Discontinue \$35,000 (Pathology)	35,000
	TX-24 Reduce \$20,000 (Pathology)	20,000
	Totals	\$ 369,500
	\$ 503,000	\$ 503,000

^{1/} Estimates of budget available for redistribution in Year 7 above the \$135,000 needed to complete graduate student programs as per Board of Directors approved policy.

^{2/} Philippines budget \$15,000 Year 7. Discontinue INTSORMIL funding Year 8.

*** Reallocation

The Reallocation of Estimated Available Funds Approved by the Sorghum/Millet CRSP Board of Directors for Year 7 is as follows:

<u>Continuing and New Projects</u>	<u>Amount</u>	<u>Host Country Collaborative Sites</u>
NE-___ Walker (Food Quality and Utilization-Millet)	\$50,000	New Project - Senegal
KS-___ Claflin (Pearl Millet) (Pathology)	40,000	New Project - Niger Sudan
KS-___ Mills (Storage-Insects) (1/2 Millet, 1/2 Sorghum)	40,000	New Project - Sudan
KS-6 Vanderlip (Cultural Practices-Millet)	20,000	Botswana - Sudan
NE-13 Clegg/Mason (Cultural Practices-Sorghum)	20,000	Botswana - Sudan
NE-___ Andrews (Prime Site Coordinator) (Millet)	20,000	India
PR-9 Post staff Agronomist (Cultural Practices-Millet)	80,000	Niger
_____ Request new pathology project for collaboration in Southern Africa, 1/2 Sorghum, 1/2 Millet Diseases	40,000	Botswana
	<u>\$ 369,500</u>	

Annual Ecogeographic Zone Workshops and Collaborative Research Planning Sessions

Sudan - E. Africa	\$ 15,166
Niger - W. Africa	15,167
Botswana - S. Africa	15,167
CIAT/S.A. - S. America	7,000
Honduras - Central America, Mexico and Caribbean	7,000
	<u>7,000</u>

\$ 59,500

The changes proposed for Year 7 are consistent with the direction established by the Global Plan of Research. The emphasis on Global Plan implementation is continued with proposed budget projections beyond Year 7, for Years 8-9-10 and 11.

B. COLLABORATIVE RESEARCH PROJECTS BY ECOGEOGRAPHIC ZONES.

Under the thrust of the new Global Plan all projects under the CRSP will address production/utilization constraints at one or more of the ecogeographic zones. Principle collaborative research activities will be conducted at each of the prime site countries and extended networking research in selected collaborating countries. Concentration of collaborative research at prime sites encourages multidisciplinary, interinstitutional research planning and implementation which addresses the priority constraints in each ecogeographic zone. Though the principle thrust of the CRSP is for research, the model also encourages joint planning, joint implementation and host country institutional development in the sorghum and millet research disciplines. The CRSP has recognized that one of the major non-production constraints to improved production/utilization of sorghum and millet has been a severe trained manpower shortage. The CRSP has invested time and resources in overcoming this constraint. The ultimate goal of the Global Plan is to have in place National research programs and available trained manpower which can address the major problems affecting sorghum and millet production and to have in place collaborating interdisciplinary teams of LDC research scientists working together.

The ecogeographic zone/prime site programs are listed on pages 52 to 57.

The U.S. on campus research which deals with research relevant to the U.S. and LDCs is listed on page 58. Much of this activity involves the LDC graduate students being trained in the U.S. In some areas, facilities and manpower are not available in the LDC situation and thus must be covered at a U.S. site.

A complete list of project numbers and titles proposed by the CRSP for Years 7, 8, 9, 10 and 11 are shown in Appendix Table 2.

ECOGEOGRAPHIC ZONE: WEST AFRICA

PRIME SITE: NIGER

INSTITUTION: PURDUE
 COORDINATOR: JOHN AXTELL
 INST. REPRESENTATIVE: WOODS THOMAS

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 27.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)						
					YEAR 7		YEAR 8		YEAR 9		
			U.S.	HOST COUNTRY	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	
1. Niger	Breeding - Sorghum	NE-15	D. Andrews	B. Quendeba	16,100	4,508	11,500	3,220	11,500	3,220	
		PRF-7	G. Ejeta	M. Adamou	10,000	2,800	10,000	2,800	10,000	2,800	
		TAM-22	D. Rosenow	B. Quendeba	16,275	4,557	16,275	4,557	16,275	4,557	
		- Millet	NE-	D. Andrews	B. Quendeba	12,600	3,528	12,600	3,528	12,600	3,528
		Physiology - Sorghum	TAM-23	A. Onken	M. Saley	38,500	10,780	38,500	10,780	38,500	10,780
		Pathology - Millet	KS-	L. Claflin	Mr. Gika	10,000	2,800	10,000	2,800	10,000	2,800
		Socio-Economics - Sorghum	KY-1	M. Coughenour		6,200	1,736	7,000	1,960	7,500	2,100
			PRF-5	J. Sanders		12,838	3,594	15,800	4,424	18,763	5,254
			KY-1	M. Coughenour		6,200	1,736	7,000	1,960	7,500	2,100
		Cultural Practices - Sorghum - Millet	PRF-9	J. Axtell	M. Saley, J. Clark	77,500	---	77,500	---	77,500	---
	PRF-9		J. Axtell		77,500	---	77,500	---	77,500	---	
	Utilization - Sorghum	PRF-3A	J. Axtell	M. Adamou	27,300	7,644	27,300	7,644	29,400	8,232	
		PRF-3B	A. Kirleis	M. Adamou	10,000	2,800	10,000	2,800	10,000	2,800	
		PRF-4B	L. Butler	M. Oumarou	13,200	3,696	13,200	3,696	13,200	3,696	
		TAM-26	L. Rooney	M. Oumarou	18,800	5,264	18,800	5,264	18,800	5,264	
2. Mali	Physiology - Sorghum - Millet	Country	A. Onken	I.M. Konate	12,500	---	12,500	---	12,500	---	
		Country	A. Onken	I.M. Konate	12,500	---	12,500	---	12,500	---	
	Cultural Practices - Sorghum - Millet	Country	A. Onken	I.M. Konate	12,500	---	12,500	---	12,500	---	
		Country	A. Onken	I.M. Konate	12,500	---	12,500	---	12,500	---	
3. Senegal	Breeding - Millet	NE-	D. Andrews	A. Fofana	12,600	3,528	12,600	3,528	12,600	3,528	
	Food Quality/Utilization - Millet	NE-	C. Walker		25,000	7,000	25,000	7,000	25,000	7,000	
4. Burkina Faso	Socio-Economics - Sorghum	PRF-5	J. Sanders		12,500	3,500	12,500	3,500	12,500	3,500	
					\$ 453,113	69,471	453,075	69,461	459,138	71,159	

ECOGEOGRAPHIC ZONE: EAST AFRICA

PRIME SITE: SUDAN

INSTITUTION: PURDUE
 COORDINATOR: ALLEN KIRLEIS
 INST. REPRESENTATIVE: WOODS THOMAS

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 31.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)						
			U.S.	HOST COUNTRY	YEAR 7		YEAR 8		YEAR 9		
					AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	
1. Sudan	Breeding - Sorghum	TAM-22	D. Rosenow	A. Latif Nour	16,275	4,557	16,275	4,557	16,275	4,557	
		PRF-7	G. Ejeta	A. Latif Nour	57,330	16,052	84,721	23,722	90,454	25,327	
		Country	A. Kirleis	A. Latif Nour	21,250	---	21,250	---	21,250	---	
		NE- Country	W. Stegmaier	E. H. Abu ElGassim	21,350	5,978	21,350	5,978	21,350	5,978	
	- Millet	KSU-1	D. Andrews	E. H. Abu ElGassim	12,600	3,528	12,600	3,528	12,600	3,528	
		Country	A. Kirleis	E. H. Abu ElGassim	8,500	---	8,500	---	8,500	---	
		Physiology - Sorghum	KS-2	E. Kanemasu		5,940	1,663	Terminated		Terminated	
		NE-16	J. Eastin	Saeed Farah	65,600	18,368	65,600	18,368	65,600	18,368	
	- Millet	Country	A. Kirleis	Saeed Farah	8,500	---	8,500	---	8,500	---	
		Country	A. Kirleis	Saeed Farah	8,500	---	8,500	---	8,500	---	
		Pathology - Sorghum	TAM-24	R. Frederiksen	Hilu Omer	11,600	3,248	11,600	3,248	13,200	3,696
		PRF-6	H. Warren	Hilu Omer	13,875	3,885	Terminated		Terminated		
	- Millet	Country	A. Kirleis	Hilu Omer	8,500	---	8,500	---	8,500	---	
		KS-	L. Claflin	Hilu Omer	10,000	2,800	10,000	2,800	10,000	2,800	
		TAM-24	R. Frederiksen	Hilu Omer	14,500	4,060	14,500	4,060	16,500	4,060	
		Entomology - Sorghum	TAM-25	G. Teetes	M.H. Shazali	14,500	4,060	14,500	4,060	14,500	4,060
	- Millet	Country	A. Kirleis	M.H. Shazali	12,750	---	12,750	---	12,750	---	
		KS-	R. Mills	M.H. Shazali	20,000	5,600	20,000	5,600	20,000	5,600	
		KS-	R. Mills	M.H. Shazali	10,000	2,800	10,000	2,800	10,000	2,800	
		Socio-Economics - Sorghum	KY-1	M. Coughenour		15,500	3,220	17,500	4,900	18,750	5,250
	- Millet	KY-2			13,160	---	16,800	---	16,800	---	
		PRF-5	J. Sanders		12,838	3,595	15,800	4,424	18,763	5,254	
		KY-1	M. Coughenour		12,400	3,472	14,000	3,920	15,000	4,200	
		KY-2			18,800	---	24,000	---	24,000	---	
Cultural Practices - Sorghum	Country	A. Kirleis	M.S. Mohamed	8,500	---	8,500	---	8,500	---		
	- Millet	KS-1-1	T. Berhe	110,000	---	110,000	---	110,000	---		
	KS-6	R. Vanderlip	M.S. Mohamed	31,280	8,758	31,280	8,758	31,280	8,758		
Food Quality/Utilization	- Sorghum	PRF-3A	J. Axtell	Sitt Badi	27,300	7,644	27,300	7,644	29,400	8,232	
		PRF-3B	A. Kirleis	Sitt Badi	36,000	10,080	36,000	10,080	36,000	10,080	
	Country	A. Kirleis	Sitt Badi	8,500	---	8,500	---	8,500	---		
	- Millet	TAM-26	L. Rooney	O. Ibrahim	18,800	5,264	18,800	5,264	18,800	5,264	
2. Kenya		TAM-32	J. Mann	B. Kanyenji	80,000	---	80,000	---	80,000	---	
					\$ 734,648	118,032	757,626	123,711	774,272	127,812	

ECOGEOGRAPHIC ZONE: SOUTHERN AFRICA

PRIME SITE: BOTSWANA

INSTITUTION: KANSAS STATE
 COORDINATOR: L. V. WITHEE
 INST. REPRESENTATIVE: KURT FELTNER

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 34.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)						
			U.S.	HOST COUNTRY	YEAR 7		YEAR 8		YEAR 9		
					AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	
1. Botswana	Breeding - Sorghum - Millet	NE-15	D. Andrews	L. Mazhani	16,100	4,508	11,500	3,220	11,500	3,220	
		NE-	D. Andrews	L. Mazhani	12,600	3,528	12,600	3,528	12,600	3,528	
		KS-1	W. Stegmeier	L. Mazhani	10,500	2,940	10,500	2,940	10,500	2,940	
	Physiology - Sorghum - Millet	KS-2	E. Kanemasu	C.S. Manthe	2,880	806	Terminated		Terminated		
		KS-2	E. Kanemasu	C.S. Manthe	5,940	1,663	Terminated		Terminated		
	Pathology - Sorghum - Millet	TAM-	A. Onken	B. Motalaote	20,000	5,600	25,000	7,000	25,000	7,000	
		TAM-	A. Onken	B. Motalaote	10,000	2,800	12,500	3,500	12,500	3,500	
	Entomology - Sorghum	TAM-25	G. Teetes		14,500	4,060	14,500	4,060	14,500	4,060	
	Socio-Economics	-- Being studied under USAID/Botswana Country ATIP Project.									
	Cultural Practices - Sorghum - Millet	KS-7	V. Withee	D. Solomon	62,500	---	62,500	---	62,500	---	
		NE-13	M. Clegg	D. Solomon	42,500	11,900	42,500	11,900	42,500	11,900	
		KS-6	R. Vanderlip	D. Solomon	7,480	2,094	7,480	2,094	7,480	2,094	
		KS-7	V. Withee	D. Solomon	62,500	---	62,500	---	62,500	---	
					\$ 267,500	39,899	261,580	38,242	261,580	38,242	

ECOGEOGRAPHIC ZONE: CENTRAL AMERICA, MEXICO AND
THE CARIBBEAN

PRIME SITE: HONDURAS

INSTITUTION: TEXAS A&M
COORDINATOR: DARRELL ROSENOW
INST. REPRESENTATIVE: DUDLEY SMITH

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 35.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)					
					YEAR 7		YEAR 8		YEAR 9	
					AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL
1. Honduras	Breeding - Sorghum	TAM-31	D. Meckenstock	R. Nolasco	67,500	---	60,000	---	50,000	---
		TAM-22	D. Rosenow	R. Nolasco	8,137	2,278	8,137	2,278	8,137	2,278
		TAM-21	F. Miller	R. Nolasco	15,400	4,312	19,800	5,544	19,800	5,544
	Pathology - Sorghum	TAM-24	R. Frederiksen		13,050	3,654	14,850	4,158	14,850	4,158
		TAM-31	D. Meckenstock		27,000	---	24,000	---	20,000	---
	Entomology - Sorghum	MS-5	H. Pitre	Mr. Castro	18,000	5,040	18,000	5,040	18,000	5,040
		TAM-25	G. Teetes	Mr. Castro	7,250	2,030	7,250	2,030	7,250	2,030
		TAM-31	D. Meckenstock	Mr. Castro	20,250	---	18,000	---	15,000	---
	Socio-Economics - Sorghum - Millet	KY-1	M. Coughenour	Mr. Cruz	24,800	6,944	28,000	7,840	30,000	8,400
		KY-2	B. DeWalt	Mr. Cruz	31,020	---	39,600	---	42,900	---
		KY-1	M. Coughenour	Mr. Cruz	12,400	3,472	14,000	3,920	14,000	3,920
	Food Quality/Utilization - Sorghum	TAM-26	L. Rooney		14,100	3,948	14,100	3,948	14,100	3,948
TAM-31		D. Meckenstock		20,250	---	20,250	---	15,000	---	
2. Dominican Republic	Cultural Practices - Sorghum	NE-8	R. Neild	R.P. Duverge	14,640	4,099	Terminated	---	Terminated	---
		NE-22	J. Logan	R.P. Duverge	49,000	---	24,500	---	Terminated	---
3. Mexico	Breeding - Sorghum	TAM-21	F. Miller	A. Betancourt	15,400	4,312	19,800	5,544	19,800	5,544
		TAM-22	D. Rosenow	A. Betancourt	8,138	2,279	8,138	2,279	8,138	2,279
	Pathology - Sorghum	TAM-24	R. Frederiksen	N.O. Fernandes	13,050	3,654	14,850	4,158	14,850	4,158
	Entomology - Sorghum	TAM-25	G. Teetes	R. Bujanos	7,250	2,030	7,250	2,030	7,250	2,030
	Socio-Economics - Sorghum	KY-1	M. Coughenour	Mr. Escudero	12,400	3,472	14,000	3,920	15,000	4,200
		KY-2	B. DeWalt	Mr. Perez	31,020	---	39,600	---	42,900	---
	Food Quality/Utilization - Sorghum	TAM-26	L. Rooney	O. Paredes-Lopez	14,100	3,948	14,100	3,948	14,100	3,948
					\$ 444,155	55,472	428,225	56,637	391,075	57,477

ECOGEOGRAPHIC ZONE: SOUTH AMERICA

PRIME SITE: CIAT

INSTITUTION: MISSISSIPPI STATE
 COORDINATOR: LYNN GOURLEY
 INST. REPRESENTATIVE: DEAN BUNCH

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 38.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)					
			U.S.	HOST COUNTRY	YEAR 7		YEAR 8		YEAR 9	
					AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL
1. Colombia/ CIAT	Breeding - Sorghum	MS-4	L. Gourley	F. Ariboleda	54,400	15,232	54,400	15,232	54,400	15,232
		MS-11	L. Gourley	F. Ariboleda	120,000	---	140,000	---	140,000	---
		PRF-3A	J. Axtell	F. Ariboleda	6,000	1,680	6,000	1,680	6,000	1,680
	Physiology - Sorghum	NE-14	R. Clark	E. Owen	38,700	10,836	38,700	10,836	38,700	10,836
	Pathology - Sorghum	TAM-24	R. Frederiksen	E. Owen	20,000	5,600	20,000	5,600	23,600	5,600
	Entomology - Sorghum	MS-5	H. Pitre	E. Owen	11,565	3,238	11,565	3,238	12,850	3,598
	Socio-Economics - Sorghum	KY-1	M. Coughenour		12,400	3,472	14,000	3,920	15,000	4,200
	2. Brazil	Pathology - Sorghum	Country	R. Frederiksen	N.G. Fernandes	15,000	---	15,000	---	15,000
TAM-24			R. Frederiksen	N.G. Fernandes	4,100	1,148	6,100	1,708	6,100	1,708
	Breeding - Sorghum	MS-4	L. Gourley	R. Borgonovi	5,000	1,400	5,000	1,400	5,000	1,400
3. Peru	Breeding - Sorghum	MS-4)	L. Gourley	TROP SOILS/CRSP	5,000	1,400	5,000	1,400	5,000	1,400
		MS-11)								
					\$ 292,165	44,006	315,765	45,014	321,650	45,654

ECOGEOGRAPHIC ZONE: ASIAN SUBCONTINENT

PRIME SITE: INDIA

INSTITUTION: NEBRASKA
 COORDINATOR: DAVID ANDREWS
 INST. REPRESENTATIVE: R. W. KLEIS

HOST COUNTRY SITES	DISCIPLINES TO ADDRESS CONSTRAINTS IDENTIFIED ON PAGE 40.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS		BUDGET (\$000)					
			U.S.	HOST COUNTRY	YEAR 7		YEAR 8		YEAR 9	
					AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL
1. India	Breeding - Millet	NE- Country	D. Andrews D. Andrews	To be determined.	12,600 20,000	3,528 ---	12,600 20,000	3,528 ---	12,600 20,000	3,528 ---
2. Philippines	Breeding - Sorghum	NE-15	D. Andrews	S. Dalmacio	16,100	4,508	11,500	3,220	11,500	3,220
	Physiology - Sorghum	NE-14	J. Maranville	S. Yoshida	32,400	9,072	32,400	9,072	32,400	9,072
	Socio-Economics - Sorghum	NE-17	D. Anderson	L. Oliva	37,000	10,360	13,000	3,640	Terminate	
	Cultural Practices - Sorghum	NE-13	M. Clegg	A. Soriano	8,500	2,380	8,500	2,380	8,500	2,380
	Cultural Practices - Sorghum	NE-21 (Country)	D. Anderson	W. Herrea	15,000	---	15,000	---	Terminate	---
					\$ 141,600	29,848	113,000	21,840	85,000	18,200

ECOLOGICAL ZONE: U.S.

INSTITUTION: U.S. PARTICIPATING
 COORDINATOR: DR. GLEN VOLLMAR
 INST. REPRESENTATIVE: DR. R. W. KLEIS

PARTICIPATING INSTITUTION	DISCIPLINES TO ADDRESS IDENTIFIED LDC CONSTRAINTS AND U.S. CONSTRAINTS.	RESEARCH PROJECTS	PRINCIPAL INVESTIGATORS	BUDGET (\$000)						
				YEAR 7		YEAR 8		YEAR 9		
				AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	AID GRANT	NON FEDERAL	
Mississippi	Breeding - Sorghum	MS-4	L. Gourley	30,600	8,568	30,600	8,568	30,600	8,568	
Nebraska		NE-15	D. Andrews	21,700	6,076	15,500	4,340	15,500	4,340	
Purdue		PRF-7	G. Ejeta	32,670	9,148	39,930	11,180	39,930	11,180	
Texas		TAM-21	F. Miller	39,200	10,976	44,800	12,544	50,400	14,112	
Texas		TAM-22	D. Rosenow	39,900	11,172	39,000	10,920	39,000	10,920	
Kansas	- Millet	KS-1	W. Stegmeier	38,150	10,682	38,150	10,682	38,150	10,682	
Nebraska		NE-	D. Andrews	39,600	11,088	39,600	11,088	39,600	11,088	
Arizona	Physiology - Sorghum	AZ-1	A. Dobrenz	18,750	5,250	Terminated		Terminated		
Kansas		KS-2	E. Kanemasu	1,620	454	Terminated		Terminated		
Nebraska		NE-14	J. Maranville/R. Clark	15,300	4,284	15,300	4,284	15,300	4,284	
Nebraska		NE-16	J. Eastin/C. Sullivan	31,400	8,792	31,400	8,792	31,400	8,792	
Texas		TAM-23	A. Onken	16,500	4,620	16,500	4,620	16,500	4,620	
Nebraska	Pathology - Sorghum	NE-10	S. Jensen	880	246	Terminated		Terminated		
Purdue		PRF-6	H. Warren	11,125	3,115	Terminated		Terminated		
Texas		TAM-24	R. Frederiksen	66,700	18,676	66,700	18,676	66,700	18,676	
Texas		TAM-	To be determined.	8,000	2,240	8,500	2,380	6,000	1,680	
Texas		- Millet	TAM-	To be determined.	8,000	2,240	8,500	2,380	6,000	1,680
Mississippi	Entomology - Sorghum	MS-5	H. Pitre	15,435	4,322	15,435	4,322	17,150	4,802	
Texas		TAM-25	G. Teetes	72,500	20,300	72,500	20,300	72,500	20,300	
Kansas		- Millet	KS-	R. Mills (New)	10,000	2,800	10,000	2,800	10,000	2,800
			TAM-25	G. Teetes	14,500	4,060	14,500	4,060	14,500	4,060
Kentucky	Socio-Economics - Sorghum	KY-1	M. Coughenour	46,500	13,020	52,500	14,700	56,250	15,750	
Purdue		PRF-5	J. Sanders	39,325	11,011	48,400	13,552	57,475	16,093	
Nebraska	Cultural Practices - Sorghum	NE-8	R. Neild	360	100	Terminated		Terminated		
Nebraska		NE-13	M. Clegg	27,200	7,616	27,200	7,616	27,200	7,616	
Nebraska		NE-22	R. Neild	1,000	280	500	140	Terminated		
Purdue		Striga	T. Housley	15,000	4,200	Terminated		Terminated		
Kansas		- Millet	KS-6	R. Vanderlip	29,240	8,187	29,240	8,187	29,240	8,187
Purdue	Food Quality/ Utilization - Sorghum	PRF-3A	J. Axtell	75,400	21,112	69,600	19,488	81,200	22,736	
Purdue		PRF-3B	A. Kirleis	54,000	15,120	54,000	15,120	60,000	16,800	
Purdue		PRF-4B	L. Butler	46,800	13,104	46,800	13,104	46,800	13,104	
Texas		TAM-26	L. Rooney	28,200	7,896	28,200	7,896	28,200	7,896	
Nebraska		- Millet	NE-	C. Walker	25,000	7,000	25,000	7,000	25,000	7,000
				\$ 920,555	257,755	888,355	248,739	920,595	257,766	

C. NETWORKING AND WORKSHOPS

The Sorghum/Millet CRSP Global Plan for Collaborative Research includes workshops and other networking activities such as research newsletters, publications, the exchange of scientists, and the exchange of germplasm.

In Year 7 \$15,000 is budgeted to support a collaborative workshop on Sorghum Seed Improvement in Latin America. The workshop will be a cooperative project of CIMMYT, CIAT, ICRISAT and INTSORMIL. Seventy-five to eighty researchers will participate from the Central America, Mexico and Caribbean and the South America ecogeographic zones.

The CRSP Global Plan includes budget for an annual workshop and research planning session to be held in each ecogeographic zone. The program in The planning sessions will involve host country researchers and administrators, U.S. researchers and possibly members of each ecogeographic zone's research advisory committee.

The Global Plan's structure of prime and collaborative sites is designed for research coordination and networking within the ecogeographic zones and as relevant between zones. The establishment of a Prime Site Country Coordinators Council will permit communication and coordination between ecogeographic zone research activity and research planning.

D. INSTITUTION BUILDING AND TRAINING

The Sorghum/Millet CRSP Global Plan for Collaborative Research is structured to work directly with National Research Programs and Research Institutions within the six ecogeographic

zones. Collaborative research; pass through funds, networking activities and the training of students contribute to the strengthening of host country research institutions.

During the first five years of the CRSP, 199 students funded with INTSORMIL sorghum/millet research funds completed graduate degrees. Of these, 96 were from host countries. Fifty-six of the 199 were women. It is projected that for Years 7, 8, and 9, 150 students will be supported all or in part with INTSORMIL funds for sorghum/millet research and will be granted graduate degrees. It is estimated that an increased proportion, approximately 90 of the 150, will be host country students.

INTSORMIL is cooperating with ICRISAT with the degree training of students from nine SADCC Southern Africa nations. Current plans are to train at least 15 students during Years 7, 8, and 9 with graduate degrees. It is quite likely that the SADCC grant to INTSORMIL will be increased whereby more than 15 students can be trained with SADCC funds. The INTSORMIL Associate Program Director, Dr. John Yohe, serves as training coordinator of this training activity which is coordinated with SADCC, USAID/Zimbabwe, AID/W, ICRISAT, and U.S. degree granting institutions.

E. STRIGA AND BIRDS

Two important constraints in areas where sorghum and millets are important food crops are the parasitic weed, Striga, and Quela Birds who feed on the grain. The Sorghum/Millet CRSP recognizes the importance of research on these constraints,

particularly in Africa, but budget limitations do not permit the kind of ambitious research programs that are needed.

With limited budgets, researchers in the Sudan and Purdue have carried on Striga research as laboratory research and the field testing of sorghum and millet for Striga resistance. Kansas State has collaborative research in the El Obeid area of Sudan with the field testing of sorghum and pearl millet for Striga resistance. INTSORMIL sponsored a Striga workshop in 1983 for host country scientists and is now supporting a Sudanese Ph.D. Student on a Striga research-study program at North Carolina State University. In the absence of additional funding, INTSORMIL sees its role as one of cooperation and encouraging donors and Striga research efforts whenever possible.

The Sorghum/Millet CRSP does not have a research plan directed solely at the Quela bird problem. However; Sorghum/Millet CRSP research has important implications. For example, biochemistry food quality research has separated the chemicals that cause sorghum tannins to inhibit the human assimilation of protein and those that provide bird resistance. The research discovery that they are two different chemicals is significant. This means that the bird resistance characteristics can be increased while the protein assimilation inhibitors can be decreased in the same sorghum plant. This research will be continued.

F. BUDGET SUMMARY

TABLE 1.

AID-GRANT CONTRIBUTION TO SORGHUM/MILLET CRSP ESTIMATED BUDGET FOR YEAR 6 (FY 85) and PROJECTED YEAR 7 (FY 86), YEAR 8 (FY 87), YEAR 9 (FY 88), YEAR 10 (FY 89), AND YEAR 11 (FY 90) FOR ALL COLLABORATIVE RESEARCH AND MANAGEMENT ENTITY.

<u>Budget Line Item</u>	<i>July to 30 - 2857/85</i> FY 85	<i>July to 30 - 2857/86</i> FY 86	<i>July to 30 - 2857/87</i> FY 87	FY 88	FY 89	FY 90
	Year 6 Estimated	Year 7 Projected	Year 8 Projected	Year 9 Projected	Year 10 Projected	Year 11 Projected
Salaries & Benefits	\$1,079,218	\$1,152,513	\$1,121,352	\$1,127,404	\$1,237,786	\$1,261,449
Equipment & Facilities	136,291	143,770	140,836	141,965	155,669	157,914
Travel	241,546	280,670	275,124	276,973	303,316	310,492
Other Direct Costs	279,766	337,053	287,431	286,669	316,739	323,379
Technical Assistance	40,000	30,000	40,000	40,000	40,000	40,000
LDC	1,036,808	963,066	1,000,268	1,001,298	1,242,835	1,475,154
Workshops	25,000	89,500	150,000	135,000	135,000	150,000
Indirect Costs	811,371	853,428	835,989	844,691	925,655	941,612
Sub-Total		3,850,000	3,851,000	3,854,000	4,357,000	4,660,000
SADCC Funding		(50,000)	(51,000)	(54,000)	(57,000)	(60,000)
TOTAL	\$3,650,000	\$3,800,000	\$3,800,000	\$3,800,000	\$4,300,000	\$4,600,000

TABLE 2.

AID-GRANT CONTRIBUTION TO SORGHUM/MILLET CRSP FOR ALL COLLABORATIVE RESEARCH, U.S. INSTITUTIONS (Florida A&M Univ., Univ. of Arizona, Kansas State Univ., Univ. of Kentucky, Mississippi State Univ., Univ. of Nebraska, Purdue Univ., Texas A&M Univ.) AND THE MANAGEMENT ENTITY.

Budget Line Items	FL	AZ	KS	KY	MS	NE	PR	TX	Institutional Total	Management Entity		Total Grant Request
										Budget	TA -LDC Workshops	
<u>YEAR 7 (FY 36)</u>												
Salary & Benefits			115,000	58,000	59,093	245,889	190,000	316,111	984,093	168,420		1,152,513
Equip.&Facilities			20,000	10,000	10,000	25,000	26,000	45,000	136,000	7,770		143,770
Travel			15,000	16,000	13,000	60,000	37,000	50,000	191,000	89,670		280,670
Other Direct Costs		37,500 ^{2/}	34,508	14,785	12,000	83,000	48,000	85,000	314,793	22,260		337,053
Technical Assistance											30,000	30,000
LDC			173,196	73,320	101,500	65,000	155,000	187,050	755,066		208,000	963,066
Workshops											89,500	89,500
Indirect Costs			113,296	45,895	74,407	143,111	159,000	185,839	721,548	131,880		853,428
Sub-Total SADCC Funding ^{1/}		37,500	471,000	218,000	270,000	622,000	615,000	869,000	3,102,500	420,000 (50,000)	327,500	3,850,000
TOTAL		\$ 37,500	\$471,000	\$218,000	\$270,000	\$622,000	\$615,000	\$869,000	\$3,102,500	\$370,000	\$327,500	\$3,800,000
<u>YEAR 8 (FY 87)</u>												
Salary & Benefits			110,622	69,186	59,103	204,765	186,884	317,961	948,521	172,831		1,121,352
Equip.&Facilities			19,252	11,934	9,990	20,823	25,591	45,273	132,863	7,973		140,836
Travel			14,405	19,084	13,014	49,987	36,360	50,255	183,105	92,019		275,124
Other Direct Costs			33,204	17,628	11,988	69,101	47,190	85,477	264,588	22,843		287,431
Technical Assistance											40,000	40,000
LDC			166,571	87,438	101,493	54,133	152,460	188,173	750,268		250,000	1,000,268
Workshops											150,000	150,000
Indirect Costs			108,946	54,730	74,412	119,191	156,515	186,861	700,655	135,334		835,989
Sub-Total SADCC Funding ^{1/}			453,000	260,000	270,000	518,000	605,000	874,000	2,980,000	431,000 (51,000)	440,000	3,851,000
TOTAL			\$453,000	\$260,000	\$270,000	\$518,000	\$605,000	\$874,000	\$2,980,000	\$380,000	\$440,000	\$3,800,000

^{1/} The Associate Director and a secretary's salary and fringe benefits are partially supported by the SADCC grant. The remainder is for office operations related to SADCC Degree Training Program and individual costs. The SADCC program is a 5-year program.

^{2/} Amount required to complete graduate student training at Arizona.

TABLE 2 Continued.

Budget Line Items	FL	AZ	KS	KY	MS	NE	PR	TX	Institutional Total	Management Entity		Total Grant Request
										Budget	TA - LDC Workshops	
YEAR 9 (FY 88)												
Salary & Benefits			110,622	70,516	58,008	183,814	204,800	321,600	949,360	178,044		1,127,404
Equip.&Facilities			19,252	12,163	9,805	18,695	28,045	45,791	133,751	8,214		141,965
Travel			14,405	19,453	12,773	44,872	39,846	50,830	182,179	94,794		276,973
Other Direct Costs			33,204	17,967	11,766	62,031	51,714	86,455	263,137	23,532		286,669
Technical Assistance											40,000	40,000
LDC			166,571	89,119	99,614	48,592	167,077	190,325	761,298		240,000	1,001,298
Workshops											135,000	135,000
Indirect Costs			108,946	55,782	73,034	106,996	171,518	188,999	705,275	139,416		844,691
Sub-Total			453,000	265,000	265,000	465,000	663,000	884,000	2,995	444,000	415,000	3,854,000
SADCC Funding 1/										(54,000)		
TOTAL			\$453,000	\$265,000	\$265,000	\$465,000	\$663,000	\$884,000	\$2,995,000	\$390,000	\$415,000	\$3,800,000
YEAR 10 (FY 89)												
Salary & Benefits			125,765	75,838	61,292	217,415	222,408	343,791	1,046,509	191,277		1,237,786
Equip.&Facilities			21,887	13,081	10,360	22,110	30,456	48,951	146,845	8,824		155,669
Travel			16,377	20,919	13,496	53,075	43,272	54,337	201,476	101,840		303,316
Other Direct Costs			37,749	19,325	12,432	73,370	56,160	92,422	291,458	25,281		316,739
Technical Assistance											40,000	40,000
LDC			189,365	95,845	105,252	57,475	181,440	203,458	832,835		410,000	1,242,835
Workshops											135,000	135,000
Indirect Costs			123,857	59,992	77,168	126,555	186,264	202,041	775,877	149,778		925,655
Sub-Total			515,000	285,000	280,000	550,000	720,000	945,000	3,295,000	477,000	585,000	4,357,000
SADCC Funding 1/										(57,000)		
TOTAL			\$515,000	\$285,000	\$280,000	\$550,000	\$720,000	\$945,000	\$3,295,000	\$420,000	\$585,000	\$4,300,000
YEAR 11 (FY 90)												
Salary & Benefits			125,765	75,838	62,386	233,227	223,952	343,791	1,064,959	196,490		1,261,449
Equip.&Facilities			21,887	13,081	10,545	23,718	30,667	48,951	148,849	9,065		157,914
Travel			16,377	20,919	13,737	56,935	43,572	54,337	205,877	104,615		310,492
Other Direct Costs			37,749	19,325	12,655	78,706	56,552	92,422	297,409	25,970		323,379
Technical Assistance											40,000	40,000
LDC			189,365	95,845	107,131	61,655	182,700	203,458	840,154		635,000	1,475,154
Workshops											150,000	150,000
Indirect Costs			123,857	59,992	78,546	135,759	187,557	202,041	787,752	153,860		941,612
Sub-Total			515,000	285,000	285,000	590,000	725,000	945,000	3,345,000	490,000	825,000	4,660,000
SADCC Funding 1/										(60,000)		
TOTAL			\$515,000	\$285,000	\$285,000	\$590,000	\$725,000	\$945,000	\$3,345,000	\$430,000	\$825,000	\$4,600,000

TABLE 3.

MANAGEMENT ENTITY OFFICE BUDGET DETAIL

<u>Budget Line Items</u>	<u>FY 80-81</u> <u>YEAR 1-2</u>	<u>FY 82</u> <u>YEAR 3</u>	<u>FY 83</u> <u>YEAR 4</u>	<u>FY 84</u> <u>YEAR 5</u>	<u>TOTAL INITIAL</u> <u>GRANT FY 80-84</u>
Salaries & Benefits	\$ 179,280	\$ 93,200	\$ 107,071	\$ 123,050	\$ 502,601
Equipment & Facilities	7,510	3,640	1,540	6,311	19,001
Travel					
International		14,000	29,000	37,900	
Domestic		5,000	10,000	9,000	
Board of Directors		5,000	6,000	10,000	
Technical Committee		6,000	10,000	17,000	
Administrative Council		1,600	4,000		
EEP		10,000			
Workshops		5,140	500	2,739	
Total Travel	<u>97,600</u>	<u>46,740</u>	<u>59,500</u>	<u>76,639</u>	280,479
Consultants		2,600	1,000	3,000	6,600
Other Direct Costs	<u>28,600</u>	<u>7,720</u>	<u>18,000</u>	<u>16,000</u>	<u>70,320</u>
Total Direct Costs	312,990	153,900	187,111	225,000	879,001
Indirect Costs	<u>87,010</u>	<u>46,100</u>	<u>112,889</u>	<u>85,000</u>	<u>330,999</u>
ME Total Costs	\$ 400,000	\$ 200,000	\$ 300,000	\$ 310,000	\$ 1,210,000

TABLE 3 Continued.

Management Entity Office Budget Detail

<u>Budget Line Items</u>	<u>FY 85 Year 6 Estimated</u>	<u>FY 86 Year 7 Projected</u>	<u>FY 87 Year 8 Projected</u>	<u>FY 88 Year 9 Projected</u>	<u>FY 86-88 Years 7-9 3-Year Total</u>	<u>FY 89 Year 10 Projected</u>	<u>FY 90 Year 11 Projected</u>
Salaries & Benefits	\$133,687	\$168,420	\$172,831	\$178,044	\$ 519,295	\$191,277	\$196,490
Equipment & Facilities	5,500	7,770	7,973	8,214	23,957	8,824	9,065
Travel	59,477	89,670	92,019	94,794	276,483	101,840	104,615
Consultants		2,100	2,155	2,220	6,475	2,385	2,450
Other Direct Costs	<u>14,516</u>	<u>20,160</u>	<u>20,688</u>	<u>21,312</u>	<u>62,160</u>	<u>22,896</u>	<u>23,520</u>
Total Direct Costs	213,180	288,120	295,666	304,584	888,370	327,222	336,140
Indirect Costs	<u>116,820</u>	<u>131,880</u>	<u>135,334</u>	<u>139,416</u>	<u>406,630</u>	<u>149,778</u>	<u>153,860</u>
ME Total Costs	330,000	420,000	431,000	444,000	1,295,000	477,000	490,000
SADCC Budget ^{1/}		<u>(50,000)</u>	<u>(51,000)</u>	<u>(54,000)</u>	<u>(155,000)</u>	<u>(57,000)</u>	<u>(60,000)</u>
Total Grant Request	330,000	370,000	380,000	390,000	1,140,000	420,000	430,000

TABLE 4.

SORGHUM/MILLET CRSP SUMMARY OF NON-FEDERAL MATCHING CONTRIBUTIONS BY U.S. INSTITUTIONS,
YEARS 1 (FY80) - 5 (FY84) ACTUAL AND YEAR 6 (FY85) ESTIMATED

U.S. INSTITUTION	YEARS 1-2 FY80-81	YEAR 3 FY82	YEAR 4 FY83	YEAR 5 FY84	GRANT YEARS 1-5 TOTAL	YEAR 6 (FY85) ESTIMATED	GRANT YEARS 1-6 TOTAL
University of Arizona	\$ 32,941	\$ 5,998	\$ 42,022	\$ 34,349	\$ 115,310	\$ 34,000	\$ 149,310
Florida A&M University	20,350	2,400	1,148		23,898		23,898
Kansas State University	148,627	125,702	320,148	18,957	613,434	110,000	723,434
University of Kentucky	99,702				99,702	59,000	158,702
Mississippi State Univ.	169,732	139,498	98,196	110,803	518,229	86,000	604,229
University of Nebraska	226,353	156,016	192,066	137,056	711,491	180,000	891,491
Purdue University	228,468	114,536	146,433	111,378	600,815	170,000	770,815
Texas A&M University	540,863	290,881	287,690	318,523	1,437,957	225,000	1,662,957
TOTAL	\$1,467,036	\$835,031	\$1,087,703	\$ 731,066	\$4,120,836	\$ 864,000	\$4,984,836

TABLE 5.

SORGHUM/MILLET CRSP TOTAL BUDGET SUMMARY IN OR ON BEHALF OF SIX ECOGEOGRAPHIC ZONES, ESTIMATED FOR YEAR 6 (FY85), AND PROJECTED FOR YEAR 7 (FY86), YEAR 8 (FY87), YEAR 9 (FY88), YEAR 10 (FY89), AND YEAR 11 (FY90)

	EAST AFRICA	WEST AFRICA	SOUTH AFRICA	CENTRAL AMERICA, MEXICO, CARIBBEAN	CIAT/NORTHERN, S. AMERICA	ASIAN SUB CONTINENT	TOTAL
<u>YEAR 6 (FY85) (Estimated)</u>							
AID/GRANT	\$ 700,785	\$ 288,044	\$ 204,150	\$ 492,239	\$ 290,231	\$ 153,698	\$2,129,147
HOST COUNTRIES	175,196	51,848	36,747	151,610	89,391	30,739	535,531
U.S. INSTITUTIONS	196,220	80,652	57,162	137,827	81,265	43,035	596,161
TOTAL	<u>\$1,072,201</u>	<u>\$ 420,544</u>	<u>\$ 298,059</u>	<u>\$ 781,676</u>	<u>\$ 460,887</u>	<u>\$ 227,472</u>	<u>\$3,260,839</u>
<u>YEAR 7 (FY86) (Projected)</u>							
AID/GRANT	\$ 749,512	\$ 460,038	\$ 267,500	\$ 414,755	\$ 301,165	\$ 160,720	\$2,353,690
HOST COUNTRIES	187,378	82,807	48,150	127,745	95,531	32,144	573,755
U.S. INSTITUTIONS	209,863	128,811	74,900	116,131	84,326	45,002	659,033
TOTAL	<u>\$1,146,753</u>	<u>\$ 671,656</u>	<u>\$ 390,550</u>	<u>\$ 658,631</u>	<u>\$ 481,022</u>	<u>\$ 237,866</u>	<u>\$3,586,478</u>
<u>YEAR 8 (FY87) (Projected)</u>							
AID/GRANT	\$ 772,130	\$ 465,000	\$ 261,580	\$ 441,025	\$ 302,765	\$ 113,000	\$2,355,500
HOST COUNTRIES	193,032	83,700	47,094	135,835	93,252	22,600	575,503
U.S. INSTITUTIONS	216,196	130,200	73,242	123,487	84,774	31,640	659,539
TOTAL	<u>\$1,181,358</u>	<u>\$ 678,900</u>	<u>\$ 381,906</u>	<u>\$ 700,347</u>	<u>\$ 480,791</u>	<u>\$ 167,240</u>	<u>\$3,590,542</u>
<u>YEAR 9 (FY88) (Projected)</u>							
AID/GRANT	\$ 788,776	\$ 470,563	\$ 261,580	\$ 410,875	\$ 308,750	\$ 85,000	\$2,325,544
HOST COUNTRIES	197,194	84,701	47,084	126,550	95,095	17,000	567,624
U.S. INSTITUTIONS	220,857	131,758	73,242	115,045	86,450	23,800	651,152
TOTAL	<u>\$1,206,827</u>	<u>\$ 687,022</u>	<u>\$ 381,906</u>	<u>\$ 652,470</u>	<u>\$ 490,295</u>	<u>\$ 125,800</u>	<u>\$3,544,320</u>
<u>YEAR 10 (FY89) (Projected)</u>							
AID/GRANT	\$ 842,353	\$ 503,788	\$ 276,950	\$ 436,225	\$ 325,550	\$ 102,200	\$2,487,066
HOST COUNTRIES	210,588	90,682	49,851	134,357	100,269	20,440	606,187
U.S. INSTITUTIONS	235,858	141,061	77,546	122,143	91,154	28,616	696,378
TOTAL	<u>\$1,288,799</u>	<u>\$ 735,531</u>	<u>\$ 404,347</u>	<u>\$ 692,725</u>	<u>\$ 516,973</u>	<u>\$ 151,256</u>	<u>\$3,789,631</u>
<u>YEAR 11 (FY90) (Projected)</u>							
AID/GRANT	\$ 843,340	\$ 499,775	\$ 276,950	\$ 436,225	\$ 336,650	\$ 106,200	\$2,499,140
HOST COUNTRIES	210,835	89,960	49,851	134,357	103,688	21,240	609,931
U.S. INSTITUTIONS	236,135	139,937	77,546	122,143	94,262	29,736	699,759
TOTAL	<u>\$1,290,310</u>	<u>\$ 729,672</u>	<u>\$ 404,347</u>	<u>\$ 692,725</u>	<u>\$ 534,600</u>	<u>\$ 157,176</u>	<u>\$3,808,830</u>
<u>ZONE TOTALS FOR EXTENSION YEARS 7-8-9-10-11</u>	<u>\$6,114,047</u>	<u>\$3,502,278</u>	<u>\$1,963,056</u>	<u>\$3,396,898</u>	<u>\$2,503,681</u>	<u>\$ 839,338</u>	<u>\$18,319,298</u>
SUMMARY AID GRANT PROJECTION - ALL ZONES -	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>	<u>Year 11</u>		
	\$2,353,690	\$2,355,500	\$2,325,544	\$2,487,066	\$2,499,140		

IV. APPENDICES

Appendix Table 1. 1982 Hectarage, Yield, and Production of Sorghum and Millet in Selected Countries, grouped by Continents or Sub-continents.^{1/}

Continent and Country	Sorghum			*	Millet		
	Area Harvested (1000 HA)	Yield KG/HA	Production (1000 MT)		Area Harvested (1000 HA)	Yield KG/HA	Production (1000 MT)
World	47,760	1447	69,111	*	42,841	681	29,166
Africa	15,412	696	10,734	*	16,358	631	10,315
Angola	---	---	---	*	80	625	50
Botswana	120	125	15	*	5	400	2
Burundi	110	864	95	*	37	811	30
Cameroon	---	---	---	*	455	893	406
Egypt	---	---	---	*	174	3647 ^{2/}	633 ^{2/}
Ethiopia	1000	1300	1300	*	230	870	200
Kenya	210	1048	220	*	82	1585	130
Lesotho	48	542	26	*	---	---	---
Malawi	130	1114	145	*	---	---	---
Mali	---	---	---	*	1454	655	952
Mozambique	250	620	155	*	20	250	5
Niger	1131	315	357	*	3066	423	1295
Nigeria	6000	633	3800	*	5100	647	3300
Senegal	---	---	---	*	850	765	650
Somalia	470	500	235	*	---	---	---
Sudan	3000	700	2100	*	800	288	230
Swaziland	2	1000	2	*	---	---	---
Tanzania	350	629	220	*	220	682	150
Upper Volta	1100	636	700	*	900	467	420
Zambia	80	500	40	*	70	857	60
Zimbabwe	208	630	131	*	390	687	190

^{1/} Extracted from the 1982 FAO Production Yearbook, Volume 36, FAO Statistics Series Number 47, United Nations, Rome, 1983.

^{2/} One or possibly both of these figures appear to be in error.

^{3/} "----" Means that production figures not listed in ^{1/}.

-- Appendix Table 1 Continued.

Continent and Country	Sorghum			Millet		
	Area Harvested (1000 HA)	Yield KG/HA	Production (1000 MT)	Area Harvested (1000 HA)	Yield KG/HA	Production (1000 MT)
N & C America	7613	3534	26,902	---	---	---
Costa Rica	22	2045	45	---	---	---
Dominican Republic	12	4167	50	---	---	---
El Salvador	114	1202	137	---	---	---
Honduras	56	804	45	---	---	---
Mexico	1340	3699	4956	---	---	---
Nicaragua	90	1122	101	---	---	---
USA	5766	3705	21,364	---	---	---
South America	3123	2966	9261	---	---	---
Argentina	2510	3187	8000	132	1168	154
Brazil	116	1834	212	---	---	---
Colombia	198	2611	517	---	---	---
Peru	20	2325	47	---	---	---
Venezuela	210	1605	337	---	---	---
Asia	20,669	978	20,215	23,476	708	16,626
China	2804	2857	8011	4003	1625	6504
India	16,000	675	10,800	18,000	500	9000
Pakistan	399	576	230	560	473	265
Yemen AR	670	870	583	39	1558	60
USSR	132	758	100	2821	709	2000

APPENDIX TABLE 2. SORGHUM/MILLET CRSP COLLABORATIVE RESEARCH
PROJECTS BY DISCIPLINES.

<u>RESEARCH PROJECTS</u>		<u>U.S. INSTITUTION</u>
<u>Breeding/Genetics</u>		
KS-1	Pearl Millet Breeding.	Kansas State
AZ-1	Evaluation and Development of Sorghum Germplasm for Arid Land Agriculture.	Arizona
MS-2	Sorghum Host-Plant Resistance and Genotype Evaluation.	Mississippi
NE-15	Recurrent Selection in Sorghum.	Nebraska
PRF-3	Development of Agronomically Superior Germplasm including Varieties, Hybrids and Populations which have improved Nutritional Value and "Evident" Food Grain Quality for utilization in Developing Countries.	Purdue
TAM-21	Sorghum Breeding and Genetics for Increased Productivity.	Texas A&M
TAM-22	Sorghum Breeding for Disease, Insect and Drought Resistance.	Texas A&M
NE-	Millet Breeding Africa and the Asian Subcontinent. (New Project)	Nebraska
MS-4	Sorghum Host-Plant Resistance and Genotype Evaluation.	Mississippi
MS-11	Adaptation of Sorghum to Highly Acid Tropical Soils. (CIAT/Northern South America)	Mississippi
TAM-31	Sorghum Production and Food Quality Improvement (Honduras).	Texas A&M
PRF-7	Strengthening Outreach Work in Sorghum Production and Utilization.	Purdue
PRF-9	Millet and Sorghum Improvement in Niger.	Purdue

Breeding/Genetics

TAM-32 Sorghum/Millet Improvement in Kenya. Texas A&M

Physiology/Agronomy

KS-2 Identify and Evaluate Physiological and Developmental Processes Adversely Affected by Environmental Stresses. Kansas State

KS-6 Seedling Vigor, Stand Establishment, Water Use, Drought Resistance and Herbicide susceptibility of Pearl Millet. Kansas State

NE-16 Physiological methods of selecting for drought resistance in sorghums. Nebraska

NE-14 Mineral element efficiencies and tolerances in sorghum and millet. Nebraska

NE-8 Agricultural Climatology of sorghum and millet Production Areas. Nebraska

TAM-23 Sorghum Breeding for Insect Resistance and Efficient Nutrient Use. (Also includes some breeding) Texas A&M

NE-13 Agronomy and Cropping Systems for Sorghum and Millet Improvement. Nebraska

KS-7 Water Use efficiency, intercropping with legumes, tillage of sorghum/millet in Botswana. Kansas State

NE-22 Improve sorghum production and utilization in the Dominican Republic. Nebraska

KS-1-1 Agronomic Research with Sorghum and Millet in North Kordofan, Western Sudan. Kansas State

NE-21 Sorghum Production and, Utilization in the Philippines. Nebraska

Entomology

KS-	Storage Insects and Preservation of Pearl Millet and Sorghum. (New Project)	Kansas State
TAM-25	Development and evaluation of systems for controlling insect pests of sorghum by integration of resistant varieties, cultural manipulation and biological control.	Texas A&M
MS-5	Biological Investigations and Management of the Fall Armyworm and Stem Borers on Sorghum.	Mississippi

Pathology

TAM-24	Identification, evaluation and implementation of effective systems for controlling disease or pathogens in sorghum/millet.	Texas A&M
NE-10	Identification of genes controlling the reaction of sorghum to MDMV.	Nebraska
KS-	Millet Diseases, Niger and Sudan. (New Project)	Kansas State
TAM-	Sorghum/Millet Diseases, Botswana, S. Africa. (New Project)	Texas A&M
MS-6	Sorghum Disease Resistance Evaluation and Pathology Investigations.	Mississippi
PRF-C	Studies on mechanisms of Disease Resistance and Susceptibility and Screening for Improved Resistance to Fungal Pathogens with emphasis on <u>Colletotricum Graminicola</u> (Anthracnose).	Purdue

Socio-Economics

KY-1	Sociocultural Constraints in the Production and Consumption of GS/PM in Less Developed Countries.	Kentucky
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Socio-Economics

PRF-5	Pricing, Policy and International Trade Constraints on Sorghum and Millet Production and Utilization in Developing Countries.	Purdue
KY-2	Socio-Economic Studies, Sudan Honduras, Mexico, and Dominican Republic.	Kentucky
NE-17	An economic analysis of the Potential for the Production and Marketing of Grain Sorghum in the Philippines.	Nebraska

Utilization, Quality and Nutrition

MS-3	An Interdisciplinary Approach to Nutrition Improvement of Grain Sorghum and Pearl Millet for Food.	Mississippi
PRF-4	Enhancement of High Tannin Sorghum Utilization.	Purdue
TAM-26	Sorghum/Millet Food Quality Improvement in the LDC's.	Texas A&M
NE-	Nutritional Quality Improvement of Pearl Millet. (New Project)	Nebraska

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORKLife of Project:
From FY 79 to FY Indef.
Total U.S. Funding \$14.5 million
Date Prepared: 2/84Project Title & Number: Sorghum/Millet CRSP 931-1254
Grant No. AID/DSAN/XII-G-0149

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To increase grain Sorghum/Pearl Millet (GS/PM) production in those countries where they are a principal food crop. This is to be achieved by research and training in conjunction with LDC scientists, the international and regional research centers and other government and private development agencies.</p>	<p>Measures of Goal Achievement:</p> <p>a. Research institutions staffed by competent researchers and managers producing improved technology that is adopted by farmers. b. Increased units of GS/PM produced and marketed by small farmers. c. Increased purchase of production inputs and consumer goods by small farmers. d. Close collaboration between the LDC research institutions, the international and regional research centers and the private sector.</p>	<p>a. Research staff trained and research results published and extended. b. Data on commercial markets collected and analyzed. c. Values of purchases and items sold by farmers using new technology compared to those using traditional production practices. e. Comparison of research publications and news releases of cooperating institutions.</p>	<p>Assumptions for achieving goal targets:</p> <p>a. That constraints currently limiting GS/PM productivity can be solved. b. That research results are adopted by LDC farmers. c. That research and training will improve the competency of LDC and US scientists. d. That farmers react to a profitable market by increasing food consumption and consumer goods purchased. e. That research institutes find collaborative research mutually beneficial.</p>
<p>Project Purpose:</p> <p>a. Organize and mobilize financial and human resources necessary for mounting a major multi-institutional US-LDC collaborative effort which in turn is expected to provide the knowledge base necessary to achieve significant advances in alleviating the principal constraints to improved production, marketing, and utilization of GS/PM in LDCs. b. Improve capabilities of appropriate LDC institutions to generate, adapt and apply improved knowledge on GS/PM to local conditions.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>a. Viable and functioning GS/PM collaborative research institutions in the US and LDCs. b. Identifiable personnel trained in the LDCs, and US able to sustain in-country programs. c. Improvement in GS/PM productivity in major project sites. d. More efficient processing and increased utilization of improved quality GS/PM products. e. Four principal research sites fully developed and functional with an interlinked network of secondary sites in each selected region.</p>	<p>a. Annual reports for each subproject. b. A consolidated annual report by the Management Entity on the GS/PM CRSP achievements. c. Annual review by the External Evaluation Panel of grant activities. d. Annual review of project accomplishments by an independent AID committee. e. Market volume and quality studies of principal research areas. f. Principal and secondary research sites' annual reports.</p>	<p>Assumptions for achieving purpose:</p> <p>a. That the goals and objectives of the GS/PM-CRSP are appropriate in the regional context of where collaboration takes place. b. That the constraints to production in LDCs are positively related to the disciplines identified by the GS/PM-CRSP. c. That market incentives will be available to encourage LDC farmers to adopt new production technology. d. That LDC interest will be sufficiently high in four AID regions to support a principal site institution. e. That surrounding countries with similar environments will see benefit of networking to gain access to new technology.</p>

<p>Outputs:</p> <p>a. Packages of validated improved technological practices developed in specific locations but readily adaptable to other areas.</p> <p>b. Documented knowledge on interacting forces constraining efficient sorghum/millet production.</p> <p>c. The practical application and implementation of knowledge gained and its dissemination via publications, workshops, trained technicians and demonstrations.</p> <p>d. Multi-resistant germ plasm available for LDC GS/PM breeding programs.</p> <p>e. Improved commercial varieties of G/PM developed for various ecosystems in use by LDC farmers.</p>	<p>Magnitude of Outputs:</p> <p>a. Develop sound production systems for four major ecosystems of humid tropics, dry tropics, high altitude temperate, semi-arid subtropics.</p> <p>b. Develop germ plasm for four major ecosystems.</p> <p>c. Provide commercial varieties to fit consumer preference at four principal research sites.</p> <p>d. Publications on major production systems which include problems and solutions as known.</p> <p>e. Research staff working with LDC extension staff to extend technology to farmers at four principal sites.</p> <p>f. Implement baseline and evaluation studies, and develop models for stimulating smallholder production conditions.</p>	<p>a. Review of data output, participation by subgrantee staff in workshops, seminars and training programs.</p> <p>b. Evaluation of publications, management, and application of research results.</p> <p>c. Number and quality of LDC staff trained by the project and job held on return to home country.</p> <p>d. Evaluation of GS/PM breeding program in LDCs and survey of commercial varieties available and used by farmers.</p>	<p>Assumptions for achieving outputs:</p> <p>a. That LDCs will utilize new knowledge developed and apply it through their local extension facilities to field conditions.</p> <p>b. That LDC facilities, staff and collaborators are eager to work with GS/PM-CRSP subgrantees in related fields.</p> <p>c. That candidates will be available for training in appropriate disciplines and return to appropriate jobs.</p> <p>d. That joint efforts of US and LDC plant breeders can evolve breeding lines and varieties suitable to LDC conditions.</p>
<p>Inputs:</p> <p>a. Grant No. AID/DSAN/XII-G-0149 to the University of Nebraska.</p> <p>b. 25% minimum cost sharing by each participating US institution.</p> <p>c. Qualified students from US and LDC institutions for appropriate training.</p> <p>d. Expertise of US and LDC staff to conduct required research.</p> <p>e. LDC resources supporting AID grants.</p> <p>f. Other donor agency and private sector support for GS/PM production and utilization program.</p>	<p>Implementation Target (Type/Qual.)</p> <p>a. Implementation of sixth (6th) year funding through subgrants effective 7/1/84.</p> <p>b. Implementation in years 7, 8, 9, through annual renewal of subgrant agreements approved by the Board of Institutional Representatives and administered by the Management Entity.</p> <p>c. 50 formally trained and 150 participants involved in short-term training on various aspects of GS/PM production and processing each year.</p>	<p>a. Annual reports and periodic evaluation by External Evaluation Panel, USAID, JCARD, and BIFAD to summarize progress and to plan for future direction.</p> <p>b. Audit of each subgrantee, the Management Entity and the GS/PM-CRSP as a whole.</p> <p>c. Participant training records.</p> <p>d. Reports of LDC and or project donors on participating in the GS/PM-CRSP.</p>	<p>Assumptions for providing inputs:</p> <p>a. That the GS/PM CRSP will receive adequate funding by AID.</p> <p>b. The overseas collaborating institutions will continue to receive domestic funding and adhere to the terms and conditions of the Memoranda of Understanding.</p> <p>c. That US institutions and their faculties will continue to retain an active interest in the GS/PM-CRSP, contribute at least 25% of total project costs, and provide staff for LDC assignments.</p> <p>d. That LDC staff will be nominated for training positions and be accepted by appropriate training institutions.</p>

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