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AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D.C. 20523

PROJECT PAPER SUPPLEMENT
NO.1

SOUTHERN AFRICA REGIONAL PROGRAM

REGIONAL SORGHUM AND MILLET RESEARCH
(690-0224)

JULY 1988

UNCLASSIFIED

PROJECT DATA SHEET

1. TRANSACTION CODE

C A = Add
C = Change
D = Delete

Amendment Number

1

DOCUMENT CODE

3

2. COUNTRY/ENTITY

SOUTHERN AFRICA REGIONAL

4. BUREAU/OFFICE

AFR/ SA

06

3. PROJECT NUMBER

690-0224

5. PROJECT TITLE (maximum 40 characters)

REGIONAL SORGHUM & MILLET RESEARCH

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)

MM DD YY
09 15 93

7. ESTIMATED DATE OF OBLIGATION

(Under "B" below, enter 1, 2, 3, or 4)

A. Initial FY 83 B. Quarter C. Final FY 83

8. COSTS (\$000 OR EQUIVALENT \$1 =)

A. FUNDING SOURCE	FIRST FY 83			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	6,083		14,800	29,950		29,950
(Grant)	(6,083)	()	(14,800)	(29,950)	()	(29,950)
(Loan)	()	()	()	()	()	()
Other U.S.						
1.						
2.						
Host Country						
Other Donor(s)				10,800		10,300
TOTALS	6,083			10,800		10,300

9. SCHEDULE OF AID FUNDING (\$000) 40,750 40,750

A. APPROPRIATION	B. PRIMARY PURPOSE 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. Grant	2. Loan
(1) ESF	771	053		14,800				14,800	
(2) SADF						15,150		15,150	
(3)									
(4)									
TOTALS				14,800		15,150		29,950	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code

B. Amount

13. PROJECT PURPOSE (maximum 480 characters)

To increase the production of sorghum and millets with good consumer acceptance, local adaptation and pest resistance.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
06 91 06 93 06 93

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a 83 page PP Amendment)

7/10/93

17. APPROVED BY

Signature

Allison B. Herrick

Title Allison B. Herrick
Director, USAID/ Zimbabwe

Date Signed

MM DD YY
08 06 93

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

Action Memorandum for the Director, USAID/Zimbabwe

FROM: Eugene ^{3 Memo} Morris, Chief, PDIS

SUBJECT: Regional Sorghum and Millet Research Project
(690-0224) - Project Paper Supplement No. 1
and Project Grant Agreement Amendment No. 6.

Problem:

Your approval is required to amend the Project Authorization for the Regional Sorghum and Millet Research Project (690-0224). Your approval and subsequent signing of the Project Grant Agreement Amendment No. 6 will increase the AID life of project funding from \$14,800,000 to \$29,950,000 and extend the PACP of the grant from December 31, 1990 to September 15, 1993. The \$15,150,000 increase in the LOP funding level will be obligated in FY 1988 and FY 1989.

Discussion

In 1983, USAID agreed to grant US\$14.8 million to the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) of Hyderabad, India, to partially fund a regional sorghum and millet improvement program based at the national research center in Matopos, Zimbabwe. This program is now in the final year of its initial (five year) phase of activities. A recent evaluation of the program, sponsored by USAID and conducted by a multi-national team of experts, including representatives from SACCAR, national agricultural research programs, CIDA and other organizations, concluded that the program has largely achieved its first-phase objectives and in some areas has surpassed the level of accomplishment envisaged in the initial program workplan. The evaluation team unanimously endorsed the continuation of current activities and an extension of the program in a second phase, elements of which are described in detail in the accompanying Project Paper Amendment.

The goal of the program remains as defined in the initial project documentation: the stabilization of food supplies in the region, leading to improved nutrition and income for poorer people farming in the drier areas. The program evaluation documented that the SADCC/ICRISAT Regional Sorghum and Millet Research Program has contributed to this goal through the following mechanisms:

- the establishment of central research programs involved in screening and testing of germplasm appropriate to the region and in genotype development through crossing trials.

- the strengthening of national programs of agricultural research through networking and information exchanges and provision of appropriate technical expertise and material support

- the provision of both long and short-term academic and technical training to improve the relevant scientific human resource base in the region.

The project purpose, as defined in the initial request to ICRISAT from the SADCC heads of state, is to increase the production of sorghum and mil ets with good consumer acceptance, local adaptation and pest resistance. This purpose statement remains essentially valid for this supplement. However, the supplement shifts the implementation focus for achieving the purpose from one of laying the foundation of a regional research program to one which emphasizes actual crop improvement. Towards this end, there will be less capital works at the regional center during the project extension, but more of such activities at the national centers and testing sites. There will be an intensification of crop improvements research at the regional center. There will be less formal degree training, but a substantial increase in on-the-job training of various kinds, study tours and workshops. Finally, the activities of the food technology and socio-economics units will differ substantially from those of the crop improvement research, due to a greater requirement for the regional program to pursue means of promoting consumer acceptance through networking at the local level and collaborative research.

The original PACD of September 15, 1988 was extended to December 30, 1990 in order to: 1) allow sufficient time for the completion of long-term academic training in the United States, and 2) permit the continuation through April, 1989, of phase I technical assistance and project operations that were delayed approximately six months from the original implementation schedule. However, for planning purposes, in order to maintain a ten-year funding horizon for phase I and II activities comprised of two discrete periods of five years each, ICRISAT now proposes to modify the timing of the second phase program to cover the period September, 1988 to September, 1993. This means that expenditure of that portion of the original grant which was extended to cover long-term training until 1990 and operational expenses for the research station through April, 1989, will continue into the phase II period. Of the original \$14,800,000 granted to ICRISAT, \$1,283,394 will be carried-over to phase II in this manner. This brings the total USAID expenditure during the second five-year period to \$16,433,394 and for the extended life of project (September, 1983 to September, 1993) to \$29,950,000.

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The supplemental funds requested from USAID will enable ICRISAT to continue to carry out its mandate at the regional center over the 1988-1993 horizon. In supporting this program supplement in the amount of \$15,150,000 in new funding, AID will be contributing approximately two-thirds of the cost of the proposed second-phase program of activities. The remaining \$7.7 million will be provided by the Canadian and German governments, both of which have indicated their commitment to the program's continuation.

The economic, social soundness and technical analyses remain essentially the same as in the original PP. No significant social or political factors have developed to alter the conclusions that:

- the project is consistent with the social and political environment;
- the project activities will have a positive economic and social impact on SADC member countries; and
- no technical, cultural or social constraints exist which would prevent the successful accomplishment of the objectives of the project.

With regard to environmental concerns, an amended IEF has been approved. All conditions precedent, covenants and implementation arrangements included in the original Project Agreement and subsequent Project Implementation Letters will remain in full force and effect.

The Southern Africa Center for Cooperation in Agricultural Research (SACCAP) has been consulted on the details of the Project Paper Supplement and has formally requested AID assistance for the continuation of the SADC/ICRISAT program.

A Congressional Notification in the amount of \$24,800,000 was submitted for this project on July 12, 1988. The waiting period expired with no objections raised (see State 247030). This CN permits a FY 1988 obligation of \$7,000,000. The balance, \$8,150,000 will be obligated in FY 1989, after a new CN for the full LOP funding (\$29,950,000) clears the Hill.

The Regional Legal Advisor has determined that section 552 of the Foreign Assistance Act, as amended, (the "Bumpers amendment") does not prohibit this activity since the project is designed to increase food security in the SADC region rather than expand agricultural exports and will not have a significant impact on the export of agricultural commodities of the United States.

Assistance provided under the Grant Amendment will not violate the legislative restrictions on assistance to countries in Southern Africa that are currently in force. In this respect, no assistance to Angola will be funded directly or indirectly by the Grant. Other donors in this multi-donor project will finance any participant training or other costs associated with Angola. Mozambique is not presently in a position to fully collaborate with ICRISAT in terms of its agricultural research capabilities. However, to a limited and incidental extent, Mozambican scientists and researchers will be eligible to participate in seminars and workshops and ICRISAT scientists may visit Mozambican research facilities. In the opinion of the RLA, based upon State 256672, the requirements contained in the FY 1988 Appropriations Act concerning Mozambique have been met.

The scope of your authority under DOA 551, as amended, encompasses grant amendments which do not (1) extend AID funding over a cumulative life of project of greater than ten years, or (2) exceed a cumulative funding level of \$30,000,000. Both of these conditions are met under the terms of this amendment.

Under Handbook 13, Chapter 2B3, you, as Director of the "cognizant technical office" have authority to non-competitively approve grant recipients for purposes of follow-on activities such as this ICRISAT-proposed extension.

Finally, under DOA 551, as amended, you have the authority to execute grants and grant amendments to foreign governments/foreign government agencies and international organizations. The original ICRISAT grant was executed by the USAID/Zimbabwe Director in the form of a grant to an international organization and AID/W has confirmed in State 254957 that this amendment can be executed on the same basis.

Recommendation:

Done ASK 16 August 1988

That you sign the Project Data Sheet for the Project Paper Supplement and the Project Grant Agreement Amendment, thereby (a) approving a \$15,150,000 increase in life of project funding for a new total of \$29,950,000, and, (b) extending the PACD to September 15, 1993 for a total life of project of ten years.

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AUTHORIZATION AMENDMENT

Name of Country/Entity: International Crops Research Institute for
for the Semi-Arid Tropics

Name of Project: Regional Sorghum and Millet Research

Number of Project: 690-0224

1. Pursuant to the Foreign Assistance Act of 1961, as amended, the Foreign Operations, Export Financing and Related Programs Appropriations Act of 1988 and Africa Bureau Delegation of Authority No. 551, as amended, the Regional Sorghum and Millet Research Program (Project) for the Southern Africa Region, which was authorized on September 15, 1983, is hereby amended as follows:

a. Revise Section 1, first paragraph by inserting, after "Section 531 of the Foreign Assistance Act, as amended", the following:

"and the Foreign Operations, Export Financing and Related Programs Appropriations Act of 1988."

b. Revise Section 1, second paragraph to read as follows:

"The Grant involves planned obligations of not to exceed \$29,950,000 over a ten year period from the date of authorization, subject to availability of funds, in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The life of project is ten years from the Date of Authorization."

c. Revise Section 2 to read as follows:

2. The first phase of the Project (through 1988) will assist ICRISAT to establish a Sorghum and Millet Research Program to serve the Southern Africa Region. The second phase of the Project will assist ICRISAT to move from establishing a regional research program to implementing actual crop improvement activities within participating countries. The project will concentrate on problems and constraints having regional significance, using a multidisciplinary team of scientists skilled in Sorghum and Millet Research located in a regional center in Zimbabwe, with appropriate linkages

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being established with national, international and regional agricultural institutions. A.I.D. will finance the costs of technical assistance, training, construction, and related commodities and services necessary to carry out the project; provided that none of the funds authorized hereunder shall be used to finance project costs associated with countries prohibited by law from receiving AID assistance."

2. The authorization cited above remains in force except as hereby amended.

Signature: Allison B. Herrick
Allison B. Herrick
Director
USAID/Zimbabwe

Date: 16 August 1985

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A Project Proposal
for
Phase II
of the
SADCC/ICRTSAT Sorghum and Millets
Research and Training Program

S A D C C / I C R I S A T
Sorghum and Millets Improvement Program
P.O. Box 776
BULAWAYO
Zimbabwe

h.



INTERNATIONAL CROPS RESEARCH INSTITUTE
FOR THE SEMI-ARID TROPICS
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21 July 1988

Ms. Allison B. Herrick
Director, USAID
1, Pascoe Avenue
P.O. Box 3340
Harare, ZIMBABWE

Dear Ms. Herrick,

I refer to the SADCC/ICRISAT Regional Sorghum and Millet Research Project (690-0224). I wish to express my appreciation for the generous support that USAID has provided to this project during its first 5 years. Comments from the recent review indicate that the program has done well for which we are pleased. We expect that the program will continue to do well during the next 5 year phase.

I request that USAID continue to provide support to this Regional Program during its second phase. The proposal for this phase has been reviewed by me and found appropriate. I understand that USAID is anticipating provision of \$15.15 million in support of the program which is greatly appreciated.

Yours sincerely

L.D. Swindale
Director General

cc: Dr. L.R. House

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LIST OF ABBREVIATIONS

AID	- Agency for International Development
CIDA	- Canadian International Development Agency
CGIAR	- Consultative Group for International Agricultural Research
FAA	- Foreign Assistance Act
FY	- Fiscal Year
GTZ	- German Agency for Technical Cooperation
ICRISAT	- International Crops Research Institute for Semi-Arid Tropics
INTSOPMIL	- Collaborative Research Support Program in Sorghum and Millet
LOP	- Life of Project
NARS	- National Agricultural Research Stations
PACD	- Project Assistance Completion Date
PP	- Project Paper
SACCAP	- Southern African Center for Cooperation in Agricultural Research
SADCC	- Southern African Development Coordination Conference
SARP	- Southern Africa Regional Program (USAID)
SMIP	- Sorghum and Millets Improvement Project
TAP	- Technical Advisory Panel

I. EXECUTIVE SUMMARY

1.1 Background

In 1983, USAID agreed to provide US\$14.8 million to the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) of Hyderabad, India, to fund the first phase of a regional Sorghum and Millet Improvement Program (SMIP) to be based in Bulawayo, Zimbabwe. These grant funds were committed in response to an unsolicited proposal initiated by ICRISAT at the express request of the Southern African Development Coordination Conference (SADCC). Phase I activities began on May 1, 1984, after an agreement to host the program was signed with the Government of Zimbabwe and the first of the ICRISAT principal staff arrived in country. This initial phase, covering the establishment of the regional center and the start-up of research and extension activities was funded for a five year period, to end in April, 1989. Donor support for this phase has also been provided by the Federal Republic of Germany (\$1.6 million) and Canada (\$1.5 million).

The stated objective of the SADCC/ICRISAT Regional Program for the Improvement of Sorghum and Millets is "to strengthen national research capability through the provision of three major inputs: research, education and training, and service". The program concept is to avoid a large outlay in capital works and institutional development at any one national research facility, but instead to have a functional regional facility at Matopos working in close collaboration with national research stations located in different countries. ICRISAT provided a core group of scientists and technicians to staff the regional center and encouraged them to travel extensively within the region. This concept ensures the presence at the regional center of a critical mass of scientists who can collectively generate an inter-disciplinary approach to solving regional problems, while individually interacting with their national counterparts and assisting them to develop adaptive research relevant to each country. The main purpose of the regional team is, therefore, to provide professional support to the national scientists and to build national capabilities in research and in the transfer of technology among the target group of farmers.

An integral part of the program design, in recognition of the paucity of trained scientific manpower in the region, is the provision of fellowships for the advanced academic training of regional candidates at B.S., M.S. and PhD levels. Because of the lack of capacity to train these candidates within the region, this aspect of the program has been subcontracted to INTSOPMIL, a consortium of five U.S. universities.

At the regional center in Matopos, the program is sponsoring a wide range of activities. These are summarized as follows:

- conducting research within the center and in collaboration with the national research centers;
- introducing, evaluating and coordinating the testing of elite germplasm from diverse sources, but with potential utility to the region;
- assisting at workshops and monitoring tours and publishing research results at regional and national levels;
- supporting national institutions physical facilities and the cadres of national scientists;
- organizing joint program-planning conferences, workshops and symposia on activities and subjects relevant to the region;
- organizing study tours and visits to field days at ICRISAT Center for research directors and scientists;
- organizing monitoring tours to regional and national centers with scientists drawn from ICRISAT Center, the regional center and national programs;
- conducting in-service training at ICRISAT Center;
- conducting short-term courses for scientists and technicians at the regional center; and
- laying the foundation for networking among scientists in the region.

These activities are conducted under the coordinating purview of the Southern African Center for Cooperation in Agricultural Research (SACCAR). SACCAR, established by SADCC in 1984, is delegated the task of coordinating all agricultural research and training activities in the region. The SADCC/ICRISAT program activities are formally reviewed by SACCAR at their annual board meetings and at the annual meeting of the Technical Advisory Panel which SACCAR has constituted specifically for this purpose.

1.2 Summary of Revised Project

The project supplement is intended to ensure continuity in an already successful regional program and to support a second-phase program of activities which encompasses both on-going and new initiatives towards the achievement of long-term program objectives.

The second-phase objectives build upon the work accomplished during the first. Groundwork laid in phase I, particularly the establishment of staff and facilities, the introduction and evaluation of breeding stock and the prioritizing of problems and constraints will constitute a resource base for phase II activities which will permit a more focussed emphasis on actual crop improvement.

Accordingly, principle elements of the phase II program of activities may be described as follows:

1) To develop and test improved varieties and hybrids of sorghum and millets for grain and forage purposes and to assist in making seed available to farmers.

2) From results of phase I screening, to breed resistance traits into superior yielding varieties and hybrids.

3) To implement plans laid in phase I to develop varieties and hybrids for multiple end users and to select for traits contributing to these end uses.

4) To strengthen research facilities at important national sorghum and millet stations.

5) To substantially increase the involvement of SADCC scientists in regional crop improvement activities.

6) To expand the range of training activities relevant to staff development for sorghum and millets improvement in the region.

1.2.1 evaluation recommendations

An AID-sponsored, evaluation of the SADCC/ICRISAT program was recently conducted by a multi-national team of experts, including representatives from SACCAP, national agricultural research programs, CIDA and other organizations. The major conclusion of the evaluation team is that an excellent and productive regional program of agricultural research has been established in a short period of time. The reasons they cite for this success include the following:

-excellent project leadership;

-strong support from SACCAP; and

- the availability of appropriate agricultural technologies (improved varieties and hybrids) for regional and national screening and testing.

The revised project will continue to benefit from these factors which have contributed to the program's success during the initial funding period.

The evaluation team also presented a set of recommendations which will be acted upon in the implementation of the second-phase program of activities. These include:

- the need to develop a formal process to ensure that action has been taken on recommendations made by the annual Technical Advisory Panel meeting;
- the need for the annual workplans of selected scientists to be more focussed, particularly those of the sorghum breeder and the agronomist; and,
- a number of "supportive recommendations", i.e. endorsing planned future activities or presenting ideas to "fine-tune" the existing program.

The SADCC/ICPISAT program management support these evaluation recommendations.

1.2.2 phase II implementation plan

The detailed implementation plan provided in section 5.5 describes how the second-phase program of activities will be implemented over the proposed five-year time horizon. Recruitment of new principal staff will occur in the first two years of the revised program. Activities in support of the national programs continue throughout the period. Construction activities and capital expenditures are concentrated at the outset and are focussed on providing facilities for the in-house training programs, additional office space at Matopos, a warehouse and a research greenhouse.

II. BACKGROUND AND CURRENT STATUS

2.1 Regional Context

The countries of southern Africa have two distinct systems of agriculture - the modern commercial sector originally developed and run by settlers (commercial farms, estates, etc), but which is of late becoming diversified in ownership; and the communal or subsistence agriculture where the production systems are less intensive and management more traditional.

The commercial sector played and continues to play a positive role in the economy of southern Africa, albeit to varying degrees of importance among the countries. It is one of the major sources of foreign exchange in the region, it caters to the food needs of a burgeoning urban population and it provides employment to the communal areas.

In the SAPCC region, the subsistence and food crop sectors suffered a general neglect in terms of research, extension and provision of agricultural inputs, both in the colonial and post-independence eras. Such neglect was not as costly when population growth rates were low (1.5 - 2.5 percent) since the subsistence farmers could expand the farm area and cope with extra demand for food. But the population growth rates in the 1970s and later ranged from 2.5 - 4.4 percent in many of the SAPCC countries, thereby generating a steep rise in the demand for food. As the population expanded, the negative impact of the low emphasis on small grain cereals became progressively apparent. The prolonged droughts of the 1970s precipitated a sequence of crises by dissipating self-sufficiency in food in many southern African countries. The poorer among these countries could not afford to buy food on commercial terms and some among them could not get aid due to political reasons. The better endowed countries in the region were obliged to delay investments for development and instead import food, in order to cope with emergencies. The food production gap resulted in acute hunger and malnutrition in some parts of the SAPCC countries and emerged as a major social issue of concern to policy makers.

As a partial response to this perceived crisis in food production, SAPCC requested ICPISAT to set up a regional center, charged with the responsibility to rapidly step up the production of sorghum and millets in SADCC countries. This request was specific to traditional food crops and focussed on increasing the production of small grains, not just conducting agricultural research on them.

The concept of a regional center for small grain research and extension was particularly appropriate in the SAPCC region,

in light of budget constraints and competing priorities for the resources dedicated to national programs and the need for continuous and consistent support for regional research systems.

Collaboration is of still greater importance in a region where the countries are often small, resources are limited and skilled personnel barely meet the needs of civil services engaged in administrative functions. The paucity of skilled scientific and technical support staff throughout the region made it imperative that countries collaborate to support the required research agenda, acknowledged to be of a size and complexity surpassing that which any one country could support or manage.

The regional research concept is not without precedent in Africa. There have been some outstanding examples of success of such enterprises, largely engendered by the economies of scale of the research establishment and its linkages with a more evolved research system in the developed countries. The Empire Cotton Growing Association and IPAT network are in this category and have made invaluable contributions to the development of agriculture in some Anglophone and Francophone countries.

2.1.1 ICRISAT and ICPISAT contributions to SADCC

The International Crops Research Institute for the Semi-Arid Tropics is one of thirteen international research and training institutes within the Consultative Group for International Agricultural Research (CGIAR). The mandate of ICRISAT is the improvement of sorghum, pearl millet, groundnuts, chickpeas and pigeon peas as well as the implementation of a program in resource management for the semi-arid areas of the world. An important focus of the program is the improvement of life for less fortunate people in the semi-arid tropics.

ICRISAT became involved in the SADCC region through a direct request from the Heads of State at their meeting of March, 1980, in Lusaka and now has established regional programs for sorghum and millets centered at Matopos, near Bulawayo and for groundnut improvement at Chetedzi Research Station near Lilongwe, Malawi.

Contributions of ICRISAT to the SADCC region include:

- 1) Provision of breeding stocks and sources of resistance. Some of the breeding lines have contributed to the release or pre-release of cultivars in Zimbabwe, Zambia, Malawi, Mozambique and Swaziland. Sources of resistance to downy mildew, anthracnose and striga in sorghum have been found to be promising.

2) Ten consultants from ICRISAT have contributed to training, to breeding and pathological research and to administration.

3) There have now been four regional workshops and eight monitoring tours. ICRISAT Center staff have participated in all of these.

4) Two of the botanists from the ICRISAT Germplasm Resources Unit have collected sorghum and millets in Lesotho, Swaziland, Tanzania and Zimbabwe.

5) Information pamphlets and symposia proceedings from ICRISAT have been distributed throughout the region. An abstracting service from the ICRISAT Center has also been distributed in the region. A volume of training information has come from the Center. An ICRISAT Center scientist has been the main contributor to a review of sorghum and millets in SADCC countries.

Additionally, the project manager of the regional program is a member of ICRISAT's Management Committee. This contributes to effective regional-Center interactions. Staff from national programs participate in field days at the Center, participate in Center training programs and have undertaken thesis research at the Center.

2.2 SADCC/ICRISAT program objectives

It is axiomatic, however, that regional programs are quick to lose their appeal and effectiveness when they lose contact with national programs and dominate rather than service them. The main strength of a regional program lies in its collectivity, even if it is comprised of individually weak national programs. While opportunities for transfer of techniques, materials and technologies among the agroclimatologically diverse sub-regions are more readily perceived by a regional program, because of its broader perspective, it is clearly understood in the SADCC/ICRISAT mandate that the regional program exists in support of the national programs, not vice versa.

The raison d'etre for the regional center is to reinforce and support the national programs; and these functions are discharged by exchanges of visits between the regional and national scientists. In addition to site visits conducted by regional staff scientists, the regional program also arranges in-service training at the Bulawayo center for national center personnel through which advances made locally and at ICRISAT Center in areas of elite germplasm development, screening techniques and research leads are disseminated.

2.2.1 Long-term objectives

In keeping with the purpose of the program as defined in the initial request to ICPI SAT from the SADCC heads of state, the regional center has concentrated on increasing the production of small grains. The implication of this focus is that while working through and with the national programs, the regional program activities must stay subservient to the objective of increasing the production of sorghum and millet by developing high yielding cultivars (including hybrids) with good consumer acceptance, local adaptation and pest resistance. This reflects the intent of governments to direct their attention to improving the well-being of the less privileged populace living in communal lands who are engaged in a traditional system of farming which perhaps met fairly satisfactorily the food needs of the population in good years, but which is vulnerable in drought years. The anticipated long-term impact of such a policy is to redress the prevailing inequities in income distribution among the poorer sections of the country's population. It is also intended to elevate the status of subsistence farmers to a semi-commercial and a commercial level. This approach thus addresses simultaneously the issues of economic growth, efficiency of food production, food security, equity in income distribution and social justice.

The achievement of these long-term goals and objectives through the medium of an integrated regional research and extension program is necessarily a slow and incremental undertaking. The time frame put forth for ICPI SAT involvement in the regional center activities is 20 to 25 years. It is anticipated, however, that as sufficient numbers of regional scientists and technicians are trained and recruited, they will progressively take over some of the functions of the expatriate personnel. For the convenience of the donor agencies, the program has been split into phases, the first of which will end in 1989.

2.2.2 Short-term Objectives (Phase I: 1983 -1988)

The short term objectives of Phase I (now extended to 1990 to allow for completion of training programs already underway) are: 1) to establish and staff a research base; 2) initiate a research program sensitive to national needs; 3) identify varietal materials and good evaluation procedures; and 4) to establish a program to train local personnel.

2.3. Current Project Status

An AID-sponsored project evaluation conducted in June, 1988, concluded that the SADCC/ICPI SAT regional program had made excellent progress in addressing most of the objectives anticipated in the project design, and is ahead of schedule and has produced results earlier than expected in a number of areas. The current status of each of the program components, as reflected in this evaluation report, is summarized below.

2.3.1. Staff and Physical Facilities

ICRISAT Center took the initiative to establish and staff the regional base at Matopos. ICRISAT has done reasonably well in keeping up with the implementation schedule and staff. The Project Manager, Farm Development Specialist and the Administrative Officer arrived in the first year of the program. The Sorghum Breeder, the Millets Breeder and Pathologist arrived in the second year as scheduled. The Agronomist and Entomologist joined the program in the third year while the Economist and Food Technologist arrived in the fourth year. The scientific team is highly qualified and has a wealth of experience. The administrative and technical component of this regional program are also made up of internationally recognized professionals and experienced personnel with good working knowledge of the local resource base.

The construction of station buildings (e.g. staff houses, office and laboratory, seed storage and processing, field shelters, etc.) purchase of equipment, and farm and station development (e.g. land shaping, establishing of an irrigation-drainage system, field roads and fencing) have essentially conformed to schedule. The timely availability of buildings, developed fields and equipment helped facilitate the establishment of qualitative field research at three sites: Matopos, Lucydale and Mzarabani.

2.3.2 Research Program

In general the SADCC/ICRISAT research program has made progress in three principle areas:

- Establishment of central research programs. Germplasm appropriate to the region, segregating material and genotypes have been identified for both grain sorghum and pearl millet with potential for release through National Agricultural Research Systems (NARS). Screening systems have been put in place for a few of the major disease constraints of sorghum and millet and stemborer on sorghum.
- Genotype development through crossing has been established as a service to NARS in several countries, with the provision of field supplies and in some cases technicians.
- Networking and information exchanges have been successfully established. Major factors contributing to the success have been the monitoring tours and annual workshops.

A summary of the current status of each of the specific research activities is presented below:

a. Sorghum

The sorghum program has made good progress in introducing, evaluating, crossing and selecting germplasm appropriate to the region. The identification of varieties for potential release in several countries (Malawi, Swaziland, Mozambique and Zimbabwe), hybrid combinations for wide-scale testing and the generation of a wide range of new variability are solid achievements unanticipated in the first phase of the project. The sorghum program has also contributed to the creation of a regional network of scientists.

b. Millets

The millets grain program has been well organized with a logical exploitation of material through various well planned stages of testing. A number of varieties have been identified for national testing in Zambia, Botswana, Malawi and Tanzania, and five are currently under evaluation in Zimbabwe. Five hybrids have also been identified for wider testing. This is commendable progress for a program that has been active for only four years.

c. Forages

A good start has been made on introducing forage sorghum and millet of various kinds. Since work commenced two year ago, forage trials were initiated in seven countries. Some breeding objectives have been formulated, while others will develop as experience accumulates with further field evaluations and the establishment of quality and feed criteria.

d. Pathology

The pathology program has made good progress in working with national scientists in developing priorities among diseases for both sorghum and pearl millet, and interacting with the breeding programs in developing screening techniques and locations for the evaluation of breeding material. The major diseases have been identified and disease nurseries and/or "hotspot" locations have been designated. The pathology program has interacted in almost every possible way to strengthen and diversify the research needed. In a short time span, techniques have been established for large quantities of breeding material to be screened for some of the prioritized major diseases. These include ergot and smut for pearl millet, downy mildew, (for both sorghum and millet) leaf blight, sorghum ergot and sorghum virus.

e. Entomology

The entomology research program is well adapted and focused on priority problems faced by small holder farmers in the SADCC region. Major insect pests of sorghum and millets within the region have been identified and prioritized. Stemborer, aphids and shootfly are the most important pests regionally.

"Hot spots" for screening germplasm against some of the major pests have been identified and techniques for rearing and artificially infecting sorghums with stemborers have been developed. Techniques for screening against shootfly, aphids and storage pests are also being developed. Considerable progress has been made in the entomology program in a brief time span.

f. Agronomy

The agronomy program only began in late 1986, so research efforts have just started. Work has been initiated on the stand establishment problem of research trials on sandy sites in Zimbabwe and Malawi. Trials have also focused on the development of suitable and acceptable sorghum and millet production technologies to improve water use (e.g. planting methods, plant density and exploratory trials). Pigeon-pea trials have also been initiated.

2.3.3 Strengthening of National Research Programs

The regional program has done an excellent job in helping to strengthen national programs. Generally, all national programs have benefitted in the following areas:

- Germplasm - Mechanisms have been established for continuously supplying the national programs with sorghum and millet germplasm accessions, converted lines, varieties and hybrids from the regional program and ICRISAT Center. Screening nurseries for both diseases and pest are also made available to national programs.
- Regional Workshops and Monitoring Tours - At the regional workshops, scientists from the regional and national programs review and plan future research and exchange ideas. The monitoring tours are held during the growing season annually, and include visits to the regional center and at least three national programs. Monitoring tours have increased the interaction and cooperation between the regional and national programs.
- External Inputs to the Regional and National Programs - Scientists from both ICRISAT Center and INTSORMIL attend the workshops and monitoring tours to provide input on topics of interest to the region. In addition, consultants from ICRISAT Center assist national programs in the region.
- Training - National programs have benefitted from both the long-term and short-term training sponsored through the regional program (see below).

Specific research and service activities initiated by the regional program to help strengthen national programs are summarized below:

a. Sorghum

All national programs in the SADCC region have received some assistance from the breeding program. The assistance varies by country. In Lesotho, Swaziland and Angola, the regional breeder does most of the sorghum work due to lack of local staff. Selection and adaptation trials are presently ongoing in these countries. In Tanzania, Malawi and Mozambique the regional breeder is providing backup support such as crossing blocks and crosses. In Botswana, Zambia and Zimbabwe, the regional breeder assists by providing parental stock upon request. All national programs are benefitting from the exchange of germplasm and the provision of operational supplies such as pollinating bags, seed envelopes, tags and field books. In Malawi, Mozambique and Swaziland, varieties of sorghum are being seed increased for wide-scale country testing. In Botswana, drought resistant varieties and hybrids are being selected. Crossing activities are being conducted in Tanzania, and elite sorghum varieties and hybrids are being released or pre-released in Zambia and Zimbabwe.

b. Millet and Forages

The millet program is well ahead of schedule in selecting potential variety releases from introduced germplasm, developing varieties from random mating populations and identifying high yielding hybrids. A great diversity of germplasm has been introduced for the millets and forage materials and these have been evaluated in the appropriate ecological zones. Local germplasms have also been collected in the region for evaluation and testing. Pearl millet trials focusing on maturity are being conducted in 7 countries, while dwarf variety trials and hybrid trials are being carried out in four countries. Finger millet trials focusing on maturity are being conducted in four countries, and work on acid soils is being carried out in Zambia. A number of millet varieties have reached either pre-release stage or advanced testing in Botswana, Malawi, Zambia, Zimbabwe and Tanzania. Thus, great strides have been made in the millet program in only four years.

Forage trials have been initiated in seven countries over the past two years. Crosses of pearl millet and elephant grass have been included in these trials. Many national programs are interested in the potential of these forage crops.

c. Pathology

The regional pathologist has worked closely with the national program staff of the SADCC countries to identify and prioritize disease problems. The pathologist has visited seven of nine countries and has worked with scientist from all the countries in SADCC. The regional pathology program has created an awareness of diseases of sorghum and millets in most national plant protection services. Screening techniques for the major diseases have been developed and tested at "hot spot" locations in the region where diseases are endemic. Disease screening nurseries have also been distributed to

interested national programs such as Zambia and Zimbabwe.

d. Entomology

The entomology program has done an excellent job in servicing the national programs. The regional entomologist has visited seven of the nine countries (all except Angola and Swaziland) since the program began. Aside from identifying the major pests in each of the SADCC countries visited, the entomologist has established sorghum insect nurseries for screening at stations in four countries (Botswana, Tanzania, Malawi, Zambia). Techniques for screening against stemborers have been developed and are available to national programs. Techniques and methodologies for screening against shootfly, aphids and storage pests are also being developed.

c. Agronomy

The agronomist has visited six of the nine countries in the SADCC region to initiate cooperative efforts. Trials have been initiated in Zimbabwe, Malawi and Swaziland. Trials have focused on poor stand establishments, crop growth and development variability on sandy soils, and suitable and acceptable sorghum and millet production technologies to improve water use. Pigeon-pea trials have also been initiated in Zimbabwe.

f. Station Development

Direct assistance has been provided to six of nine countries (Botswana, Lesotho, Malawi, Tanzania, Zambia and Zimbabwe). This assistance has included station managements training, improvement of field facilities, farm equipment, housing, field shelters, seed stores, vehicles and the provision of technicians. Technicians have been provided to Zimbabwe, Botswana and Malawi, and three other countries will be provided such assistance in the coming year. The station development assistance provides the tools and training for work in crop improvement.

g. Agricultural Economics

The socio-economist position was only filled this year, so no research has been initiated to date. Up to this time, the research program has had very limited activity in relation to the socio-economic context in which the crops being researched are cultivated. The present work plan is primarily focused on post-harvest problems and policy issues such as marketing and food security. Such issues are extremely important to countries where food surpluses currently exist. However many national scientists feel that this work should be complimented with other types of socio-economic assistance to be provided to SADCC countries. The agricultural economist will: 1) interact with the farming systems research teams in each

country and reviewing country research documents in order to understand small farmer production constraints; 2) incorporate this information into the sorghum and millet improvement program; and 3) study the relationship between small holder production systems and national policies to give guidance to national program researchers.

2.3.4 Training

In general, the training program is off to a good start and priority is being given to this major component. The training program is conceptually well structured and accepted by national programs. Factors contributing to its success include:

- Professional and technical training are being phased so that professionals returning from degree training will have trained technicians in place.
- A conscious effort is being made to ensure that technicians returning from training to national programs are provided with the necessary tools to allow them to take maximum advantage of their newly acquired skills.
- There is increasing interaction with regional universities and the utilization of summer students in both the national and regional programs.
- The training program has focused on both long-term degree training and short-term, in-service training. The current status of these subcomponents are summarized below.

a. Long-term Training (INTSORMIL)

The degree-level training carried out by INTSORMIL on behalf of SADCC/ICRISAT got a late start but is going well. Forty students are actually in the U.S.A. at present pursuing degrees (7 BScs, 22 MScs, and 11 PhDs), and another four are departing in the near future (all MScs). One student is pursuing a PhD at the University of Zimbabwe. Nine of the trainees are females. The number of students being trained in Phase I (45) is less than was projected (63). This is primarily due to the late start and the limited number of qualified candidates available in the region. INTSORMIL is making an effort to overcome this problem by annually touring the region and meeting with each national program to identify candidates. It is planned to train 7 more MSc's and 35 more PhDs in Phase II. Changing needs and program direction will necessitate a review of the INTSORMIL plan to ensure that enough socio-economic and crop utilization expertise is being acquired.

b. Short-term In-service Training

The regional program has a strong in-service training

component carried out either at ICPISAT Center in India or at Matopos. Courses in India are given by center staff while those at Matopos are given either by center staff or project staff. To date twenty persons have participated in training activities in India. In-service training at Matopos has involved four sessions: two for technicians and two for station managers. Forty-four persons have participated in the training. The regional program plans to train 100 persons in in-service training courses at Matopos in Phase II. A training officer will be hired to coordinate this effort. In addition to technician in-service training, a summer student training program at Matopos has begun with students from the University of Zimbabwe. Training materials are also being developed by the regional program and being distributed to trainers for future reference. Plans have been made for Phase II to hire an information and development officer to further assist in this.

In Phase II it is planned to have the returning graduates from the degree program spend 2-3 months at Matopos to work with the regional program in their respective discipline in order to become familiar with the program and methodologies prior to returning to their national programs. A research associate program is also planned in Phase II under which national scientists will spend 2-3 years working in the regional program. This will enhance the takeover of regional responsibility by national scientists.

The regional program is also carrying out informal training through annual workshops, monitoring tours and national visits. National scientists believe that such informal training is highly beneficial, creates a positive competitive spirit in the region and stimulates interaction amongst both scientists and technicians. This is the cornerstone of a regional network. Due to internal difficulties and clearance problems, Mozambique, Angola and Malawi have not been able to take maximum advantage of the informal training.

2.3.5 Sorghum and Millet Utilization

The improvement of the food situation in the region has given rise to questions of alternative uses for sorghum and millets. In response to proposals from SADCC countries, the regional program established a food technologist position which was only recently filled. The food technologist is to play a collaborative and catalytic role in promoting the diversity and improvement of sorghum and millet utilization as food, feed, beverage and for other industrial uses. The effort will reinforce crop improvement research, materialize a partial import substitution of wheat and enable a progressive replacement of maize for sorghum.

Studies are planned of possible uses of sorghum and millet in livestock forage and feed, brewing, and blending with other

flours in the baking industry. The work will be coordinated with the socio-economist studies on marketing and food security policies, the SADCC Food Security Program and work funded by IDRC on grain processors.

Activities implemented to get the utilization program started included: 1) drawing up plans for a food technology laboratory; 2) a preliminary collection of sweet stem and waxy sorghums has been made; 3) an international workshop held in February, 1988 on utilization opportunities available with sorghums and millets; 4) a follow-up regional workshop on sorghum and millet utilization was held to further focus and prioritize areas of interest to SADCC; 5) a consultancy report prepared on the "Technical Status of Sorghum as a Food Grain in Zimbabwe", and 6) a forage improvement program involving sorghum, several millets, napier grass and various crosses has been started recognizing the need for animal feeds.

III REVISED PROJECT DESCRIPTION: PHASE II (1988-1993)

3.1 Goal

The program goal remains as defined in Phase I: the stabilization of food supplies in the region, leading to improved nutrition and income for poorer people farming in the drier areas.

3.2 Purpose

The project purpose, as defined in the initial request to ICRISAT from the SADCC heads of state, remains "to increase the production of sorghum and millets with good consumer acceptance, local adaptation and pest resistance". The mechanism through which this is accomplished is coordinated research and extension efforts with the national programs, thereby improving the national programs' capacity to accomplish their individual research agendas. An education and training component addresses the shortage of trained scientific and technical personnel that presents a serious constraint to the development of the national program capacities.

3.3 Revised Project Summary

Important in the first phase was the development of the regional team and the construction of facilities required for research and training activities. The program as originally conceived focussed on increased grain production but expanded to initiate programs on crop utilization and experimental station development. An education/training program was initiated. A substantial amount of germplasm and breeding stocks were introduced and selected with some entries moving to advanced testing or release in several countries. Disease, insect and striga pests were prioritized and screening procedures developed for some. Phase I was basically an establishment period.

During Phase II, a greater number of varieties and hybrids will be released by SADCC countries and seeds will be in farmers' hands. A substantive impact on national production figures is not expected but movement in this direction will be apparant. These varieties and hybrids will have known response to yield-limiting traits being better, or at least as good as, local varieties. They will also be developed with ultimate use in mind and with multiple crop uses as an objective. This expanded base of research will be reflected in a substantially expanded array of opportunities for human resources development, including education and training. With the regional center operational, there will be a greater effort in the development of selected national stations and the off-season location at Mzarabani. Several of the staff development programs (research associates and post-docs) and the employment of several regional staff members represents an effort to begin to expand the involvement of scientists from national programs in the regional program. Phase II will see an increase in the array of contributing varieties and hybrids, the increased involvement of educated scientists in national programs, a greater participation of national scientists in the regional program and progress in strengthening national research facilities.

Phase II will see a consolidation of research and personnel development programs and a greater regionalization of its staff.

At the end of Phase II, many of the scientists needed to implement national programs for the improvement of sorghum and millets should be in place. Training will continue to provide better-qualified technicians and station managers. Facilities at important stations will be improved.

This increased personnel base will reflect in varieties and hybrids with resistance to yield limiting pests and environmental constraints and to a contributing array of end-uses. Progress in these directions is just beginning and will be more evident mid-way through Phase II. Many components will be contributing by the end of the second period.

3.4 Revised Project Outputs, Means of Verification and Inputs

A detailed analysis of total Phase II outputs and inputs is provided below. This data is not disaggregated by donor inputs. For a breakdown of specific components to be funded by AID, see Table VII, page 58. The outputs, means of verification and inputs are presented by program component. Salaries, operational costs, evaluation costs and overhead are not broken out by program component, and are presented as overall inputs to the program at the end of the section dealing with staffing and physical facilities.

3.4.1 Staff and Physical Facilities

Component Output 1:

An interdisciplinary research team that has been established at the regional center continues to conduct research, training and provides services to national programs in sorghum breeding, millet breeding, agronomy, pathology, entomology, agricultural economics, food technology and station management development.

Means of Verification - Project evaluations, TAP reports.

Inputs - (see 3.4.1.1, below)

Component Output 2:

Project administration includes a project manager, a regional administration officer and a staff as indicated below.

Means of Verification - USAID Project Manager oversight, project evaluations, TAP reports.

Inputs - In addition to principal staff salaries (see 3.4.1.1), support staff required to administer the project include one assistant administration officer, one assistant accounts officer, two secretaries, eleven assistants, three telephone operators and seven general hands. The cost of this support is \$654,600.

Component Output 3:

A coordinated program of in-service training activities is established at Matopos. Preference is given to SADCC scientists and SACCAR is involved with screening scientists.

Means of Verification - The training officer position will be filled by the second quarter of 1989. Evidence will be in project files that SADCC was advised of staffing and invited to make recommendations.

Inputs - Support staff required by the training officer include one research technician, and one driver. The cost of this support is \$108,360. Consultancies will also be used at a cost of \$12,000.

Component Output 4:

A station development officer assists in the strengthening of research for national programs. This staff member is chosen from a SADCC country and SACCAR is involved in the selection process.

Means of Verification - The station development officer will be chosen by the second quarter of 1989. Project files will demonstrate that SACCAR was involved in the choice.

Inputs - Support staff required by the station development officer include one research manager, nine research technicians, one secretary, four mechanic/tractor operators, one carpenter, two drivers and eighteen general hands. This support will cost \$1,267,800. Consultants will also be used a cost of \$9,000.

Component Output 5:

On-going research at the regional center is facilitated by the addition of a pearl millet breeder, finger millet breeder and a pathologist. Preference in the selection of these new employees is given to SADCC scientists and SACCAR is involved with the screening of candidates.

Means of Verification - The pearl millet breeder will be hired by the first quarter of 1990, and the finger millet breeder and pathologist will be hired by the first quarter of 1993. Project files will demonstrate SACCAR's input into the choice of candidates.

Inputs - (see 3.4.1.1, below)

Component Output 8:

The regional stations at Matopos and Mzarabani are upgraded in the form of land development, office buildings, housing for staff, a warehouse, support staff amenities, farm development, green houses, machinery, vehicles and equipment.

Means of Verification - Property records and on-site inventories document building development, staff amenities, machinery, vehicles and equipment in place.

Inputs - The capital costs for building development, machinery, vehicles and equipment will be \$2,361,000.

3.4.1.1 Overall Program Inputs - The principal staff salaries will be \$3,726,067 over 5 years. The regional scientists' salaries (e.g. training officer, station development officer, pearl millet breeder, finger millet breeder and pathologist) will be \$449,146 over five years. The operational costs (e.g. research operations and supplies, travel, vehicle operations and maintenance, laboratory and computer services, office occupancy and maintenance, administration and some consultancies) will be \$3,895,791 over the five year period. Project evaluation (e.g. review consultant and the Technical Advisory Panel) will cost \$245,000. The overhead that ICRISAT will charge for Phase II will be \$1,262,725. (15%).

3.4.2 Research

3.4.2.1 Sorghum Breeding Program

Component Output 1:

An interdisciplinary team continues to develop base populations, crossing and conversion programs, experimental varieties and hybrids, screening for resistance to diseases, insects, striga, drought and quality characteristics related to crop utilization. Exploitation of segregated materials continues in a critical manner in collaboration with pathology, entomology, agronomy, food technology and socio-economic programs. Introductions and germplasm collections are regionally evaluated and a pedigree management program is used to keep track of materials. Crosses are made as required to enhance selection opportunities toward defined objectives.

Means of Verification - A germplasm cataloging system and a pedigree identification system will be in use. Selection criteria involving resistance traits and focussed on end-use will be mentioned in annual germplasm reports as well as evidence of strengthened interactions with the crop utilization community. Superior varieties and hybrids will move into advanced national trials and some will be released for farmer use.

Inputs - Support staff for the sorghum breeding program will include four research technicians, one secretary, one driver, and nine general hands. The support will cost \$459,000 over five years. Consultants will also be periodically used at a cost of \$16,087.

Component Output 2:

National programs contribute to development, evaluation and release of improved sorghum varieties and hybrids. The regional sorghum breeder will assist national breeders in these activities.

Means of Verification - National breeders are using national research funds to develop new varieties and hybrids and test them in their countries. They will also be responsible for release of superior cultivars.

Inputs - (see 3.4.2.1.a)

Component Output 3:

Collaborative links are developed with SACCAR between the sorghum breeding program and seed multiplication agencies/producers.

Means of Verification - Regional program has evidence of actively consulting seed multiplication agencies/producers (e.g. minutes from meetings, reports and letters).

Inputs - (see 3.4.2. 1.a)

3.4.2.2. Millet and Forage Breeding Program

3.4.2.2.1 Pearl Millet

Sub-Component Output 1:

As for sorghum, an interdisciplinary team continues to develop millet lines and hybrids that were initiated in Phase I. A pedigree management program is employed to handle program stocks and selections.

Means of Verification - As with sorghum, a germplasm cataloging system and a pedigree identification system will be maintained. In addition, selection criteria involving resistance traits and focussed on end-use will be described in annual germplasm reports. Superior varieties and hybrids move into advanced national trials and some are released for farmer use.

Inputs - Support staff for the overall millet and forage breeding program will include seven research technicians, one secretary, one driver, and ten general hands. The total cost of support over five years is \$559,800. Consultants will also be used periodically at a cost of \$31,088. In addition, one post-doctoral candidate will be working in the program on forages, and his funding comes from outside sources.

Sub-Component Output 2:

National programs contribute to development, evaluation and release of improved pearl millet varieties and hybrids. The regional pearl millet breeder assists national breeders in these activities.

Means of Verification - National breeders use national research funds to develop new varieties and hybrids and test them in their countries. They are also responsible for the release of superior cultivars.

Inputs - (see 3.4.2.2.1.a)

3.4.2.2.2 Finger Millets

Sub-Component Output 1:

Acquisition of finger millet germplasm, particularly from East Africa, continues. This germplasm collection is expanded and preserved.

Means of Verification - A germplasm cataloging system for finger millets and a pedigree identification system will be maintained.

Inputs - (see 3.4.2.2.1a)

Sub-Component Output 2:

As for sorghum, an interdisciplinary team continues to develop finger millet lines based on breeding stock identified in Phase I.

Means of Verification - Development of varieties with resistance and quality traits. Results will be included in proceedings of Annual Workshops.

Inputs - (see 3.4.2.2.1a)

Sub-Component Output 3:

Work continues on finger millet crossing techniques and identification of male sterile lines.

Means of Verification - Information on finger millet crossing techniques and male sterile lines will be reported in annual reports.

Inputs - (see 3.4.2.2.1a)

Sub-Component Output 4:

Finger millet end-use criteria to allow for meaningful selection is established.

Means of Verification - End-use criteria will be specified in annual reports.

Inputs - (see 3.4.2.2.1a)

3.4.2.2.3 Forages

Sub-Component Output 1:

Germplasm collections of forage sorghums and millets as well as interspecific hybrids involving pearl millet are expanded substantially. Forages are assessed in comparison to the performance of Babala and Bana Grass.

Means of Verification - A germplasm cataloging system for forage sorghums, millets and interspecific hybrids and a pedigree identification system are maintained.

Inputs - (see 3.4.2.2.1a)

Sub-Component Output 2:

Promising varieties of forage sorghum and millets are evaluated and made available in the region.

Means of Verification - Varieties of forage sorghum and millets and hybrids similar to, or better than commonly used varieties will be released. Responsibilities of the regional and national programs will be identified.

Inputs - (see 3.4.2.2.1a)

Sub-Component Output 3:

Value of sorghum and millet forages are evaluated in collaboration with livestock management programs.

Means of Verification - Results of animal feed trials will be reflected in annual reports.

Inputs - (see 3.4.2.2.1a)

3.4.2.3 Pathology Program

Component Output 1:

The pathology program continues to support the sorghum and millets breeding programs in breeding for disease resistance by screening breeding material and other germplasm under natural and artificial disease pressure.

Means of Verification - Evidence of disease screening will be provided in the annual pathology program reports.

Inputs - Support staff required for the pathology program will include four research technicians, one secretary, one driver, and four general hands. This support will cost \$334,200 over a five year period. Consultants will also be used periodically at a total cost of \$10,500.

Component Output 2:

Economically important diseases of sorghum and millets in the SADCC region are identified and their distribution is defined.

Means of Verification - A technical report summarizing disease distributions in the region will be provided.

Inputs - (see 3.4.2.3a)

Component Output 3:

A green house screening facility is established for screening seedlings for Downy Mildew.

Means of Verification - A green house screening facility is established and operational.

Inputs - (see 3.4.1h)

Component Output 4:

Screening methods for important sorghum and millet diseases such as downy mildew and ergot are developed and utilized.

Means of Verification - The annual pathology report will show evidence of screening methods and the use of techniques developed to help reduce disease severity.

Inputs - (see 3.4.2.3a)

3.4.2.4

Entomology Program

Component Output 1:

The entomology program continues to support the sorghum and millet breeding programs by screening breeding material and other germplasm under natural and artificial infestation.

Means of Verification - The annual entomology program reports show evidence of effective screening.

Inputs - The support staff for the entomology program will be three technicians, one secretary, one driver, and two general hands. This support will cost \$268,200 over five years. Consultants will also be used periodically at a total cost of \$10,500.

Component Output 2:

Economically important insect pests are identified and their distribution defined.

Means of Verification - A report will be prepared which summarizes the distribution of the economically important insects in the region.

Inputs - (see 3.4.2.4a)

Component Output 3:

Assistance is provided to national program scientists in planning and conducting loss-assessment studies.

Means of Verification - Assistance to national program scientists in planning and conduction loss-assessment studies will be reflected in annual reports.

Inputs - (see 3.4.2.4a)

Component Output 4:

Screening methods for important bores, other priority insects and storage insects are developed and utilize .

Means of Verification - The annual entomology reports will show evidence that screening methods help reduce the severity of insect damage.

Inputs - (see 3.4.2.4a)

3.4.2.5

Agronomy Program

Component Output 1:

The agronomy program continues to review sorghum and millet husbandry practices in the region and on-going agronomic research conducted by the national programs.

Means of Verification - A synthesis report will be made available which identifies topics of wide concern. This report will provide a base to keep focus in the program.

Inputs - The support staff for the agronomy program will include four research technicians, one secretary, one driver, and four general hands. The cost of the support will be \$283,800 over five years. Consultants will also be used periodically at a cost of \$23,000.

Component Output 2:

Pigeon pea evaluation continues.

Means of Verification - Varieties of pigeon peas will be identified with demonstrated superior performance in the region.

Inputs (see 3.4.2.5a)

Component Output 3:

Drought screening methods for sorghum and millets are developed regionally and in collaboration with the ICRISAT Center. Drought prone areas in the region are identified as benchmark areas for screening germplasm.

Means of Verification - A technical report will be provided which describes drought screening methods and their contribution to varietal improvement.

Inputs - (see 3.4.2.5a)

Component Output 4:

Crop management practices are developed by the agronomy program which improve crop establishment, crop growth, water-use efficiency and grain yield.

Means of Verification - The annual reports of the agronomy program will show evidence of improved crop management practices.

Inputs - (see 3.4.2.5a)

Component Output 5:

Working relationships are established between the regional agronomy program and national program scientists such that collaborative research trials are initiated.

Means of Verification - Trip reports issued by the agronomy program will reflect this collaboration with the national programs.

Inputs - (see 3.4.2.5a)

3.4.2.6 Agricultural Economics Program

Component Output 1:

Studies on sorghum and millet marketing and utilization issues for SADCC countries are on-going.

Means of Verification - Information on sorghum and millet marketing and utilization issues for SADCC countries will be provided in technical reports and annual reports.

Inputs - The support staff for the agricultural economics program will include one research technician, one research associate, one secretary and one driver. The total cost of this support for five years will be \$120,600.

Component Output 2:

The social science program continues to work closely with the breeders, pathologist, entomologist, agronomist, and food technologist to ensure that the socio-economic dimensions of the development of crops are considered.

Means of Verification - The annual reports of the various technical science programs reflect that socio-economic constraints and considerations are being taken into account.

Inputs - (see 3.4.2.6a)

Component Output 3:

Studies of coarse grain substitution and related sorghum and millet food security issues for the SADCC countries are on-going.

Means of Verification - Information on sorghum and millet marketing and utilization issues for SADCC countries will be provided in technical and annual reports.

Inputs - (see 3.4.2.6a)

3.4.3

Sorghum and Millet Utilization

Component Output 1:

A grain and product quality testing facility is established with the capability to carry out physical chemical, bio-chemical, functional and sensory tests.

Means of Verification - The grain and products testing facility is in place and operational.

Inputs - The equipment for the grain quality laboratory will cost \$102,087.

Component Output 2:

A cereal technology laboratory is set up for Rheological and specialized functional tests on secondary products of grain processing such as flour, dough and beverages.

Means of Verification - The cereals technology laboratory is in place and operational.

Inputs - The equipment for the cereal technology laboratory will cost \$77,177.

Component Output 3:

A pilot plant is established incorporating various cereal processing facilities and equipment for milling, baking and brewing.

Means of Verification - The pilot plant is in place and operational.

Inputs - The equipment for the pilot plant is estimated to cost \$180,000.

Component Output 4:

A test kitchen is established.

Means of Verification - The test kitchen is in place and operational.

Inputs - The equipment for the test kitchen will cost \$6,000.

Component Output 5:

Priorities are established for improving sorghum and millet utilization.

Means of Verification - A technical report will be made available outlining how priorities were established.

Inputs - Support staff for the sorghum and millet utilization program will include two research technicians, one secretary, and some general hands. This support will cost \$186,000 over five years.

Component Output 6:

Techniques are developed to assist sorghum and millet breeders to select varieties and hybrids for specific end-uses.

Means of Verification - End-use tests developed by the utilization unit are being used as selection criteria in breeding programs.

Inputs - (sec 3.4.3e)

Component Output 7:

Several non-food industrial products such as alcohol (for fuel) and cellulose for fiber board are examined by the utilization unit.

Means of Verification - Annual reports by the utilization unit describe what products have been examined and certain products are available for review.

Inputs - (see 3.4.5e)

Component Output 8:

The sorghum and millet utilization program contributes to the establishment of some grain and stem quality characteristics.

Means of Verification - Annual reports and technical reports produced by the utilization unit will outline grain and stem quality characteristics.

Inputs - (see 3.4.5e)

Component Output 9:

A descriptor list of grain quality traits is developed.

Means of Verification - A technical report will be produced by the utilization unit that presents this descriptor list.

Inputs - (see 3.4.5e)

Component Output 10:

Crop utilization workshops are held annually and one international workshop is held during the five year period.

Means of Verification - The proceedings of the workshops will be made available.

Inputs - The cost of the workshops over the five year period will be \$85,375.

3.4.4 Strengthening National Programs

Component Output 1:

The regional program continues to provide to national programs elite germplasm, lines for hybridization, populations for further improvements, coordinated trials for yield testing and nurseries of various kinds.

Means of Verification - Annual reports produced by the regional crop improvement program will reflect the materials and coordinated trials provided to national programs. The proceedings of the Annual Workshop will also reflect the distribution of these materials and service to NARS.

Inputs - The operational budget for carrying out the support to national programs is \$202,000 over five years. This includes inputs such as field supplies, operational assistance, weed control and striga research.

Component Output 2:

Annual workshops are held for joint program planning and reporting results.

Means of Verification - A workshop proceedings record will be produced annually.

Inputs - The money budgeted for annual workshops for five years is \$257,250.

Component Output 3:

Monitoring tours are held annually. These are held during the growing season and include visits to the regional center and at least three national programs.

Means of Verification - Trip reports will be provided that documents the countries and programs visited and participants.

Inputs - Travel money has been budgeted for these activities in the sum of \$238,295 over the next five years.

Component Output 4:

Regional scientists continue to visit national programs to promote scientific interaction and on-the-job training.

Means of Verification - Trip reports will be provided that document the countries and research programs visited and important findings.

Inputs - Travel money has been budgeted for these activities in the sum of \$168,000 over five years. Consultants will also be used at a cost of \$398,970.

Component Output 5:

Several conferences (both regional and international) and workshops on specific topics of regional interest are sponsored. Workshops and conferences are held on such topics as station management development, crop utilization, birds and rodents, feed and animal nutrition, sorghum in the nineties, parasitic weeds (striga), stemborers, water management in the semi-arid SADCC region, and aphids.

Means of Verification - Proceedings on sponsored workshops and conferences will be made available.

Inputs - The cost of these conferences and workshops will be \$141,720 over five years.

Component Output 6:

Assistance is provided for experiment station design, development of fields and water management, systems for station management and the provision of field and laboratory equipment and supplies to strengthen national program research stations. A plan is developed for station improvement in each SADCC country. Assessments are made of national stations to determine what appropriate resources and infrastructure are required for station improvement.

Means of Verification - Evidence will be provided that substantive progress has been made in some of the SADCC countries to strengthen an important sorghum and millet station. Annual updates of activities and lists of materials supplied to national programs will also be provided.

Inputs - The inputs over the next five years for station improvements are as follows: 1) plant protection (75,000); 2) seed storage (\$190,000); 3) station development (\$285,000); machinery and equipment (\$350,000); 4) laboratory and housing (\$135,000) and vehicles (\$42,500).

Component Output 7:

Publications, brochures, technical bulletins and pamphlets are produced by the regional program and provided to national program researchers and extension personnel. The training officer and the information/documentation officer coordinate these activities.

Means of Verification - The regional program will provide an annual updated list of available publications by category and subject.

Input - The cost of publications and their distribution has been budgeted at \$106,250.

Component Output 8:

National program scientists travel throughout SADCC countries to promote networking and exchange of ideas with their colleagues.

Means of Verification - Trip reports will be provided which document the movements of national scientists within the region and program visited.

3.4.5 Training

3.4.5.1 Long-term Degree Training (INTSORMIL)

Sub-Component Output 1:

Thirty-five PhD students and six MSc students are trained or sent for training in Phase II. The INTSORMIL training plan is reviewed to ensure that changes in program direction are taken into account in the selection of disciplinary training. For example, more emphasis may be given to food technology and social science than was originally planned. This long-term training program is coordinated with other bilateral training programs. When possible, thesis research is carried out in the region.

Means of Verification - A training document will be prepared by the training officer which will contain information such as projected vs. achieved figures, courses of study, names of trainees, location of training, duration and number of students doing thesis research in the region. This training document will account for changing project direction and national needs. A follow-up evaluation system will be established with specific criteria to assess impact.

Inputs - The long-term degree training costs over the next five years will be \$4,857,500. This program will be managed by INTSORMIL.

3.4.5.2 Non - Degree Training

Sub-Component Output 1:

Two in-service training programs are offered at ICPISAT Center each year. One course is an in-service training course for research technicians (6 months) and one is on experiment station management, development and operations.

Means of Verification - A follow-up will be established to assess the impact of these training programs. A training document will also be prepared by the training officer specifying the names of the trainees, and courses of study.

Inputs - The cost of the ICRISAT Center in-service training will be \$215,000 over five years.

Sub-Component Output 2:

Nine in-service training programs are offered annually or bi-annually at the regional center at Matopos. Training courses cover such topics as experiment station management, research technical training, crop utilization and experimental design.

Means of Verification - A training document will be prepared by the training officer specifying the names of the trainees, their country of origin and the training course of study. An evaluation system will also assess the impact of these training activities.

Inputs - The cost of the in-service training offered at Matopos will be \$496,170 over five years.

Sub-Component Output 3:

Thirteen post-doctoral candidates are working with the regional program over the next five years. One or more of these post-doctoral candidates focuses on sorghum and millet utilization.

Means of Verification - A training document will be prepared by the training officer specifying the activities of the various post-doctoral candidates.

Inputs - The cost of the post-doctoral program will be \$192,000 over five years.

Sub-Component Output 4:

Five research associates are working with the regional program on various disciplinary topics over the next five years. At least one of these research associates focuses on sorghum and millet utilization.

Means of Verification - A report will be prepared annually by the training officer which records the nature and duration of the work of each national scientist working at Matopos.

Inputs - The cost of the research associates program has been estimated to be \$264,000.

Sub-Component Output 5:

Additional national agricultural staff are periodically trained.

Means of Verification - A training document will be prepared by the training officer specifying the names of the trainees, their country or origin and courses of study.

Inputs - The cost of the training activity will be \$70,000.

Sub-Component Output 6:

The University Summer Student Program is carried out on an annual basis.

Means of Verification - The summer students program will be in place for both the regional program and some of the NARS. A training document will be prepared by the training officer specifying the number of students participating and their research focus.

Inputs - The cost of the University Summer Students Program will be \$152,500 over five years.

Sub-Component Output 7:

Fifty trainees returning from long-term training work for two to three months at the regional center (approximately 10 per year). This training helps them become familiar with the research and methodologies of the regional center in their respective areas of expertise.

Means of Verification - A report will be prepared annually by the training officer which documents the presence of returning students and the nature of their work at the regional center.

Inputs - The cost of this training is estimated at \$168,000. The total cost of consultancies associated with training components will be \$456,000.

4.1 Project Costs

Realization of the program of activities for the period September, 1988 to September 1993 has been estimated to cost \$24,115,654. A detailed budget is attached in annex as Table VIII: SADCC/ICFISAT, SMIP/Phase II - Financial Plan and Budget. The AID-funded components of the total requirement, amounting to \$16,433,394 (\$15,150,000 supplement + \$1,283,394 carry-over from phase I) comprises 68% of the program. The remainder of the program costs has been pledged by the Canadian and German governments.

Specific elements to be funded under the AID contribution to the program are as follows:

Crop breeding	\$3,413,783
Pathology	1,206,079
Economics	816,999
Matopos station development	4,114,522
INTSORMIL training*	4,537,500
Administration	<u>2,344,511</u>
	16,433,394

*Excepting Angolan students.

4.2 Other Donor Inputs

The Canadian International Development Agency (CIDA) will contribute US \$5,867,831 in support of phase II program activities. The specific components to be funded by Canada are as follows:

Agronomy	\$1,176,217
Food Technology	1,374,310
Assistance to national stations	1,517,795
In-service training	<u>1,799,509</u>
	5,867,831

The German Agency for Technical Cooperation (GTZ) will contribute the remaining US \$1,814,429 required to fully-fund the phase II program. The specific components to be funded by Germany are as follows:

Entomology	\$1,173,929
INTSORMIL training*	320,000
In-service training	<u>320,500</u>
	1,814,429

*Angolan students.

4.3 National Participation in the Project

The input of the different SADCC states into the improvement of sorghum and millets varies. Essentially, national programs provide staff, land and operational costs to grow and manage national and regional nurseries and yield trials (both on and off station). They contribute to the management of introduction nurseries and screening nurseries for resistance to disease and insect pests. Their farming equipment is utilized without charge to the project to support crops of the regional program. The regional program attempts to avoid funding operations of the national stations and rather, to use its resources to strengthen the development of the stations. This has worked well in phase I and will continue.

An important constraint in phase I has been a shortage of qualified staff to contribute to both national and regional research agenda. With the return of individuals educated under the auspices of the phase I program and with further education in phase II, the directors of research and chief agricultural research officers will be in a position to allow more regional participation from their (national) staff. Elements included in phase II in anticipation of this include:

- 1) employment of regional scientists;
- 2) a research associate program;
- 3) support for national scientists to contribute regionally;
- 4) increasing regional awareness of sorghum and millet improvement opportunities for returning students by funding 2-3 months at the regional center during their studies.

This moves the program more in the direction of greater regional participation but not of regional support. SACCAP has not been structured to implement and finance programs such as this. They are considering how recurrent costs might be met in the future. In phase II, the contribution of national scientists to research, both national and regional and to education and training should increase and can be documented. It is not anticipated in phase II that SADCC/SACCAP will become financially involved, although they may contribute to some aspect of the staff development activity. There is an active concern within SACCAP over the long range financial costs of regional activities

V. Phase II Implementation Plan

5.1 SACCAP Monitoring

Each year, the Southern African Center for Cooperation in Agricultural Research (SACCAP) has three opportunities to review the progress of the SADCC/ICPISAT regional program.

First, the regional program director makes a status report to the annual board meetings of SACCAR. This board is composed of senior administrators so only issues of concern at the policy level are discussed.

Second, a Technical Advisory Panel (TAP) has been constituted to annually review the progress of the regional project for SACCAR. The membership of this panel comprises leading sorghum and millet scientists from the region and outside. The TAP meetings are attended by all of the regional scientists who report on the progress made in the respective programs and plans for the future. TAP meetings are also attended by the donors.

5.2 AID Project Monitoring

The implementation of the second phase of this project will be monitored by the project officer responsible for agricultural activities under the supervision of the Deputy Director, USAID/Zimbabwe. Financial management will be provided by the Controller, USAID/Zimbabwe.

5.3 Evaluation Schedule

The final evaluation of the first phase of the project was conducted in June, 1988. The time remaining until the PACD is of such a short duration that no further formal evaluations are planned. The Project Completion Report to be prepared in December, 1990, will further assess the accomplishments of the first phase of the project.

An interim evaluation of the project supplement has been scheduled for June, 1991 and a final evaluation of phase II activities is planned for June, 1993. These evaluations will be supplemental to the annual Technical Advisory Panel reviews.

5.4 Evaluation Framework and Linkage Between Phase II Activities and Project Purpose

The purpose of the program is to increase production of sorghum and millets resulting in an improvement in the quality of life of poor people in semi-arid areas. There are several components to this purpose:

- 1) development of varieties and hybrids with yield capability initially exceeding that of cultivars currently being grown. Improvement in yield is a constant endeavor of all breeding programs;

- 2) assurance that yield over seasons and locations is stable. Stability of yield is to a degree heritable and resistance to pests and environmental stresses contributes to stability. It is of concern that new varieties and hybrids are not highly susceptible to some pest that could endanger overall

production of a crop in a region. Assurance of stability of production requires contribution from a multidisciplinary research team;

3) the production of sorghum and millets to be used as food, feed and to contribute to industrial products - both for food and non-food uses. Traits can be identified and tests developed so that a selection pressure can be applied with respect to some product or products. Frequently, the crop can have several uses - grain for food, stover for feed. Increasing the convenience of using sorghum and millets as traditional foods and in improving their marketability are important aspects of encouraging production.

A crop improvement program needs to analyze many small samples while a commercial concern handles one or two varieties in very large quantity. This unique requirement of a crop improvement program makes necessary the laboratory capability to manage large numbers of samples where small quantities of seeds are available.

The sustainability of production of sorghum and millets rests on research that involves increasing yield, stabilizing production and increasing opportunities to use the grain and stover. Clearly, a multidisciplinary team is required whether it has regional or national responsibilities. How well these components are stabilized within the research structures of the region is a measure of achievement.

While the principle means of achieving the program purpose is through the strengthening of national research capability, the desired long-term contribution of a regional program is less clear. The approach to strengthening national capability to improve sorghum and millets involves research, education and training, and assistance in improving conditions and opportunities for research. These are inter-related activities. All of these activities have been initiated by the regional program and all have contributed in varying degrees to strengthening national program capabilities.

Human resource development is a constraint in the SAHCC region. A regional program is a mechanism to spread expertise and ICRISAT is a source of expertise. However, a transition from ICRISAT expertise to local expertise is the long-term objective of the program. Experience indicates that 20 to 25 years is a reasonable timeframe for this transition.

Advancement cannot occur without research and a regional program will not contribute per se to the strengthening of national programs without a research base. The regional program can explore at levels initially difficult for national programs and then transfer the technology derived from these explorations. The input into crop utilization is a case in point. The regional program, in a sense, is catalytic in

generating national research. It can also be cost effective; since not all nations attach the same degree of priority to breeding for stem-borer resistance, it can be done as a regional service. Given limited resources at the national level, it would perhaps not be done at all in some countries if left to the national programs functioning autonomously.

Although the purpose of the program is to increase production of sorghum and millets, a very important component of this is the strengthening of the human resource base in the region to sustain and expand the research component and hence the sustainability of ever-increasing production. The education and training aspects are essential to this and provide a base for increased national contribution to the regional program.

Signposts of success will be effective contribution of national scientists to both national and regional programs. Proceedings of workshops and the TAP reviews will assist in monitoring this. Participation in educational and training programs can also be followed as an indication of progress. Improvements at the experimental stations will be reported at both workshops and TAP meetings.

The broader issue of ICFISAT phasing out of the regional program, leaving it to SADC management, will occur through a gradual and systematic transition process. The first five years of the project were essentially a period of establishment and infrastructure building. The second five years anticipates a much greater involvement of national scientists in national and regional research but funding of the regional program by outside donors, through ICFISAT. The third phase will begin to see a moving out of ICFISAT international staff and the program increasingly manned by regional staff who are employed by ICFISAT. By the end of the third five-year period and into the fourth, the catalytic role of the regional program should be less as national programs will have a stronger base. One can visualize that the regional program would be more service-oriented than at present. In the fourth and fifth five year periods, SADC/SACCAP will need to determine how large a regional program they want, how it will be managed and how funded.

5.5 Schedule for Implementation of Phase II

<u>Time Period</u>	<u>Activities</u>
Year 6 (1989)	<ul style="list-style-type: none">- Recruitment of the Training Officer and Station Development Officer in the second quarter.- Annual Regional Workshop on sorghum and millet research planning held.- Station Management and Development Workshop held.- Annual Crop Utilization Workshop held.- Verification of sorghum lines resistant to <u>Striga</u> begins.- Agronomy program completes synthesis report which is a review of husbandry practices and on-going research.- Begin review of existing farmer production constraints for SAPCC countries. <p>Techniques are developed to assist sorghum and millet breeders in selecting varieties and hybrids for specific end uses.</p> <ul style="list-style-type: none">- A descriptor list of grain quality traits is developed.- Four PhD student and nine MSc students sent for training.

Time Period

Activities

Year 7 (1990)

- Recruitment of Pearl Millet Breeder.
- Annual Regional Workshop on sorghum and millet research planning held.
- Workshop on birds and rodents held.
- Annual Crop Utilization Workshop held.
- International Workshop on Sorghum in the Nineties held.
- Expand housing construction at Mzarabani.
- Construct additional office buildings at Matopos.
- Expand construction on support staff housing.
- Begin additional construction of green houses.
- Methods of screening pearl millet for Downy Mildew adapted.
- Method of screening pearl millet for smut adapted.
- Disease distributions for sorghum and millets in the region are defined.
- Green house screening facility is established for screening seedlings for Downy Mildew.
- Priorities are established for improving sorghum and millet utilization.

Time Period

Activities

Year 7 (1990) cont.

- Grain and stem quality characteristics are established.
- Thirteen PhD students and twelve MSc students sent for training.

Year 8 (1991)

- Annual Regional Workshop on sorghum and millet reseach planning held.
- Annual Crop Utilization Workshop held.
- Workshop on Economic Aspects of Sorghum and Millets in SADCC.
- First International Workshop on Finger Millets held.
- Construction of additional office buildings at Matopos continues.
- Links with seed multiplication agencies/producers are established.
- Promising varieties of forage sorghum and millets will be evaluated and made available in the region.
- Sorghum and millets forages are evaluated in collaboration with livestock management programs.
- Economically important insect pests are identified and their distribution is specified.

Time Period

Activities

Year 8 (1991) cont.

- First report on socio-economic implications of new varieties and hybrids for farmer use and marketing is completed.
- Non-food industrial products of sorghum and millet are examined.
- Nineteen PhD students and five MSc students are sent for training.

Year 9 (1992)

- Recruitment of finger millet breeder and pathologist in first quarter.
- Annual Regional Workshop on sorghum and millet research planning held.
- Annual Crop Utilization Workshop held.
- Additional warehouse at Matopos constructed.
- National programs release improved sorghum hybrids and varieties.
- Assessment conducted of striga resistant lines of sorghum.
- Methods for screening pearl millet for Ergot are adapted.
- Techniques are developed for evaluating resistance to finger millet blast.
- Second report on socio-economic implications of new varieties and hybrids for farmer use and marketing completed.
- Twenty PhD students and two MSc students sent for training.

Time Period

Activities

Year 10 (1993)

- Annual Regional Workshop on sorghum and millet research planning held.
- International Crop Utilization and Reappraisal Workshop held.
- Station Management and Development Workshop held.
- National programs release improved sorghum hybrids and varieties.
- Finger millet end-use criteria are well established.
- Twenty PhD students and two MSc students sent for training. Another 15 PhD students and one MSc student are sent in 1994, and 10 more PhD students are sent in 1995.

6.1 Technical Analysis

A crop improvement program has two important components: the generation of variability for selection and the exploitation of variability in the development of new varieties and hybrids. The regional program does both, but its greater contribution is introduction and crossing to generate variability and working with national programs to exploit it. This will become increasingly apparent in phase II and will increasingly involve resistance and quality traits.

The collection, characterization and preservation of germplasm in the region is still not complete and will proceed as opportunity permits.

Prioritization of pests (disease, insects, striga) in the region is reasonably clear and will be completed in phase II. Techniques will be adapted from other stations as possible or developed when necessary to screen introductions and breeding stock for resistance traits. "Hot spot" locations in the region will be determined and the interaction between pest and climate studied to assist in developing and adapting screening procedures. Establishment of screening procedures are complicated by seasonal variation in pest expression. Initial steps have been taken to understand racial similarities and differences in pests important to their crop interactions. These are important aspects of regional research, enabling interaction with breeders. Incorporation of resistance traits contributes to the stability of production of high-yielding varieties and hybrids.

Increased production of sorghum and millets will be encouraged by developing procedures to simplify the preparation of these crops into food and the expansion of market opportunities. Two concepts, breeding for end use and multiple crop use evolved in phase I and will be implemented in phase II. This implementation requires trait identification and prioritization for which good progress has already been made. A laboratory is required to analyze large numbers of samples of small quantity to support selection for various crop uses. There are no institutions in the region equipped to do this apart from the regional program.

6.2 Economic Analysis

Although maize is the dominant cereal crop in the SADCC region, sorghum and millet are of major importance to the economies of most of the nine constituent countries. Botswana is the only SADCC country wherein sorghum and millet account for the dominant share of cereal production (over 60 percent). These crops provide a crucial source of calories, however, to many of the lowest income farmers situated in the large semi-arid areas of most of the remaining SADCC countries.

One reason for the dominance of maize in many of these countries is the relative lack of historical support for small grain research. This has placed low income farmers at a disadvantage, and promoted the substitution of maize for sorghum and millet in regions which may be better suited to the small grains. Regional imports of maize and wheat have increased while national food security has declined. Such circumstances offer the prospects for substantial long term returns to the regional strengthening of national sorghum and millet research programs.

A more detailed view of the relative importance of sorghum and millet in the nine SADCC country economies provides a basis for assessing the potential size of these returns. Sorghum and millet account for almost 80 percent of the cereal area planted in Botswana (Table 1). These crops have been planted on over one-quarter of all cereal area in Tanzania, Lesotho, Mozambique and Zimbabwe. The two crops account for at least ten percent of cereal area in Angola, Malawi and most likely Zambia. (Local inquiries suggest the actual importance of sorghum and millet in Zambia may be substantially higher than is indicated by the country's official statistics.) Only Swaziland has a relatively minor portion of its land allocated to small grains.

The relative importance of sorghum and millet becomes similarly apparent in the assessment of their relative contribution to national cereal supplies (Table 2). Between 1981 and 1986, sorghum and millet accounted for almost 60 percent of Botswana's cereal production and over one-quarter of the cereal production in Mozambique, Tanzania and Lesotho. Angola, Malawi and Zimbabwe derived at least nine percent of their cereal production from small grains. The lower contribution of sorghum and millet to cereal production relative to cereal area in these countries results from the significantly lower average yields of these crops in comparison with maize. This, in turn, has resulted from the relative historical emphasis on maize in the national research programs. This contrast is particularly evident in Zimbabwe, a country with a decades old and well-regarded maize research capability. Prior to independence in 1980, Zimbabwe's sorghum and millet research capability was almost non-existent.

As a result, though sorghum and millet in Zimbabwe account for 25 percent of cereal production area, these crops account for only nine percent of cereal production.

Table 1. Sorghum and Millet as a Proportion of Cereal Production Area in the SADCC Countries, 1981-86

Country	Sorghum as a Percent of Cereal Area (1)	Millet as a Percent of Cereal Area (2)	Sorghum and Millet as a Percent of Cereal Area (1+2)
Botswana	67.6	9.4	77.0
Tanzania	23.7	11.9	35.6
Lesotho	27.9	-	27.9
Mozambique	23.8	2.2	26.0
Zimbabwe	11.5	13.6	25.1
Angola	-	11.0	11.0
Malawi	10.2	-	10.2
Zambia**	4.5	3.9	8.4
Swaziland	3.0	-	3.0

** These data are believed to grossly underestimate the contribution of sorghum and millet to Zambian cereal supplies.

Source: FAO Production Tapes (1986) Rome.

Table 2. Relative Importance of Sorghum and Millet in the Production Systems of the SADCC Countries, 1981-86

Country	Sorghum as a Percent of Cereal Production (1)	Millet as a Percent of Cereal Production (2)	Sorghum and Millet as a Percent of Cereal Production (1+2)
Botswana	53.3	5.3	58.6
Mozambique	31.1	0.8	31.9
Tanzania	19.2	9.1	28.3
Lesotho	26.6	-	26.6
Angola	-	15.1	15.1
Malawi	9.5	-	9.5
Zimbabwe	3.7	5.5	9.2
Zambia**	1.9	1.6	3.5
Swaziland	1.3	-	1.3

** These data are believed to grossly underestimate the contribution of sorghum and millet to Zambian cereal supplies.

Source: FAO Production Tapes (1986) Rome.

Sorghum and millet account for over one-third of the total calories consumed in Botswana (Table 3). The proportion would be substantially higher if Botswana was not a deficit cereal grain producer. During the worst drought years of the 1980s, domestic cereal production declined to less than ten percent of consumption requirements. As a result, local diets have rapidly been shifting to a reliance on imported maize and wheat.

Sorghum and millet have historically accounted for approximately 15 percent of calories consumed in Zimbabwe and Lesotho and ten percent in Mozambique. Both Lesotho and Mozambique are similarly importing large quantities of maize and wheat, while Zimbabwe imports roughly 20 percent of its wheat requirements. Angola, Swaziland and Zambia are also consistent cereal grain importers, while Malawi may be heading in this direction.

Table 3. Per Capita Consumption of Calories Per Day and Percent of Calories Derived From Sorghum and Millet for the SADCC Countries, 1972-74

Country	Per Capita Calories Consumed Per Day	Sorghum as a Percent of Total Calories Consumed	Millet as a Percent of Total Calories Consumed	Sorghum and Millet as a Percent of Total Calories Consumed
Botswana	2025	34.0	1.1	35.1
Zimbabwe	2478	2.0	13.8	15.8
Lesotho	2205	15.0	-	15.0
Mozambique	1987	9.4	0.4	9.8
Zambia	2014	3.2	2.8	6.0
Angola	1993	-	4.5	4.5
Tanzania	1956	2.5	1.5	4.0
Malawi	2413	2.7	-	2.7
Swaziland	2117	1.2	-	1.2

Source: FAO Provisional Food Balance Sheets, 1972-74 Average (1977) Rome.

Recent regional production trends for sorghum and millet provide a sobering contrast to the importance of these crops for the SADCC economies (Table 4). Production levels of sorghum have declined since the early 1960's in four of the eight countries producing this crop (Lesotho, Botswana, Zambia and Swaziland). In two of the four countries registering production gains (Tanzania and Zimbabwe), this growth has resulted solely from area expansion. Yields have been declining. Only Malawi has obtained significant annual increases in average yields.

Only two of the six SADCC millet producers have obtained average production gains (Tanzania and Botswana). The growth of millet production in both countries has been based largely on area expansion. Only Zambia appears to have registered significant average yield gains, though as noted above, this data is subject to question.

Table 4. Average Annual Growth Rates of Area, Production and Yield for Sorghum and Millet in the SADCC Countries, 1961-65 to 1981-86

Country	Average Annual Growth Rate (Percent)					
	Sorghum			Millet		
	Area	Yield	Production	Area	Yield	Production
Tanzania	6.7	-0.2	6.5	3.5	0.5	4.1
Malawi	2.7	2.6	5.3	-	-	-
Zimbabwe	4.9	-2.5	2.4	-2.3	-0.4	-2.7
Mozambique	0.0	0.3	0.3	0.3	-3.6	-3.4
Angola	-	-	-	-0.5	-1.0	-1.5
Lesotho	-0.7	-1.1	-1.8	-	-	-
Botswana	-0.4	-2.6	-3.0	10.9	-4.3	6.7
Zambia	-4.6	0.9	-3.6	-7.9	1.1	-6.8
Swaziland	-10.5	1.0	-9.5	-	-	-

Source: FAO Production Tapes (1986) Rome.

Similarly, only two SADCC countries (Tanzania and Malawi) have registered positive per capita growth rates in sorghum and millet production since the early 1960s (Table 5). In both cases, the largest proportion of this gain was achieved during the 1970s. By contrast, the remaining SADCC countries (except Zimbabwe) have become increasingly reliant on cereal grain imports. In Zimbabwe, small farmers in the 75 percent of the country subject to mid-season dry spells and drought have begun shifting land out of sorghum and millet to maize. This increases the risks of production shortfalls and food insecurity.

The returns to agricultural research investments have been well documented in studies throughout the world. These generally range above the levels obtainable from most alternative capital investments. Despite this, many African countries have ignored the value of this investment. Governments have failed to account for the long periods required to build up a productive research capability. The contributions of research to yield growth and the general growth of the agricultural economy have not been fully perceived. The most direct constituency of research, the farm community, has not developed the authority to make its interests known. As a result, food production, as evidenced in the regional sorghum and millet production statistics, has stagnated. Cereal grain imports in the SADCC region have multiplied, straining the foreign exchange reserves of many of these countries. Limited supplies have been used to justify food subsidies in order to keep consumer prices low. Drought relief programs and health care

costs associated with the need to treat the malnourished have increased. Without agricultural sector growth, rural-to-urban migration increases and the growth of the broader macroeconomy slows.

Table 5. Production Growth of Sorghum and Millet Relative to Population Growth in the SADCC Countries

Country	Production Growth of Sorghum and Millet, 1961-65 to 1981-86	Population Growth Rate 1978-90
Tanzania	5.6	3.3
Malawi	5.3	3.4
Mozambique	0.2	2.8
Zimbabwe	-1.3	3.4
Angola	-1.5	2.7
Lesotho	-1.8	2.4
Botswana	-2.6	2.9
Zambia	-5.4	3.3
Swaziland	-9.5	2.9

Sources: FAO Production Tapes (1986) Rome.
IFPRI Computer Printouts (for population growth estimates)

If the SADCC/ICRISAT regional program contributes to raising average sorghum and millet yields by one-half the rate of regional population growth, the direct returns to this investment could approach 28 million dollars per year in ten years and over 40 million dollars per year in 15 years. Once the indirect returns were added in (the multiplied effect of income growth, and cost savings associated with the availability of cheaper food and improved health), the returns would be substantially higher.

At the same time, the unique synergistic impact of this program must be accounted for. The SADCC/ICRISAT research facility provides a low cost means to reinvigorate the sorghum and millet research capacity of nine different national programs. The critical mass of SADCC/ICRISAT scientists provides a strong research capability in its own right. Perhaps more importantly, this program provides a means to improve the resources available to each national program.

This group of scientists has direct access to the substantial expertise and germplasm of the ICRISAT center in India. In addition, they have the capacity to draw upon the vast array of genetic material available in the SADCC region and in

Africa as a whole. Such access is beyond the bounds of any individual national program. Regional tours and training programs allow national scientists to learn from one another as well as from the experience of scientists from outside the region. At a minimum, this program provides a strong foundation for the development of self-sustaining national endeavors. Further, the improved flow of both information and genetic material can multiply the returns to national investments. These benefits are difficult to quantify. Yet they would clearly not be available from a similar level of independent investments in each individual national program.

The failure of the SADCC countries to develop strong research programs geared to sorghum and millet is clearly evidenced in the production trends for these commodities. The SADCC/ICRISAT project was established to help reverse these trends. Progress achieved over the first four years of this project indicates that in the 10 to 20 years generally required before the returns to research begin to become evident, this reversal will have been initiated.

Recognizing that the returns to research depend additionally on market circumstances, the SADCC/ICRISAT program has recently established a regional analytical capability in agricultural economics and food technology. As sorghum and millet production have declined, these cereals have been widely replaced by maize and wheat. The economics program will explore measures necessary to reverse these trends which encompass issues beyond the technological determinants of potential yield. These include the wider determinants of coarse grain substitution and factors influencing the expansion of product utilization. The food technology program will examine the technological constraints to expanded utilization through new, alternative sorts of sorghum and millet based products. These include the use of sorghum as a substitute for imported wheat. Insights from both programs can reinforce the expected returns to crop improvement research.

6.3 Social Soundness Analysis

In the SADCC region, sorghum and millet are largely small-scale sector crops grown in the low rainfall, often drought prone, regions. The single exception to this generalization is Zimbabwe, where 20-50 percent of production is derived from the large-scale commercial sector to meet brewing industry demand. Farmers in these semi-arid areas are at the lower end of the income scale. Their limited set of economic opportunities are further affected by climatic uncertainties. This smallholder sector, encompassing a large proportion of subsistence producers

has generally been ignored by national research programs. The low priority attached to small grain cereals coupled with high population growth rates and prolonged, periodic drought has exacerbated the difficulties facing these farmers. Further, low incomes have limited their capacity to purchase food and food aid often arrives late or in limited quantities. As a consequence, the food production gap represented by declining production levels of sorghum and millet has resulted in acute hunger and malnutrition. Recent declines in sorghum and millet yields have particularly affected the poorest small grain producers. This pressing social issue brought the need for a regional sorghum and millet improvement program to the awareness of SADCC policy makers.

It was in this context that the SADCC/ICRISAT regional program was established. This regional program is basically charged with the responsibility to rapidly improve the production of sorghum and millet in the SADCC countries through crop improvement research as a means to aid low income, resource poor farmers.

The direct beneficiaries of the project will be the national program institutions, scientists, technicians and support staff. The three major inputs provided by the project are education and training, research and services. Thirty-nine trainees from different national programs have received degree training and numerous technicians have participated in in-service training offered by the ICRISAT center and Matopos. Research has been undertaken collaboratively by the national program scientists and regional scientists, focusing on improved varieties and hybrids with resistance to important pests and diseases and suitability for various end products. Services to national program scientists and staff encompass a wide array of activities including material support (e.g. provision of operational supplies and station development), professional help (e.g. establishment of nurseries, diagnosis of field problems, collecting germplasm), maintenance of off-season nurseries and dissemination of information.

The indirect beneficiaries of this strengthening of national programs are the poor populations living in the semi-arid areas where sorghum and millet are primarily produced. Production increases of these grains are intended to improve the well-being of these populations and ultimately redress inequalities of income distribution. A portion of these production gains will be sold, allowing these farmers to increase their incomes. A portion will serve to increase the food supplies of deficit households. Additional research and training input will serve to promote the expansion of market opportunities and formal sector demand for these commodities. It is expected that the new varieties and hybrids will both provide more food to insecure households on average and more food than they would otherwise obtain in drought years. Thus the crop improvement input will contribute to

economic growth, increased food production, increased food security and greater equity in income distribution.

Another indirect beneficiary will be the ever growing numbers of urban poor. Increased food production will make food shortages less likely, limiting the attendant rise in food prices. Research on alternative sorghum and millet based food products can help to lower food costs to these urban poor even in good years. Stability in cereal production and cereal grain stocks offers the basis for reducing the costs of imports and the strains on national economic growth these cause. Food security can enhance the stability of regional governments while freeing resources for broader economic advancement.

6.4 The Role of Women

Except for the two training programs on station development and management, every activity of the regional program includes women. The principal food technologist is a woman; the project employs two female technicians and women comprise the majority of the project labor force. About 25% of those going for degree education from the region are women. Women have participated at all of the project workshops, on all of the monitoring tours and in technician in-service training at both the ICRISAT Center and the regional center. The project component which focusses on crop utilization and food technology will have very important implications for women throughout the region.

SADCC/ICRISAT - SMIP

FINANCIAL STATEMENT OF BUDGET AND EXPENDITURE

USAID. PHASE I - SEPT. 1983 TO AUG. 1988 *

LINE ITEMS	APPROVED BUDGET	EXPENDITURE			ANTICIPATED BALANCE AVAILABLE
		ACTUALS UPTO MAY '88	ANTICIPATED JUNE-AUG '88	TOTAL	
A. PROFESSIONAL STAFF	2 831 500	1 528 632	113 415	1 642 047	1 189 453
B. SUPPORT STAFF	1 755 800	928 040	83 150	1 011 190	744 610
C. OPERATIONS	3 320 000	2 672 691	150 000	2 822 691	497 309
D. TRAINING	1 930 000	979 863	1 855 500	2 835 363	(905 363)
E. PROJECT EVALUATION	360 000	43 862	15 000	58 862	301 138
F. ASSISTANCE TO NARS	617 500	82 208	45 000	127 208	490 292
G. CAPITAL	3 297 100	4 046 244	575 000	4 621 244	(1 324 144)
H. OVERHEADS	688 100	368 501	29 500	398 001	290 099
TOTAL	14 800 000	10 650 041	2 866 565	13 516 606	1 283 394

* Project extension PACD will be September, 1993. The Phase I Financial Statement, above, shows available balance of \$1,283,394 through September, 1988 to maintain a five-year funding horizon for Phase II activities. Actual PACD for currently funded program (including long-term training) is December, 1990.

USAID funds available for the five-year period Sept. 1988 - Sept. 1993 include balance of phase I = \$1,283,394 + project extension funding = 15,150,000; totalling \$16,433,394.

SADCC/ICRISAT SMIP PHASE II
Anticipated Funding - Phase II

	<u>U.S. Dollars</u>
1) USAID:	
September, 1983 - August, 1988	\$14,800,000
September, 1988 - September, 1993	15,150,000
<u>Less:</u> Phase I, actual expenditures as of May 31, 1988	(10,650,041)
Anticipated expenses, June 1, 1988 through August 31, 1988	<u>(2,866,565)*</u>
Balance of USAID funds available for Phase II:	16,433,394
2) Other donor contributions, anticipated:	
CIDA	5,867,831
GTZ	<u>1,814,429</u>
Other donor subtotal	7,682,260
ANTICIPATED TOTAL FUNDS AVAILABLE FOR PHASE II:	24,115,654

(*Includes accrued cost of Phase I training program of \$1,855,500 extending up to December, 1990).

SADCC/ICRISAT

SMIP PHASE II

PROGRAM AND BUDGET

(IN US DOLLARS)

PROGRAM	TOTAL BUDGET	USAID (UPTO AUG 93)	CIDA (UPTO APR 94)	GTZ (UPTO APR 94)
1. Crop Breeding (Sorghum Millets, Forage)	3 413 783	3 413 783	--	--
2. Pathology	1 206 079	1 206 079	--	--
3. Entomology	1 173 929	--	--	1 173 929
4. Agronomy	1 176 217	--	1 176 217	--
5. Economics	816 999	816 999	--	--
6. Crop Utilisation (Food Technology)	1 374 310	--	1 374 310	--
7. Station Management Development:				
ICRISAT	4 114 522	4 114 522	--	--
Assistance to NARS	1 517 795	--	1 517 795	--
8. Training				
INTSORMIL	4 857 500	4 537 500	--	320 000 (1)
In-Service etc.	2 120 009	--	1 799 509	320 500 (2)
9. Administration	2 344 511	2 344 511	--	--
TOTAL	24 115 654	16 433 394	5 867 831	1 814 429

NOTE : 1. Angolan Students

2. Research Monitoring Tour & University Students

SADCC/ICRISAT

SMIP - PHASE II - FINANCIAL PLAN & BUDGET

US DOLLARS

	ITEMS	USAID (UPTO AUG 93)	CIDA (UPTO APR 94)	GTZ (UPTO APR 94)	TOTAL
A	PROFESSIONAL STAFF : Principal Staff	2 517 613	805 636	402 818	3 726 067
	Third country Nationals	291 556	157 590	--	449 146
B	SUPPORT STAFF :	3 396 000	578 760	268 200'	4 242 960
C	OPERATIONAL :				
	Research operations & supplies	705 683	236 527	86 528	1 028 738
	Travel	962 075	258 547	152 156	1 372 778
	Vehicle operations & maintenance	146 584	60 011	15 285	221 880
	Laboratory & computer services	30 000	12 000	3 000	45 000
	Communications, Library & Publications	87 500	15 000	3 750	106 250
	Consultancies	76 675	35 000	10 500	112 175
	Seminars, Workshops & Meetings	347 930	--	51 040	398 970
	Administration (including office occupancy)	610 000	--	--	610 000
	SUB TOTAL	2 956 447	617 085	322 259	3 895 791
D	TRAINING :				
	Education - INTSORMIL	4 537 500	--	320 000	4 857 500
	In-Service Training	--	711 170	320 500	1 031 670
	Post Doctoral & Research Associates	--	456 000	--	456 000
	National Agricultural Staff	--	70 000	--	70 000
	SUB TOTAL	4 537 500	1 237 170	640 500	6 415 170
E	PROJECT EVALUATION :	160 000	65 000	20 000	245 000

	ITEMS	USAID (UPTO AUG 93)	CIDA (UPTO APR 94)	GTZ UPTO APR 94)	TOTAL
F	ASSISTANCE TO NARS :				
	Research operations	--	202 000	--	202 000
	Plant Protection	--	75 000	--	75 000
	Travel	--	238 295	--	238 295
	Seed Storage	--	190 000	--	190 000
	Station Development	--	285 000	--	285 000
	Machinery & Equipment	--	350 000	--	350 000
	Laboratory & Housing	--	135 000	--	135 000
Vehicles	--	42 500	--	42 500	
	SUB TOTAL	--	1 517 795	--	1 517 795
G	CAPITAL :				
	Buildings & Development	801 000	--	--	801 000
	Machinery & Equipment	435 000	550 000	25 000	1 010 000
	Vehicles (Addition & Replacements)	407 500	107 500	35 000	550 000
	SUB TOTAL	1 643 500	657 500	60 000	2 361 000
H	OVERHEADS 15% :	930 778	231 295	100 652	1 262 725
	GRAND TOTAL	10 433 394	5 867 831	1 814 429	24 115 654

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DEVELOPMENT HYPOTHESES

MANAGEABLE INTEREST

If Purpose, Then Goal

If Outputs, Then Purpose

If Inputs, Then Outputs

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program Goal: The broader objective to which this project contributes: Stabilization of food supplies in the region, leading to improved nutrition and income for poorer people farming in drier areas.</p>	<p>Measures of Goal Achievement: Higher per capita consumption of sorghum and millets. Decline in reported incidents of clinical malnutrition and related illnesses in rural areas. Higher per capita incomes in rural areas.</p>	<p>Health surveys and statistics. Macro-economic indicators.</p>	<p>Concerning long term value of program/project: Continued government support of research. Market opportunities for rural producers. Appropriate economic policies, including pricing.</p>
<p>Project Purpose: To increase the production of sorghum and millets with good consumer acceptance, local adaptation and pest resistance.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status. Improved sorghum and millets crop yields per hectare. Increase in production and consumption of sorghum and millets in SADCC member states.</p>	<p>Agricultural surveys and statistics. Crop yields data; rural survey data.</p>	<p>Affecting purpose to goal link: Increased small grains production is appropriately stored and distributed or commercialized within the region. Farmers receive financial benefits from increased production.</p>
<p>Outputs: Improved sorghum and millet cultivars deriving from research, breeding and field testing. Trained regional scientists and technicians. Strengthened national research programs.</p>	<p>Magnitude of Outputs necessary and sufficient to achieve purpose. National programs capable of developing high-yielding varieties and hybrids with resistance to important pests and with quality factors for utilization. Seeds produced in a timely manner, in adequate quantity and quality. Experimental stations organized to provide bases for quality research. Market opportunities to encourage production.</p>	<p>Project evaluations, Technical Advisory Panel reports, annual technical reports, training plans, workshop minutes and records, project manager oversight.</p>	<p>Affecting output-to-purpose link: Average rainfall sufficient to allow crop production. Absence of catastrophic pest or disease infestation. Adequate seed distribution mechanism and extension services to effect transfer of improved varieties to rural farmers.</p>
<p>Inputs: Activities and Types of Resources See page 2 (attached).</p>	<p>Level of Effort/Expenditure for each activity. See page 2 (attached).</p>	<p>See page 2 (attached).</p>	<p>Affecting input-to-output link: See page 2 (attached).</p>

<u>Inputs</u>	<u>Level of Effort/Expenditure</u>
1. Professional Staff	
-principal staff	\$2,517,613
-third country nationals	291,556
2. Support Staff	3,396,000
3. Operational Support	
-research supplies	705,683
-travel	962,075
-vehicle operations and maint.	146,584
-computer services	30,000
-publications	87,500
-consultancies	76,675
-seminars and workshops	347,930
-administration	610,000
4. Training	
-INTSORMIL	4,537,500
5. Project Evaluation	160,000
6. Capital Development	
-buildings	801,000
-machinery and equip.	435,000
-vehicles	407,500
7. Overheads (ICRISAT Centre)	930,778
TOTAL, USAID-FUNDED INPUTS FOR PHASE II:	16,433,394

<u>Means of Verification</u>	<u>Assumptions Affecting Input to Output Link</u>
1. Project Mgr. oversight, financial and annual reporting.	Professional staff are technically competent and work effectively.
2. As above.	
3. Project Mgr oversight, physical inspections, periodic audit and project evaluations.	Facilities provided are used productively to achieve project purposes.
4. Annual training reports, financial reporting, project evaluations.	INTSOPMIL training component effectively addresses HPD requirements
5. AID staff participate in evaluations.	
6. Engineering reports, physical inspections, financial reports.	Building construction and equipment procurement is completed on timely basis.
7. Financial reports.	

Job Description

Agroclimatologist

SADCC level Scientist Position in ICRISAT

1. The Agroclimatologist will work closely with the ICRISAT Climatologists at the ICRISAT Center and the ICRISAT Sahelian Center. The purpose of this collaboration will be the use of meteorological data:
 - a. To be able to predict seasonal rainfall behaviour based on early season rainfall behaviour. (This has been possible in Niger with about 80 % confidence). To relate this to production opportunities.
 - b. To relate agroclimatic data with crop performance to identify areas of similar adaptation.
 - c. To relate agroclimatic data with pest problems to determine areas of incidence, to predict severity, and to define weather conditions conducive to pest expression. This information would be useful to developing screening procedures for the crop improvement programs.
2. To assist regional and national programs to accumulate agrometeorological information useful to the interpretation of yield trial and pest screening results.
3. Interact with agencies in the SADCC region to contribute to and have ready access to agroclimatological data.
4. Assist national programs to establish proper weather stations on their Experiment Stations.
5. To participate in training activities in the SADCC Region.

Job Descriptions

Pearl and Finger Millet Breeders

Both SADCC level positions in ICRISAT

1. To assume much of the responsibility of the pearl millet and of the finger millet breeding programs but in consultation with the Principal Forage and Millet Breeder.
2. To introduce and evaluate, on a continuing basis, breeding stocks and germplasm accessions from all over the world. Useful introductions would be provided to National Programs for their use.
3. To develop high yielding and stable cultivars for the areas in the region where these crops are found to be competitive. This would involve multilocation evaluation to identify those entries with the most stable performance.
4. To participate in the organization and evaluation of regional trials and nurseries by National Programs in the region.
5. To jointly evaluate, with scientists in country programs, their nursery and yield trial material as well as that provided by the Regional Program. To develop together plans for the future processing of these materials including the identification of parents for crossing for the selection of new lines, and in relation to the development of hybrids.
6. To assist as a service, crossing blocks and off-season nurseries to advance materials from National and from the Regional Program.
7. To work closely with the Entomologist and Pathologist to ensure that breeding stocks are properly evaluated for resistance traits; and also to work in cooperation with the Food Technologist.
8. To contribute to the maintenance of pure breeders seed.
9. To participate in Regional training programs.
10. To help National Programs organize their facilities to undertake quality research.
11. To collaborate with ICRISAT and other agencies contributing to research in the region.

12. To cooperate with the Agronomist in terms of materials evaluation in both sole and inter cropping in the array of environments important to pearl/finger millets in the region.
13. To cooperate with experiment station management to improve conditions of field research at important sorghum and millet stations in the region.
14. To provide a leadership role in the Annual Workshop.

SADCC/ICRISAT
TRAINING OFFICER

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) is looking for a Training Officer to be recruited on a regional basis and to work as a member of the staff of the SADCC/ICRISAT Sorghum and Millet Improvement Program with headquarters in Matopos (near Bulawayo), Zimbabwe.

Qualifications:

Essential

- (a) A degree in an agricultural discipline with formal training in educational subjects.
- (b) Minimum of 3-years of experience in teaching agricultural subjects.
- (c) Fluency in speaking, writing and reading English. Competence in Portuguese would be a plus.

Desirable:

- (a) Knowledge and experience in the use of audio/visual equipment and competence in teaching.

Job Description:

- (a) Plan, organise and conduct short-term training courses in collaboration with the Principal Scientists, for the benefit of scientists and technicians of the national agricultural research systems in the SADCC region.
- (b) Evaluate on a continuing basis agriculturally related training and education needs in the SADCC region.
- (c) Assist in matters relating to the designation, assignment and travel of students and trainees from the SADCC region and be responsible for the housing, welfare, and financial arrangements for all trainees assigned for training in Zimbabwe or anywhere else in the SADCC region.
- (d) Assist in organising and conducting workshops, conferences, seminars, etc. within the SADCC region.
- (e) Develop and maintain close working relationships with NARS personnel in the SADCC region, the Principal Staff in the SADCC/ICRISAT Program and the Principal Training Officer at ICRISAT Center.
- (f) Develop, organise and maintain the library and arrange dissemination of relevant research information to interested clients in the SADCC region. Also help in the preparation of reports/information material for dissemination.

The position will require periodic travel in Southern Africa (SADCC region) and at times to India. The Training Officer will report to the Executive Director, SADCC/ICRISAT Program.

Job Description

Information Officer/Documentalist

SADCC level Position in ICRISAT

1. To accumulate and supply relevant information to SADCC National and the Regional Programs.
2. To organize and manage the library for the Regional Program.
3. To assist scientists of the Regional Program with the array of reports that they need to organize.
4. To assist National Stations involved with sorghum and millets develop their information system/supply.
5. To maintain a mailing list for the Regional Program.
6. To help the Regional Program establish a calendar of events.

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded with Development Assistance loans; and B(3) applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT? N/A
Yes.

A. GENERAL CRITERIA FOR PROJECT

1. FY 1988 Continuing Resolution Sec. 523; FAA Sec. 634A. If money is sought to obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified? Yes, CN cleared the Congress without objection 7/27/88.
2. FAA Sec. 611(a)(1). Prior to an obligation in excess of \$500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance, and (b) a reasonably firm estimate of the cost to the U.S. of the assistance? a) Yes.
b) Yes.
3. FAA Sec. 611(a)(2). If legislative action is required within recipient country, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance? N/A

4. FAA Sec. 611(b); FY 1988 Continuing Resolution Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.) N/A
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively? N/A
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. Yes. Assistance to be provided to SADCC through SACCAR.
7. FAA Sec. 601(a). Information and conclusions on whether projects will encourage efforts of the country to:
(a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
a) no
b) no
c) not specifically, through improved rural incomes may result in increased use of such associations by rural populations. d) no
e) yes, a main project purpose is improving technical efficiency of agricultural production. f) no
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). A U.S. University consortium INTSORMIL, will participate in the Project.
9. FAA Secs. 612(b), 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars. This is a regional project. National programs will contribute land, salaries and other inputs in kind.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? N/A
11. FY 1988 Continuing Resolution Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? N/A
12. FY 1988 Continuing Resolution Sec. 553. Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel? No.
13. FAA Sec. 119(q)(4)-(6). Will the assistance (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas? No. This is a regional agricultural research and institution building activity. It will, however, have either neutral or indirect positive environmental effects.

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (either dollars or local currency generated therefrom)? N/A
15. FY 1988 Continuing Resolution. If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government? N/A
16. FY Continuing Resolution Sec. 541. If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.? N/A
17. FY 1988 Continuing Resolution Sec. 514. If funds are being obligated under an appropriation account to which they were not appropriated, has prior approval of the Appropriations Committees of Congress been obtained? N/A
18. FY Continuing Resolution Sec. 515. If deob/reob authority is sought to be exercised in the provision of assistance, are the funds being obligated for the same general purpose, and for countries within the same general region as originally obligated, and have the Appropriations Committees of both Houses of Congress been properly notified? N/A
19. State Authorization Sec. 139 (as interpreted by conference report). Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision). Relevant obligational procedures will be complied with.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FY 1988 Continuing Resolution Sec. 552 (as interpreted by conference report). If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities (a) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (b) in support of research that is intended primarily to benefit U.S. producers?

a) no
b) no

b. FAA Secs. 102(b), 111, 113, 281(a). Describe extent to which activity will (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and

a-c) project beneficiaries are poor farmers in drier areas of the Southern Africa Region. Project goal includes increasing net incomes of these farmers by improving crop yields and marketability of sorghum and millet crops, through the development of improved germplasm and consumer utilization.

insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries.

d) women will benefit from the project activities to the extent they are directly and indirectly involved in small-grains production, consumption and commercialization. A special effort will be made to include women in the project training activities. e) regional cooperation is the specific mandate of SADCC and SACCAR, both of which are being supported through this project.

- c. FAA Secs. 103, 103A, 104, 105, 106, 120-21. Does the project fit the criteria for the source of funds (functional account) being used?
- d. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?
- e. FAA Secs. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?
- f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?

Yes.

Yes, appropriate technology taken to mean adaptive agricultural inputs e.g. seeds.

N/A (regional project)

Yes.

- g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government. Regional scientists and technicians are being recruited for training components. They will be re-integrated into National Programs upon return to the region.
- h. FY 1988 Continuing Resolution Sec. 538. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions? N/A
- Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations? N/A
- Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? N/A
- i. FY 1988 Continuing Resolution. Is the assistance being made available to any organization or program which has been determined to support or participate in the management of a program of coercive abortion or involuntary sterilization? No.
- If assistance is from the population functional account, are any of the funds to be made available to voluntary family planning projects which do not offer, either directly or through referral to or information about access to, a broad range of family planning methods and services? No.

- j. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
- k. FY 1988 Continuing Resolution. What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 20 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)? No set aside was determined appropriate for this activity.
- l. FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (a) stress the importance of conserving and sustainably managing forest resources; (b) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (c) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (d) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (e) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared Yes.
a) N/A
b) N/A
c) N/A
d) Yes.
e) Yes.

or degraded; (f) conserve forested watersheds and rehabilitate those which have been deforested; (g) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (h) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (i) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (j) seek to increase the awareness of U.S. government agencies and other donors of the immediate and long-term value of tropical forests; and (k) utilize the resources and abilities of all relevant U.S. government agencies?

f) N/A
g) N/A
h) N/A
i) N/A
j) N/A
k) N/A

m. FAA Sec. 118(c)(13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project (a) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (b) take full account of the environmental impacts of the proposed activities on biological diversity?

N/A

- n. FAA Sec. 118(c)(14). Will assistance be used for (a) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (b) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas?
- a) No.
b) No.
- o. FAA Sec. 118(c)(15). Will assistance be used for (a) activities which would result in the conversion of forest lands to the rearing of livestock; (b) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands; (c) the colonization of forest lands; or (d) the construction of dams or other water control structures which flood relatively undegraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?
- a) No.
b) No.
c) No.
d) No.
- p. FY 1988 Continuing Resolution If assistance will come from the Sub-Saharan Africa DA account, is it (a) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (b) being provided in
- N/A

accordance with the policies contained in section 102 of the FAA; (c) being provided, when consistent with the objectives of such assistance, through African, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development in Sub-Saharan Africa; (d) being used to help overcome shorter-term constraints to long-term development, to promote reform of sectoral economic policies, to support the critical sector priorities of agricultural production and natural resources, health, voluntary family planning services, education, and income generating opportunities, to bring about appropriate sectoral restructuring of the Sub-Saharan African economies, to support reform in public administration and finances and to establish a favorable environment for individual enterprise and self-sustaining development, and to take into account, in assisted policy reforms, the need to protect vulnerable groups; (e) being used to increase agricultural production in ways that protect and restore the natural resource base, especially food production, to maintain and improve basic transportation and communication networks, to maintain and restore the natural resource base in ways that increase agricultural production, to improve health conditions with special emphasis on meeting the health needs of mothers and children, including the establishment of self-sustaining primary health care systems that give priority to preventive care, to provide increased access to voluntary family planning services, to improve basic literacy and mathematics especially to those outside the formal educational system and to improve primary education, and to develop income-generating opportunities for the unemployed and underemployed in urban and rural areas?

(ag. sector policies)

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. PROCUREMENT

- | | |
|---|------|
| 1. <u>FAA Sec. 602(a)</u> . Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? | N/A |
| 2. <u>FAA Sec. 604(a)</u> . Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? | Yes. |
| 3. <u>FAA Sec. 604(d)</u> . If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? | N/A |
| 4. <u>FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a)</u> . If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) | N/A |
| 5. <u>FAA Sec. 604(q)</u> . Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those | No. |

countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.)

6. FAA Sec. 603. Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?
Yes.
Grant to an I.O.
7. FAA Sec. 621(a). If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?
N/A
8. International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available?
No.
Grant to an I.O.
9. FY 1988 Continuing Resolution Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States?
N/A
10. FY 1988 Continuing Resolution Sec. 524. If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)?
N/A

B. CONSTRUCTION

1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used? They will be able to compete for any such contracts.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? Yes.
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP), or does assistance have the express approval of Congress? Yes.

C. OTHER RESTRICTIONS

1. FAA Sec. 122(b). If development loan repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? Yes.

4. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f); FY 1987 Continuing Resolution Secs. 525, 538. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; or (4) to lobby for abortion? Yes.
 - b. FAA Sec. 483. To make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated? Yes.
 - c. FAA Sec. 620(q). To compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President? Yes.
 - d. FAA Sec. 660. To provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? Yes.
 - e. FAA Sec. 662. For CIA activities? Yes.
 - f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? Yes.

- g. FY 1988 Continuing Resolution Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel? Yes.
- h. FY 1988 Continuing Resolution Sec. 505. To pay U.N. assessments, arrearages or dues? Yes.
- i. FY 1988 Continuing Resolution Sec. 506. To carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)? Yes.
- j. FY 1988 Continuing Resolution Sec. 510. To finance the export of nuclear equipment, fuel, or technology? Yes.
- k. FY 1988 Continuing Resolution Sec. 511. For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights? Yes.
- l. FY 1988 Continuing Resolution Sec. 516; State Authorization Sec. 109. To be used for publicity or propaganda purposes designed to support or defeat legislation pending before Congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by Congress? Yes.

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CLASS: UNCLASSIFIED
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 APPRV: AID:2(A):PBHUSSEY
 DRFTD: CPDO:FMORRIS:GFA
 CLEAR: 1.ADO:FWITT(DRAFT)
 2.RLA:TSPPIGGS(TL)
 DISTR: AID-3 ACP DCM

AIDAC

FOR AFR/TR/SDP, BESSIE BOYD

E.O. 12356: N/A

SUBJECT: IEF - REGIONAL SORGHUM AND MILLET RESEARCH
 AMENDMENT (690-0224)

1. THIS MESSAGE REQUESTS A DELEGATION OF AUTHORITY FROM THE AFR ENVIRONMENTAL OFFICER TO THE DIRECTOR, USAID/ZIMBABWE TO APPROVE A NEGATIVE DETERMINATION FOR AN IEF FOR THE SUBJECT AMENDMENT TO A FB17 GRANT TO AN INTERNATIONAL ORGANIZATION (ICRISAT). THE IEF WILL BE CLEARED BY THE RLA/SA.
2. BACKGROUND: IN 1983, AID GRANTED DCIS 14.8 MILLION TO ICRISAT TO IMPLEMENT THE REGIONAL SORGHUM AND MILLET RESEARCH PROJECT (690-0224). ICRISAT'S UNSOLICITED PROPOSAL TO AID WAS BASED ON A REQUEST BY SADCC FOR ASSISTANCE IN DEVELOPING DROUGHT RESISTANT VARIETIES OF SORGHUM AND MILLET WHICH COULD BE GROWN BY SMALLHOLDERS IN THE REGION. AFTER FIVE YEARS, ICRISAT, IN CONJUNCTION WITH THE NATIONAL AGRICULTURAL RESEARCH CENTERS IN THE SADCC REGION, HAS MADE SOME IMPRESSIVE GAINS. SEVERAL NEW VARIETIES OF SORGHUM AND MILLET HAVE BEEN DEVELOPED, TESTED AND ARE NOW READY FOR RELEASE TO FARMERS. AS NEW VARIETIES BECOME AVAILABLE, NATIONAL PROGRAMS TAKE OVER SINCE IT IS THEIR RESPONSIBILITY TO RELEASE NEW SEED VARIETIES IN EACH COUNTRY.
3. PROJECT EXTENSION: THE PROJECT EXTENSION ENTAILS THE CONTINUATION OF THE BREEDING, AGRONOMIC, ENTOMOLOGY AND PATHOLOGY RESEARCH EFFORTS WITH THE FOCUS OF RESEARCH SHIFTING FROM THE REGIONAL ICRISAT STATION AT MATOPOS, ZIMBABWE TO THE NATIONAL CENTERS IN SADCC COUNTRIES. IN FACT, THE EMPHASIS OF ICRISAT'S PROGRAM DURING THE NEXT FOUR YEARS WILL BE THE STRENGTHENING OF NATIONAL RESEARCH PROGRAMS AS WELL AS THE FURTHER DEVELOPMENT OF A REGIONAL NETWORK OF RESEARCH EFFORTS. THE PRINCIPAL NEW ACTIVITIES DURING THE PROJECT EXTENSION ARE:
 - A. ACADEMIC TRAINING OF APPROXIMATELY 51 SCIENTISTS FROM THROUGHOUT THE SADCC REGION. THESE SCIENTISTS WILL RETURN TO WORK AT THE ICRISAT RESEARCH STATION IN ZIMBABWE FOR 3-6 MONTHS, THEN TAKE THEIR PLACE AS PERMANENT STAFF AT NATIONAL CENTERS.

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-- E. RESEARCH INTO ALTERNATIVE USES OF SORGHUM AND MILLET, E.G., COMPOSITE FLOUR, PRODUCTION OF PAPER PRODUCTS, VARIOUS LIVESTOCK FEEDS.

C. SOCIO-ECONOMIC RESEARCH INTO PRODUCTION ON PRACTICES, THE IMPACT OF PRICING POLICY ON THE PRODUCTION AND SALE OF SORGHUM AND MILLET, RELATIONSHIP BETWEEN SORGHUM AND MILLET PRODUCTION AND PRICES OF OTHER GRAINS.

-- F. INTENSIFIED ON-STATION TRAINING OF REGIONAL SCIENTISTS AND TECHNICIANS AT THE MAPTOPOS STATION.

4. ENVIRONMENTAL CONSIDERATIONS

A CATEGORICAL EXCLUSION WAS APPROVED FOR THE PROJECT IN SEPTEMBER 1983. TO DATE, ALL ACTIVITIES WITH POTENTIAL ENVIRONMENTAL CONSEQUENCES HAVE BEEN CARRIED OUT UNDER TIGHTLY CONTROLLED CONDITIONS AND HAVE BEEN THOROUGHLY MONITORED. AGRICULTURAL CHEMICALS, INCLUDING PESTICIDES, HERBICIDES AND SEED DRESSINGS, ARE APPLIED ONLY BY TRAINED ICRISAT OR NATIONAL PROGRAM RESEARCH STAFF, USING INTERNATIONALLY ACCEPTED PROCEDURES TO ENSURE THE SAFETY OF ALL PERSONNEL. THERE IS NO PLAN TO TEST OR USE NEW PESTICIDES TO SUPPORT RESEARCH ACTIVITIES DURING THE EXTENSION OF THE PROJECT. THE PROVISION INCLUDED IN PILS UNDER THE ORIGINAL GRANT WILL BE MAINTAINED TO ENSURE THAT THE MANUFACTURERS OF ANY PESTICIDE USED IN THE RESEARCH PROGRAM PROVIDE TOXICOLOGICAL AND ENVIRONMENTAL DATA NECESSARY TO SAFEGUARD THE HEALTH OF RESEARCH PERSONNEL AND THE QUALITY OF THE LOCAL ENVIRONMENT IN WHICH THE PESTICIDES WILL BE USED. PILS UNDER THE GRANT AMENDMENT WILL ALSO CONTAIN A PROVISION THAT TREATED CROPS WILL NOT BE USED FOR ANIMAL OR HUMAN CONSUMPTION UNLESS APPROPRIATE TOLERANCES HAVE BEEN ESTABLISHED BY THE USEPA OR RECOMMENDED BY FAO/WHO AND THAT THE FREQUENCY OF APPLICATION, TOGETHER WITH THE PRESCRIBED PRE-HARVEST INTERVALS, DOES NOT RESULT IN RESIDUES EXCEEDING SUCH TOLERANCES.

THE PROJECT ENTAILS THE USE OF APPROXIMATELY 100

RECTAPES OF THE NATIONAL (ZIMBABWE) RESEARCH FARM AT MATOPOS. THE SITE IS ADJACENT TO THE MAIN ROAD. IRRIGATION WATER IS TAKEN FROM NEARBY LAKE MATOPOS. MOST CONSTRUCTION AND LAND CLEARING ACTIVITIES HAVE BEEN COMPLETED. ALL SUCH ACTIVITIES ARE MONITORED AND APPROVED BY THE REGIONAL ENGINEER, USAID/ZIMBABWE, INCLUDING PROVISIONS FOR WATER, ELECTRICAL, AND SEWERAGE HOODS.

ANY NEW LAND BROUGHT INTO CULTIVATION BY FARMERS WILL NOT FALL WITHIN THE PURVIEW OF THIS PROJECT. AFTER RESEARCH RESULTS ARE APPROVED, FURTHER TESTING AT THE NATIONAL LEVEL AND RECOMMENDATIONS TO FARMERS ARE THE RESPONSIBILITY OF NATIONAL AGRICULTURAL RESEARCH CENTERS

5. IEE FACESHEET DATA:

COUNTRY:	SOUTHERN AFRICA REGIONAL
TITLE:	REGIONAL SORGHUM AND MILLET RESEARCH
FUNDING:	LOP - DOLS 29,152,000
-	THRU FY 87 - DOLS 14,500,000
-	FY 88 - DOLS 7,000,000
-	FUTURE YEARS - DOLS 2,152,000

IEE PREPARED BY: USAID/ZIMBABWE
 ENVIRONMENTAL ACTION RECOMMENDED: NEGATIVE DETERMINATION.

6. APPRECIATE YOUR ASSISTANCE.

RAWLINGS

T
 #3794

NNNN

NEGATIVE DETERMINATION APPROVED BY: 1)

ABH

 A.B. HERRICK
 DIRECTOR, USAID/ZIMBABWE

- 1) PER AUTHORITY DELEGATED IN STATE 264924 (ATTACHED)
 RLA/SA CLEARANCE NOTED ON HARARE 3794 (IEE CABLE)

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Department of State

OUTGOING
TELEGRAM

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ORIGIN AID-00

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INFO AFSA-03 AFPD-04 AAAF-03 SAST-01 GC-01 GCAF-01 STFN-02
RELO-01 AMAD-01 /022 A0

INFO LOG-00 AF-00 CIAE-00 EB-00 DODE-00 TRSE-00 /000 R

DRAFTED BY: AID/AFR/TR/ANR: BLBOYD: TS: 86470
APPROVED BY: AID/AFR/TR/ANR: NSHELDON
AID/AFR/PD/SAP: RROESER (PHONE) AID/AFR/ZZMS: HWILKERSON (PHONE)
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UNCLAS STATE 264924

AIDAC

E. O. 12356: N/A

SUBJECT: IEE, REGIONAL SORGHUM AND MILLET RESEARCH
AMENDMENT (690-0224)

REF: HARARE 03794

1. DELEGATION OF AUTHORITY IS HEREBY GRANTED TO THE DIRECTOR USAID/ZIMBABWE TO APPROVE THE IEE FOR SUBJECT RESEARCH AMENDMENT WITH CLEARANCE BY THE RLA/SA.
2. ENVIRONMENTAL CONSIDERATIONS: TO THE EXTENT POSSIBLE, DATA COLLECTION, AND MONITORING THE IMPLEMENTATION OF PROGRAMS AND ACTIVITIES SHOULD CONTINUE TO BE DOCUMENTED AS A RESEARCH COMPONENT. THE INTENSIFIED ON-STATION TRAINING SHOULD ALSO INCLUDE SAFE MEASURES FOR PESTICIDE APPLICATION, HANDLING, EQUIPMENT USE AND USER HAZARDS. WHITEHEAD

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SACCAR

Southern African Centre for Cooperation
in
Agricultural Research

Private Bag 00108 Gaborone Botswana
Telephone 352381-4 Telex 2752 SACAR BD



REF: 594 SAR/3/11

5th August, 1988

Mr. Eric N. Witt
Agricultural Development Officer
USAID
1 Pascoe Avenue
P.O. Box 3340
HARARE
Zimbabwe

Dear Mr. Witt,

RE: EVALUATION OF THE SADCC'S SORGHUM AND
MILLETS IMPROVEMENT PROGRAMME

I wish to acknowledge your letter in which you stated that you were very impressed with the quality of SADCC nationals namely,

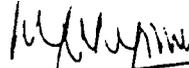
Dr. B.K. Patel, Director of Agric. Research, Zambia
Dr. G. Mkamanga, Deputy Chief Agric. Research Officer, Malawi
Dr. G. Mitawa, Director, Ilonga Research Institute, Tanzania

who with Mr. D. Andrews, University of Nebraska, Dr. T. Frankenberger, University of Arizona and Dr. J. Elliot, Agriculturist, Government of Canada participated in the Review of the Phase I of the SADCC's Sorghum and Millets Improvement Programme. The Review Document you presented to me yesterday August 4, 1988 which includes the recommendation that because of the excellent progress the project has made support be given to launch phase two of it was well prepared.

Because SADCC has also observed that the Programme has made a great contribution and that it should therefore be continued, I have recommended to my Botswana Government which coordinates the sector of agricultural research and training to request your government to continue to support the programme.

With best regards,

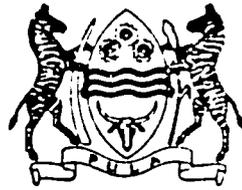
Yours sincerely,



M.L. Kyomo
DIRECTOR

- cc: The Executive Secretary
SADCC Secretariat
Private Bag 0095
GABORONE
- : The Permanent Secretary
Ministry of Agriculture
Private Bag 003
GABORONE
- : The Director
Dept. of Agricultural Research
Private Bag 0033
GABORONE

TELEPHONE: 51177
TELEGRAMS: MINAGRIC
REFERENCE: A29/1/9



REPUBLIC OF BOTSWANA

MINISTRY OF AGRICULTURE
PRIVATE BAG 003
GABORONE
BOTSWANA

5th August, 1988

Ms. Allison B. Herrick
Director
USAID
1 Pascoe Avenue
P.O. Box 3340
HARARE
Zimbabwe

Dear Ms. Herrick,

RE: REQUEST FOR YOUR GOVERNMENTS CONTINUED SUPPORT
FOR THE SADCC'S SORGHUM AND MILLETS IMPROVEMENT
PROGRAMME

SADCC was made aware in 1986 by the Southern African Centre for Cooperation in Agricultural Research and Training (SACCAR) that the five year Phase I of running and funding of the Sorghum and Millets Improvement Program would end in September 1988. Accordingly, the Ministers of Agriculture and Natural Resources of SADCC observed the following:

"Project 3.0.2. SORGHUM AND MILLET IMPROVEMENT PROGRAMME

Research work is beginning to show good results. High yielding and adaptable varieties and hybrids, which last year were still at the experimentation stage, are now being bred. The construction of the office and laboratory at Matopos, Zimbabwe, for the programme was completed, and the building occupied during the year. The Steering Committee and the Technical Advisory Panel (TAP) continued to meet and guide the programme. Cooperating partners are being urged to consider funding the programme beyond 1989."

Quote from the Food, Agriculture and Natural Resources, Southern African Development Coordination Conference (SADCC) Document presented to the SADCC-Donor Annual Consultations, Arusha, United Republic of Tanzania, 28th-29th January, 1988.

I have been gratified to note that the Review Team comprising:

Mr. D. Andrews, University of Nebraska
Dr. T. Frankenberger, University of Arizona
Dr. B.K. Patel, Director of Agricultural Research, Zambia
Dr. G. Mkamanga, Ass. Chief Agricultural Research Officer, Malawi
Dr. G. Mitawa, Director, Agric. Research Institute Ilonga, Tanzania
Dr. J. Elliot, Agriculturist, Canadian Government

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have, after interviewing staff in the organisations such as SACCAR, representatives of governments such as the Departments of Agricultural Research, Botswana and Zimbabwe, USAID staff in Harare and Gaborone, GTZ and CIDA came up with the observation similiar to that of SADCC namely, that the project has achieved more in a space of four years than what was expected of it. I am further very pleased that the Team has recommended further support for Phase II of the Programme from SADCC's Cooperating Partners. Because of the expanded objectives of the programme to include the utilisation of sorghum and millets I understand the recommended budget is as follows:

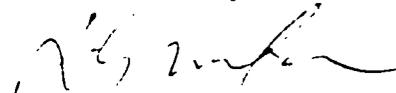
<u>Source of Assistance</u>	<u>Phase I US\$</u>	<u>Phase II US\$</u>
USAID	14,800,000	15,150,000
GTZ	1,600,000	1,814,429
CIDA	<u>1,500,000</u>	<u>5,864,831</u>
TOTAL	<u>17,900,000</u>	<u>22,829,260</u>

cover/

Because of the above reasons and especially since the Programme continues to education, training, technical assistance to national research systems and germplasm development, I am requesting you to use your good offices to urge your Government to continue to make the contribution shown above.

Finally, let me record my appreciation to your staff and your Government for the great support you have and continue to give to SADCC.

Yours sincerely,



G.L. Motsemme
for/PERMANENT SECRETARY

cc: The Permanent Secretary
Ministry of Finance and Development Planning
Private Bag 008
GABORONE

ATTN: MR. O.K. MATAMBO

: The Executive Secretary
SADCC Secretariat
Private Bag 0095
GABORONE

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cc: The Director
Department of Agric. Research
Private Bag 003
GABORONE

: The Director
SACCAR
Private Bag 00108
GABORONE

: The Director
USAID
P.O. Box 90
GABORONE

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TELEPHONE: 352381

TELEGRAMS: RESAGRIC

REFERENCE AR 4/13



DEPARTMENT OF AGRICULTURAL RESEARCH

PRIVATE BAG 003

GABORONE

REPUBLIC OF BOTSWANA

ALL CORRESPONDENCE TO BE ADDRESSED TO: DIRECTOR OF AGRICULTURAL RESEARCH

5th August 1988

The Director
SACCAR
P/3ag 00108
GABORONE

Dear Dr. Kyomo,

PROJECT PROPOSAL FOR PHASE II OF THE SADCC/ICRISAT SORGHUM
AND MILLETS RESEARCH AND TRAINING PROGRAM

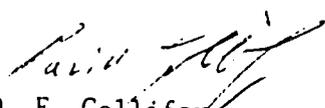
I refer to the above Project Proposal and the A.I.D. Evaluation Summary of the Project dated 1/8/88.

I fully support the proposal for Phase II and consider that it adequately covers the important areas of:-

Education
Training
Technical assistance
National agric. research system development
Germplasm development

which will substantially assist with the attainment of the Program objectives.

Yours sincerely,


D. E. Gollifer
DIRECTOR OF AGRICULTURAL RESEARCH

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