

# INTSORMIL CRSP

## Sorghum, Millet and Other Grains Collaborative Research Support Program

Leader with Associates Cooperative Agreement  
No. EEP-A-00-06-0016-00

Award from the U.S. Agency for International Development

to

**The University of Nebraska-Lincoln**

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**USAID**  
FROM THE AMERICAN PEOPLE



September 29, 2006

Gary L. Cunningham  
Dean and Director  
Nebraska Agriculture Experiment Station  
University of Nebraska – Lincoln  
207 Agriculture Hall  
Lincoln, NE 68583-0704

Subject: Sorghum, Millet, and Other Grains Collaborative Research Support Program  
SMOG CRSP  
Leader with Associates Cooperative Agreement No. EPP-A-00-06-00016-00

Dear Mr. Cunningham:

Pursuant to the authority contained in the Foreign Assistance Act of 1961, as amended, the U.S. Agency for International Development (USAID) hereby awards to University of Nebraska - Lincoln (hereinafter referred to as the "Recipient"), the sum of \$9,000,000.00 to provide support for a program in Sorghum, Millet, and Other Grains Collaborative Research Support Program as described in the Schedule of this award and in Attachment B, entitled "Program Description."

This Leader with Associates Cooperative Agreement is effective and obligation is made as of 09-30-2006 and shall apply to expenditures made by the Recipient in furtherance of program objectives during the period beginning with the effective date and ending 09-29-2011. USAID will not be liable for reimbursing the Recipient for any costs in excess of the obligated amount.

This award is made to the Recipient on condition that the funds will be administered in accordance with the terms and conditions as set forth in Attachment A (the Schedule), Attachment 2 (the Program Description), and Attachment C (the Standard Provisions), all of which have been agreed to by your organization.

Please sign the original and all enclosed copies of this letter to acknowledge your receipt of the award, and return the original and all but one copy to the undersigned.

Sincerely,

Joseph Schmidt  
Agreement Officer  
M/OAA/EGAT

Attachments:

- A. Schedule
- B. Program Description
- C. Standard Provisions
- D. Marking Plan and Branding Strategy

ACKNOWLEDGED:

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

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A. GENERAL

1. Total Estimated USAID Amount: \$ 9,000,000.00  
2. Total Obligated USAID Amount: \$ 900,000.00  
3. Cost-Sharing Amount (Non-Federal): \$ 1,050,000.00  
4. Activity Title: Sorghum, Millet, and Other Grains Collaborative  
Research Support Program  
5. USAID Technical Office: EGAT/AG  
6. Tax I.D. Number: 470049123  
7. DUNS No.: 555456995  
8. LOC Number: HHS-69A8P

B. SPECIFIC

BBFY: 2006  
EBFY: 2007  
Fund: DV  
Operating Unit: EGAT/AG  
Strategic Objective: 905-901  
Distribution: 931-1254  
Team/Division: EGAT/AG  
Benefiting Geo Area: 997  
Object Class: 4100201  
Obligation: \$900,000

C. PAYMENT OFFICE

USAID  
M/CFO/CMP  
Ronald Reagan Building  
1300 Pennsylvania Ave, NW  
Washington, DC 20523

## **Attachment A**

### **SCHEDULE**

#### **A.1 PURPOSE OF AGREEMENT**

The purpose of this Agreement is to provide support for the program described in Attachment B to this Agreement entitled "Program Description."

#### **A.2 PERIOD OF AGREEMENT**

1. The effective date of this Agreement is 09-30-2006. The estimated completion date of this Agreement is 09-29-2011.
2. Funds obligated hereunder are available for program expenditures for the estimated period 09-30-2006 to 09-29-2007.

#### **A.3 AMOUNT OF AWARD AND PAYMENT**

1. The total estimated amount of this Award for the period shown in A.2.1 above is \$9,000,000.00.
2. USAID hereby obligates the amount of \$900,000.00 for program expenditures during the period set forth in A.2.2 above and as shown in the budget below. The recipient will be given written notice by the Agreement Officer if additional funds will be added. USAID is not obligated to reimburse the recipient for the expenditure of amounts in excess of the total obligated amount.
3. Payment shall be made to the Recipient by Letter of Credit in accordance with procedures set forth in 22 CFR 226.
4. Additional funds up to the total amount of the grant shown in A.3.1 above may be obligated by USAID subject to the availability of funds, satisfactory progress of the project, and continued relevance to USAID programs.

#### **A.4 BUDGET**

The following is the Agreement Budget, including local cost financing items, if authorized. Revisions to this budget shall be made in accordance with 22 CFR 226.

	Year 1	Year 2	Year 3	Year 4	Year 5	Cost Share
Personnel:	\$ 59,728	\$ 246,080	\$ 253,460	\$ 261,064	\$ 268,895	
Fringe Benefits:	\$ 16,724	\$ 68,902	\$ 70,969	\$ 73,098	\$ 75,291	
Travel:	\$ 22,800	\$ 23,000	\$ 23,900	\$ 23,000	\$ 19,400	
Supplies:	\$ 2,000	\$ 4,050	\$ 4,100	\$ 4,150	\$ 2,020	
Contractual:	\$ 55,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	
Other:	\$ 17,100	\$ 34,600	\$ 30,000	\$ 75,000	\$ 65,000	
Indirect Charges:	\$ 79,696	\$ 180,151	\$ 182,817	\$ 207,603	\$ 204,980	
Regional/Research:	\$346,244	\$1,500,000	\$1,500,000	\$1,470,000	\$1,469,279	\$1,050,000
<b>TOTAL:</b>	<b>\$599,192</b>	<b>\$2,071,783</b>	<b>\$2,080,246</b>	<b>\$2,128,915</b>	<b>\$2,119,864</b>	<b>\$1,050,000</b>

Note: Training, normally a separate budget line item, is directly embedded into the research projects under the contractual line of this budget. When research projects are negotiated and awarded, the recipient will be able to delineate the specific amount for training.

## A.5 REPORTING AND EVALUATION

### 1. Financial Reporting

The Recipient shall submit an original and one copy. Financial Reports shall be in keeping with 22 CFR 226.52.

Recipient shall list each country included in the program and the total amount expended for each country under the award for the reporting period in the “Remarks” block on the “Financial Status Report” SF 269 or SF-269A, or on a separate sheet of paper with the “Request for Advance or Reimbursement” SF 270. Financial Reports will be required on a quarterly basis. The recipient shall submit these forms in the following manner:

1. The SF 269 shall be submitted to the Cognizant Technical Officer with one copy to the Agreement Officer.
2. The SF 272 and 272a (if necessary) will be submitted via electronic format to the U.S. Department of Health and Human Services (<<http://www.dpm.psc.gov>>). A copy of this form shall also be simultaneously submitted to the Agreement Officer and the Cognizant Technical Officer.
3. In accordance with 22 CFR 226.70-72 the original and two copies of final financial reports shall be submitted as follows: M/CFO, the Agreement Officer, and the CTO.

### 2. Monitoring and Reporting Program Performance

1. Reporting Requirements for the Leader Cooperative Agreement: The Recipient shall submit an original and two (2) copies of a performance report to the Cognizant Technical Officer in USAID/Washington. The performance reports are required to be submitted annually and shall present the information contained in 22 CFR 226.51(d). In addition, the report shall be included under both the Leader Cooperative Agreement and all Associate Agreements.

2. All country-level and global research activities implemented through the Leader Agreement shall be incorporated in the Recipient's Annual Report and Implementation Plans.
3. The format, content and time schedule of the Annual Report and Implementation Plan shall be submitted in a format and on a time schedule agreed to between the CTO and CRSP ME. Reporting will need to correspond to USAID required indicators (program component indicators, SO indicators, or IEHA indicators).
4. Reporting should include progress made toward benchmarks and result indicators of development impact, as discussed in the program description of this RFA. In addition, qualitative descriptions of success stories and achievements to illustrate the applications of CRSP research should be included when possible.
5. The Annual Report for the Leader Award should include information concerning any Associate Awards that summarizes activities undertaken, progress made/results achieved, trends, problems, etc. under both the Leader grant and Associate grants.

### 3. Final Report

The final performance report shall contain the information contained in 22 CFR 226.51(d). The Recipient shall submit a final report that replaces the last annual report and includes: an executive summary of the Recipient's accomplishments in achieving results and impact, conclusions about lessons learned, future challenges and opportunities, an overall description of the Recipient's activities and attainment of results by country, region, or theme, an assessment of progress made toward accomplishing the Objectives and Expected Results, significance of these activities, and important research findings, comments and recommendations. The final report should also include a final fiscal report that describes how funds were used.

### 4. Submission of Reports

The Recipient shall submit an original to the Washington CTO, one copy to the Agreement Officer, and one electronic copy of the final report to the Development Experience Clearinghouse (DEC). Documents submitted to the DEC should be sent in original format via email to:

E-mail (the preferred means of submission): <docsubmit@dec.cdie.org>

U.S. Postal Service:  
Development Experience Clearinghouse  
8403 Colesville Road, Suite 210  
Silver Spring, MD 20910

Fax Number: (301) 588-7787

Please reference web site [http://www.dec.org/submit\\_doc.cfm](http://www.dec.org/submit_doc.cfm) or contact one of the following concerning any questions your organization may have on the reporting requirements:

Development Experience Clearinghouse  
E-mail: [docsubmit@dec.cdie.org](mailto:docsubmit@dec.cdie.org)  
Phone: (301) 562-0641



5. Evaluation

There are two types of assessments that are required of the CRSPs. The first, the external evaluation, evaluates the quality and progress of the research, the achievement of outreach and development impact benchmarks, and the degree to which the research activities achieve integration and relevance to development policy and programming—in-country and more broadly. The second, the administrative/management review evaluates the administrative and management effectiveness of the CRSP, including the relationship between ME and subaward institutions, the relationship and communication with USAID/W and Missions, fulfillment of cost share requirements, and the outreach and intellectual leadership activities undertaken by the ME. These two evaluations are related and have some overlap in areas of inquiry, however, the two assessment processes are distinct; the two assessments have different primary audiences, and rely on different types of evaluators. Both evaluations are generally conducted in the beginning of the fourth year of the five-year award.

These evaluations provide input into the renewal extension for a possible second five-year award. The CRSP must submit its application along with the evaluation reports for consideration by USAID and SPARE (a subcommittee of BIFAD).

The nature and funding source of these evaluations are currently under review. It is unlikely that the CRSP will remain responsible for funding and overseeing its own external evaluation. The cost application should not budget for an external evaluation.

**A.6 INDIRECT COST RATE**

Pending establishment of revised provisional or final indirect cost rates, allowable indirect costs shall be reimbursed on the basis of the following negotiated provisional or predetermined rates and the appropriate bases:

**SECTION I: FACILITIES AND ADMINISTRATIVE COST RATES\***

**RATE TYPES: FIXED FINAL PROV.(PROVISIONAL) PRED.(PREDETERMINED)**

**EFFECTIVE PERIOD**

TYPE	FROM	TO	RATE(%)	LOCATIONS	APPLICABLE TO
PRED.	07/01/05	06/30/06	46.0	On Campus	Organized Research
PRED.	07/01/03	06/30/06	46.0	On Campus	Ag. Research Division
PRED.	07/01/03	06/30/06	46.0	On Campus	Instruction
PRED.	07/01/03	06/30/06	34.0	On Campus	Other Spon. Act
PRED.	07/01/03	06/30/06	40.0	On Campus	Coop Exten Service
PRED.	07/01/03	06/30/06	26.0	Off Campus	All Programs
PROV.	07/01/06	UNTIL AMENDED			Use same rates and conditions as those cited

for fiscal year ending June 30, 2006.

**\*BASE:**

Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials, supplies, services, travel and subgrants and subcontracts up to the first \$25,000 of each subgrant or subcontract (regardless of the period covered by the subgrant or subcontract). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, tuition remission, rental costs of off-site facilities, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of \$25,000.

**A.7 TITLE TO PROPERTY**

Property Title will be vested with the Recipient in accordance with 22 CFR 226.

**A.8 AUTHORIZED GEOGRAPHIC CODE**

The authorized geographic code for procurement of goods and services under this award is 000.

**A.9 COST SHARING**

The Recipient agrees to expend an amount not less than \$1,050,000.00 of the total activity costs.

**A.10 SUBSTANTIAL INVOLVEMENT**

Substantial Involvement. The intended purpose of CTO involvement during the Leader award is to assist the recipient in achieving the supported objectives. The Agreement Officer has delegated the following approvals to the Cognizant Technical Officer, except for changes to the Program Description or the approved budget. Such changes, as first reviewed by the Cognizant Technical Officer, shall only be approved by the Agreement Officer.

Substantial involvement will be limited to:

1. Review and comment on annual implementation plans for the Leader Award.
2. Approval of specified key personnel assigned to the position(s) listed below. The personnel position currently listed below has been approved. All changes thereto must be submitted for the approval of the Cognizant Technical Officer and to the Agreement Officer.

SMOG CRSP Director

3. Agency and recipient collaboration or joint participation.

- a. Collaborative involvement in selection of members of advisory committees. USAID may also choose to become a member of these committees. Advisory committees shall concern themselves only with technical or programmatic issues and not routine administrative matters;
- b. USAID will review and comment on the solicitation for research activity sub-awards;
- c. USAID will participate with voice and vote, but not veto, in the selection of sub-award recipients; and
- d. USAID will approve the recipient's monitoring and evaluation plan.

Specific substantial involvement provisions for associate awards will be identified for each award. These provisions may include A) Approval of recipient's implementation plans; B) Approval of specified key personnel; and C) Agency and recipient collaboration or joint participation. The Mission or other office/bureau commissioning activities through an associate award will propose terms for substantive involvement, but terms for the associate awards should be consistent with the leader award.

#### **A.11 TYPE OF AND IMPLEMENTATION OF AGREEMENT**

This is a Leader with Associate (LWA) Cooperative Agreement. There is no dollar ceiling on individual Associate awards or the cumulative dollar amount of Associate Awards. It is not necessary to amend the Leader Award if the amount of Associate Awards exceeds the estimated amount. (Reference USAID Contract Information Bulletin 99-10.)

The Leader Award will have one Cognizant Technical Officer (CTO) located in USAID/W. While this global LWA agreement will be similar to a traditional Cooperative Agreement (CA), this instrument is designed to allow additional flexibility to facilitate participation by USAID overseas Missions and Bureaus. Through the LWA, Missions and Bureaus will be able to develop their own stand-alone cooperative agreements or grants (Associate Award) without repeating the competition process, provided the Associate Awards are consistent with the program description of the Leader Agreement. Associate Awards shall contain a separate activity description that fits within the broader program description of the Leader Agreement, as well as separate budget and reporting requirements, but will otherwise be considered to be covered by the terms and conditions of the Leader Agreement. Prior to issuance of an Associate Award, the requesting office in the Mission or in USAID/W must consult USAID/W CTO. The Agreement Officer in the operating unit issuing the Associate Award and the USAID/W CTO will jointly determine whether the program description of the Associate Award is consistent with the Leader Award program description. Sub-grantees and subcontractors are not eligible to receive stand alone Associate Awards through this mechanism.

**A12. EXECUTIVE ORDER ON TERRORISM FINANCING (FEB 2002)**

The Contractor/Recipient is reminded that U.S. Executive Orders and U.S. law prohibits transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the responsibility of the contractor/recipient to ensure compliance with these Executive Orders and laws. This provision must be included in all subcontracts/subawards issued under this contract/agreement.

## Attachment B

### PROGRAM DESCRIPTION

#### I. TECHNICAL APPROACH

##### A. INTRODUCTION

Sorghum and pearl millet are poised to be the major grains of the 21<sup>st</sup> Century in the semi-arid tropics. Significant research advances have been made with resultant technologies starting to be exploited in pilot programs in several regions. Domestic markets for food and feed are increasing rapidly. Success in research and development shows that sorghum and pearl millet are moving from subsistence to cash crops. There are increasing opportunities for farmers producing the staple food crops to participate in new markets and increase their incomes. In West Africa, these opportunities include linking farmers using improved tan-plant, white-grain cultivars combined with use of improved agronomic practices, with end-users producing products including processed pearl millet as couscous and other food uses, and sorghum for poultry feed. In Eastern Africa, farmers growing *Striga*-resistant sorghum cultivars as part of an integrated crop management strategy have increased sustainable grain yields. Tan-plant, white-grain cultivars are being used to produce an increasingly popular lager beer in East and Southern Africa, and for bread and snack foods in Central America.

Although historically recognized as staple crops of the poor, advantages to growing sorghum and pearl millet are numerous. These crops are endowed with enormous genetic variability. Research has resulted in cultivars and hybrids that fit into most production systems. Sorghum and pearl millet can be grown in monoculture, rotated with many other crops, or intercropped with legumes or maize. Plant biomass is used as stover for animals, as building material, or as a mulch to improve soil quality and reduce erosion. Dependability of harvests in the prevalent growing environments and potential gains of sizable yield increases make sorghum and pearl millet a key factor for the future prosperity of Africa and other regions of the world. Production of sorghum is undergoing changes worldwide mainly because of changes in demand and markets. In Africa, production increased from 17.8 m MT in 1995, to 18.5 m MT in 2000, to 23.3 m MT in 2004. Sorghum and pearl millet are superior in water- and nutrient-use efficiency to most other grains. Sorghum and pearl millet use less water than maize, so in lower rainfall areas, as in most semiarid regions, sorghum and pearl millet should be favored over maize.

The **overall vision** for the Sorghum, Millet, and Other Grains CRSP will be to improve food security, enhance farm income, and improve economic activity in the major sorghum- and pearl millet-producing countries of Africa and Central America. The program will result in mutual benefits to the United States by development and transfer of new technologies and by strengthening human and institutional capacity.

The CRSP will lead efforts to promote profitable markets for sorghum, pearl millet, and other grains by working with agencies that identify and expand markets, assess economics, and facilitate the evolution of a production-supply chain and expanding markets to deliver quality grain to end-users. The Sorghum, Millet, and Other Grains CRSP, through collaborative research with U.S. universities, USDA-ARS, developing and transforming country national research programs and universities, other advanced research institutions worldwide, private industry, and Future Harvest Centers (ICRISAT, IITA, CIAT), will be the major provider of scientific information on genetics; integrated pest management; crop, soil, and water management; and human food and animal feed utilization. The technologies developed will be disseminated collaboratively with national extension services, non-governmental organizations (NGOs/PVOs), food- and feed-processing entrepreneurs, and other relevant organizations.

The **overall approach** will focus on increasing food security and promoting market development of sorghum and pearl millet products for developing and transforming countries. Targeted basic and applied research, education/short-term training, and technology transfer will promote adoption and economic impact. The approach will involve regional, interdisciplinary, multi-organizational teams.

## **B. PROGRAM OBJECTIVES**

- 1. *Facilitate the growth of rapidly expanding markets for sorghum and pearl millet***
- 2. *Improve the food and nutritional quality of sorghum and pearl millet to enhance marketability and consumer health***
- 3. *Increase the stability and yield of sorghum and pearl millet through crop, soil, and water management while maintaining or improving the natural resources of soil (land) and water***
- 4. *Develop and disseminate information on the management of biotic stresses in an integrated system to increase grain yield and quality in the field and in storage***
- 5. *Enhance the stability and yield of sorghum and pearl millet through use of genetic technologies***
- 6. *Enhance global sorghum and pearl millet genetic resources and the conservation of biodiversity***
- 7. *Develop effective partnerships with national and international agencies engaged in the improvement of sorghum and pearl millet production and the betterment of people dependent on these crops for their livelihoods***

## **C. TECHNICAL LEADERSHIP**

### **1. State of Knowledge**

Sorghum and pearl millet are basic staples in Sub-Saharan Africa and are viewed widely as subsistence crops. There are a limited number of other cereal crops: teff in Ethiopia, finger millet in East, Central, and Southern Africa, and fonio in West Africa. Little research information and scientific expertise exists on these crops individually or as components of a sorghum or pearl millet cropping system. Although these crops are of minor or regional importance, further research on these crops may be merited. In addition, maize is an integral part of the sorghum/maize intercropping system dominant in the highlands of Central America.

Historically, sustained on-farm yield improvement has been difficult to achieve due to the risky production environment (weather and pests), lack of farmer access to inputs, and price collapse following bumper harvests. Poor market structures and lack of access to input and product markets inhibit development of end-use industries (processed food and feed) for sorghum and pearl millet. Many segments of agro-industry (seed, fertilizer, or end-use) are hesitant to expand research and development with sorghum and pearl millet because of historically low profitability. However, development of end-use industries for each crop will stimulate investment in inputs of improved seed and fertilizer and, subsequently, increase farm incomes and improve the health of the population.

With introduction of new technology and marketing strategies, sorghum and pearl millet are being converted into commercial crops by taking advantage of the technology backlog developed by INTSORMIL, national agricultural research organizations, and Future Harvest Centers. This

improved production takes advantage of marketing strategies to utilize both the price variation and new markets to benefit farmers.

Agriculture is a dynamic biological system, so crops, pests, and agronomic practices are continually evolving. As new technologies that render solutions to old problems are deployed, new pests and diseases may arise. Climate influences crop production yearly. Changes also are occurring in consumer preferences, food-quality, and government policy. Thus, the foundation of this CRSP will be a strong research program able to respond to emerging research problems, needs, and opportunities as well as to the more intractable existing problems. CRSP research will address the entire continuum from the most basic to the more applied and direct (identification of farm-level strategies involved with producing grains for new markets and concurrent income gains associated with the introduction of new technologies and new markets). Although primarily a research program, the CRSP will nevertheless measure its success in the outstanding scientific results it generates as well as in achieving benchmarks with collaborating partners, increasing effects on farm incomes, and welfare in developing and transforming countries and the United States. This ability to work on several levels from basic research to farm-level introduction distinguishes CRSP researchers from their peers at U.S. institutions.

Developing human and institutional capacity for effective research and development in sorghum and pearl millet is critical to maintaining cutting-edge programs in genetic improvement; soil, crop, and water management; integrated pest management; food science; and economics that are essential for success. Building a wide network of collaborators of national agricultural research and extension systems and other agencies is essential for development and deployment of technologies. For pilot projects that have national impact, USAID missions, other NGOs/PVOs, donors, and public policy makers must be involved. This CRSP will be active in each of the above educational and institutional endeavors.

Strengthened institutions and an enlightened work force are key to bringing about sustainable change if encouraged by the greater policy environment. Successful research is essential in developing appropriate technologies that increase production and offer people the opportunity to feed themselves and their families. Sustained change is made possible only when the increases in production are translated to market access and profitable enterprises that stimulate income.

The supply-chain management concept of producing and delivering high-quality grains from farmers to end-users is essential to develop robust, sustainable markets for sorghum and pearl millet. Increased income generation is important for women who are often the key entrepreneurs involved in processing and marketing of sorghum and pearl millet food and feed products and do much of the agricultural labor. At the same time, urban consumer demand will be met with more



convenient, highly nutritious food products available at reasonable cost in the market place.

Sorghum and pearl millet grain are used to produce numerous specialty food products, including snack foods, beer, and yogurts in Africa and Japan, and as a substitute for wheat flour in bread products in Central America. Many opportunities exist to expand commercialization of products because sorghum flour readily accepts added flavors, produces visually attractive products, is gluten-free, and is from a non-GMO crop. The nutritional profiles of sorghum and pearl millet offer benefits that improve human health. Sorghum foods have low glycemic levels and offer slow rates of starch digestion and moderate blood glucose levels that have a positive impact on diabetes, cardiovascular disease, and obesity. Historically, these characteristics of sorghum have been viewed as problems; however, diabetes and obesity are growing problems in developing and transforming countries. Phenolic compounds in sorghum are antioxidants desirable for heart health. Markets for sorghum and pearl millet for health foods may make a substantial contribution to human health. Pearl millet is an excellent cereal grain for poultry production because of high protein and oil content and a unique ratio of amino acids and fatty acids. Sorghum and pearl millet grains are less prone than maize to infection by the fungus *Aspergillus* that produces aflatoxin and *Fusarium* that produces fumonisin, both of which are carcinogens. With proper grain storage, these mycotoxin problems are essentially absent in sorghum and pearl millet.

Sorghum and pearl millet grain are valuable livestock and poultry feeds. As economies of developing and transforming countries improve, meat becomes a more important part of the diet. Experts project that poultry production and consumption in Africa will explode during the next 10 years. To promote sustainable development, grain crop production of local cereals (i.e., yields of sorghum and pearl millet) must increase rapidly. At present, imported grain (mostly maize) is widely used for poultry feed and, without large yield increases to provide a reliable supply of sorghum and pearl millet in semi-arid countries, imported maize grain will continue to be the basis of livestock rations. Development of sorghum and pearl millet production, along with handling and storage systems to meet this demand, has huge potential to improve producer income while providing poultry and livestock protein in diets of urban and rural populations and reducing trade imbalance (i.e., imports). Additionally, in Central America and some African countries, forage sorghum and pearl millet are important feedstuffs for intensive dairy production near urban centers to meet increasing demand for milk and cheese.

Petroleum is a finite energy source, and crude oil prices are projected to rise with increased production unable to meet demand. Sorghum and pearl millet grain and/or stover and sweet sorghum are possible feedstocks for biofuel production. Sorghum grain is used to produce ethanol in the Central Great Plains of the United States, and active research is underway in the United States and Central America to use grain and sweet sorghums for ethanol production.

## **2. Priority Constraints and a Technology Extension-Marketing Strategy for semi-arid Sub Saharan Africa**

Constraints to the applied regional research programs for this CRSP can be prioritized under three headings: Agronomic, Economic Factors, and Market Constraints. How the program will respond to these constraints is discussed.

**Agronomic Constraints:**

- Water and soil fertility combined
- New cultivars
- Improved agronomic practices

**Economic Factors:**

- Product price collapses
- Lack or inadequacy of input markets especially seed, fertilizer, and credit

**Market Constraints:**

- Food markets -Irregular quantities and dirty grain supplies
- Ties of food processors to farmers' groups
- Technology and business practices of food processors
- Feed market - Tannin
- Price competition with maize
- Mycotoxins

***Agronomic Constraints***

If you work in a semiarid environment where sorghum and millet have a comparative advantage because of their greater tolerance to drought and low soil fertility than most cereals, the first and most obvious constraint is water. This is not necessarily irrigation because most of the semiarid world cannot be irrigated for either technical or economic reasons. However, in much of the semiarid environment, rainfall and underground water can be much better used through water harvesting and out-of-season irrigation respectively.

It is also well known that just providing water, where soil nutrients have been exhausted, will not have a big effect. Similarly, if soil fertility is improved and there is a water deficit in a critical period of plant growth, the soil fertility amendment will have little or no effect. This lack of effect of soil fertility improvement is especially true of soils with more clay where the runoff and amount of rainfall is very high. But sandy soils also need to hold the water within the soil better or reduce percolation of water through the soil.

Mining of soil nutrients is a pervasive problem in Sub Saharan Africa semiarid agriculture. So the first part of the constraints is to simultaneously attack the water deficit and soil fertility problems. Finally, the lowest cost method per unit of nutrients to provide basic plant nutrients is with inorganic fertilizers.

The proposed program puts an initial stress on good agronomy that includes investigating simultaneously the effects of water and soil fertility improvement. This combined soil and water research is linked to extension because methods for doing this are soil- and region-specific.

Once soil water and fertility are improved, new cultivars to respond to these better conditions become critical. Many breeders have tried to do it all with cultivars, especially using earliness to combat drought. Unfortunately, drought does not always come at the beginning or end of the season. Moreover traditional cultivars have generally been selected for their tolerance to a range of rainfall conditions. Finally, breeders need to respond to many biotic constraints (disease and insect). Asking breeders to simultaneously respond to abiotic constraints (lack of water and nutrients) and biotic ones is unreasonable. Finally, with slightly more water and nutrients, yields can be increased but the plant has to be in the field long enough to benefit, which often requires at least medium- and long-season cultivars in the lower rainfall risk regions. Thus, breeders are asked to breed for moderately improved environments, to identify regionally important biotic constraints, and to overcome them with new cultivars that also have improved quality characteristics for food or feed (low tannin).

Because of many biotic constraints and quality requirements, the breeders' roles are critical. Breeders also are inclined to work at various stages of the food chain to get their new material into farmers' hands. An emphasis on breeding is important in the technology development phase. However, given their commitment to getting technology into farmers' hands, breeders are also important in farm-level extension and responses to emerging markets.

Once the soil-water and new cultivars are available, weeds, fit into the cropping system, spacing, and timing become important. These region-specific requirements need to be delegated to national research systems and regional research and extension. The proposed program needs to have a central emphasis on working with and developing the capacity of the national research system through academic and short-term training to integrate the technology components and to continually adapt the system as new biotic constraints emerge and the economy evolves, demanding new processed foods and feeds from the traditional staples.

### ***Economic Factors***

New markets for the products from the rapid development of the food and feed sector provide a crucial element for rapid technological change. Markets for staples tend to have a price collapse in good, and sometimes even normal, rainfall years because people can only eat so much of the staple. When there is an adequate supply for all those with money to buy the staple, no more purchases are made unless there are exports or new markets.

In developing countries, two other price collapses reduce farmers' incomes besides the good weather year effect. First, the seasonal price collapse at harvest results from farmers' needs for cash then and is a strong discouraging factor for the purchase of inputs. Second, the public sector and NGOs tend to drive down staple prices in poor rainfall years. In summary, staple prices collapse with good rainfall; with poor rainfall, the public sector and NGOs attempt to drive down prices. Finally, in all years the lowest price point tends to be at harvest when most farmers are selling their harvest. To introduce new technologies, the most important factor is to increase the profitability of farmer operations so that farmers can afford to purchase inorganic fertilizers and improved seeds.

The marketing strategy of the potential new CRSP revolves around increasing that profitability. First, we propose to introduce inventory credit for the annual price collapse at harvest. Second, we propose to facilitate the development of the already rapidly increasing food processing sector of the basic staples of millet and sorghum for the between year price collapse. This will serve as a price floor in the good rainfall years in the same way that a ketchup factory keeps the price of tomatoes from collapsing. The food processing sector will have only a small effect in increasing total demand. The big expansion sector is for feed especially for broilers. But the main point is that technologies will only be introduced as the production of staples becomes more profitable. Put another way, the main constraints to increasing farmers' incomes are low harvest prices (the annual seasonal price collapse) and the two price collapses mentioned previously.

The most important constraint is profitability, which needs to be attacked with a series of measures to increase farmers' prices with a better marketing strategy. This strategy includes facilitating growth of the emerging food processing sector of the basic staples and replacing a substantial proportion of maize in poultry and animal feed rations. Fortunately, as incomes increase, consumers want more processed food from their staples. Then, the market for animal-based protein, especially broilers, accelerates and causes long-term shifts in the types of meat consumed and rapid increases in the demand for feed grains such as sorghum, millet, and maize.

### ***Input Markets***

When donors moved away from subsidizing inputs and the public provision of inputs in the late '80s and '90s, they left many of the staples as orphan crops. Those crops were not profitable enough to encourage investment by private seed companies, and public seed production was discouraged. Unfortunately, farmers will not buy seed or fertilizer unless product prices are first higher, so we propose to put our emphasis there. Accelerating the demand to use higher cost inputs is the key by first operating with marketing strategies to increase profitability. Then we can facilitate evolution of the

private sector, but, in the interim, the public sector will need to jumpstart this process of creating a demand for higher cost and more valuable seeds as well as regular fertilizer purchases. The public sector needs a strategy to raise the seed price to perhaps a 6-to-1 ratio of seed price to grain. In developed countries, this ratio is often 8-to-10-to-1, but seed companies in developed countries have higher research and other expenses. Input markets will develop as the sector is made more profitable, but the priority sectors are the food and feed processing of the principal staples. With their development, input markets follow.

### **Markets: The Food Processing Sector**

These rapidly expanding markets processing millet and sorghum for a series of products in the urban areas of Sub-Sahara Africa principally need increased supplies of clean grain. Threshing of millet and sorghum in West Africa, for example, is on the ground with an average of 15% of impurities. Getting tarps on the ground or introducing threshers is a priority goal for both millet and sorghum production. Processors will also have to pay more to farmers' organizations for cleaner grain with much of it sold later in the season after the price collapse from the harvest period. Processors of food from staples need an assured supply of uniform, clean grain, more direct contacts with farmers' organizations, and, ultimately, contracts with farmers. Finally, the technology level, new product development, and financial/economic capabilities of these food processing firms will be facilitated with more interaction of food scientists from Sub-Saharan Africa and developed countries.

The feed sectors for millet and sorghum have different requirements. First, non tannin sorghums have much greater substitution potential for maize and are now widely available even though many in the feed industry do not realize this fact. Second, yields of sorghum have to be substantially increased to be competitive with corn. Finally, resolving the storage problem will give sorghum and millet an advantage over maize with the reduced mycotoxins, to which even maize in the field is susceptible. This is a serious quality problem in feeds because mycotoxins are deadly for chickens and carcinogenic for humans.

### **3. A Market-focused Strategy to Take Advantage of Existing Opportunities or to Create New Opportunities**

The principal staples have three markets:

- Food processing
- Feed mixing and processing
- Traditional home and national consumption.

The food processing (traditional cereals) sector, for example, is still small but rapidly growing in West Africa, East Africa, and Southern Africa for sorghum and millet products. Millet processed products include arraw, chakri, coucous, bouillie, degue, and flour. These products are steamed or boiled, making the processed and

packaged traditional product available to a wide range of urban consumers. In the Sahel of West Africa, where there is a high value placed on the time of women in urban areas and on the traditional preferences for these products, demand is growing rapidly. Much of the production is sold from small street stalls and the producers' homes but it is also available in modern grocery stores, especially the flour. Exports to the expatriate communities in Europe and the US are also increasing rapidly. For example, approximately 14 millet processors are in Senegal, 5 to 8 in Mali and Burkina Faso, and 3 in Niger. This is still a small sector and, even with substantial growth, it is not expected to take more than 10% of the millet supply. Nevertheless, this sector is growing rapidly and for some of the farmers' groups, will be important for raising their prices received.

For food processors, farmers' groups need to be engaged to produce specific required cultivars with an emphasis on an assured supply of clean grain. The food processors need to pay a premium price for quality and stagger their purchases over the season rather than attempting to buy and store all their annual requirements at harvest time. We propose to engage Marketing economists to work with food processors on contracting supplies and other technical issues including packaging and franchising.

For feed mixers and processors, sorghum is preferred over millet. For example, in Senegal, there are 500 to 600 intensive (confined and fed with rations) poultry producers. In Senegal there is a new law banning poultry imports, so this number is expected to double in the next two years. Six major firms are producing their feed for sale. This process is just beginning in Mali and Burkina Faso with about 20 to 40 intensive poultry producers in both countries and only two major producers in Niger, both concentrating on egg production. In Zambia and Tanzania in East and Southern Africa, opportunities exist for identified sorghum sources for production of sorghum lager beer by SAB Breweries.

Poultry, especially broilers, is the big expansion industry, which is going to keep demand increasing for local cereals even as the population reduces its food consumption of unprocessed millet and sorghum with income growth. The relative price of chicken to all other meats falls over time with intensive production, and there are major changes in meat consumption practices. This occurs in the development process over a two to three decade period and is still going on in the US after 50 years. We propose to concentrate on this substitution of sorghum for imported and domestic maize in feed.

Cereals (maize or sorghum) compose half of a feed ration, and the feed is 50 to 60% of the costs of broiler production. The first requirement for the feed sector is for a non-tannin sorghum. Then, the sorghum has to be sold at a lower price than maize. This requires rapid technological change, but we can expect to double or triple sorghum yields in normal and good rainfall years. In bad rainfall years, yields will not collapse because water harvesting techniques will be

introduced. In these years, the high millet and sorghum prices will result in both being used principally as food. Hence, in these seasons, feed mixers and processors will need to look elsewhere for the principal cereal. Farmers will still benefit from the good prices this year and the price support from feed demand in the normal and good years. Finally, a lower mycotoxin level is an advantage of millet and sorghum over maize, especially if the sorghum is well-handled in storage so that there is no humidity problem. Maize often comes in from the field with fungi that produce mycotoxin, but neither sorghum nor millet does. However, both millet and sorghum can develop the fungi with poor storage practices.

Traditional markets for unprocessed millet and sorghum grain will continue to be important, especially in rural areas. Farm-level producers should also be able to benefit from adoption of production practices being introduced for the food and feed processors.

#### **4. Linking Producers to Markets**

Food processors need first to identify the preferred cultivar so that the processor is satisfied that she/he will have the characteristics desired as well as a uniform and clean grain (see earlier comments about the importance of the clean grain, especially getting threshing off the ground). Contacts well in advance of planting time will be made between food processors and farmers' groups. These contacts will be either direct contacts or through the intermediary of this program, and the extension service or NGO directly working with the farmers' groups. Where farmers' groups do not exist, they will need to be created through village negotiations when setting up the program.

A pervasive problem is the establishment of contracts in a region where there is minimum effective protection of contract rights with both sides attempting to take advantage of short-term price increases without a commitment to a long-term partnership. Thus, setting up contracts between farmers' groups and food processors is highly important.

For feed processors, the system of setting up linkages is different. The big processors that mix and sell their feed need large minimum-size lots, such as 200 tons of grain. Farmers' groups normally cannot guarantee that quantity at the start of the process because they are too small and also need to eat some of their staple sorghum. Moreover, they have to improve productivity (double or triple yields) so they can be price competitive with imported or local maize. While these types of yield increases can be achieved, the other component is for producers' groups to recognize that with technological change, their costs per output unit are decreasing so that they can still profit from lower prices. In bad rainfall years, they will withhold their sorghum for food uses because prices will be substantially higher, and in these years, feed processors will have to import cereals.

Of the 500 to 600 intensive poultry producers in Senegal for example, about 10% use Ready Mix (all the feed except for the cereal) or CVM (Calcium, Vitamins, and Minerals) plus the cereals and protein sources. Thus, producers need to be identified and linked with farmers' organizations. The price negotiation needs to be tied to the price of maize. Non-tannin sorghum has 97% of the feed efficiency of maize. With tannin, this falls to 85 to 87%. Feed processors should prefer non-tannin sorghum over maize if farm-gate prices for sorghum fall below 97%. Changing preferences will also depend upon feed suppliers' and farmers' recognition of the feed value of non-tannin sorghums.

The other part of the strategy is to maintain low humidity in storage and transportation to eliminate the mycotoxin problem. Also, successful information diffusion would point out the greater propensity of maize, including imported maize, to have mycotoxin problems and the widespread availability of non-tannin sorghums.

### **5. Improving Producer Access to New Technologies**

Financing of increased input purchases including inorganic fertilizers and improved cultivars will ultimately be taken over by local and regional credit agencies. To start this program, this CRSP will initially provide these inputs, but the value of the inputs will have to be repaid at harvest in-kind to the farmers' groups. The farmers' groups will then store and sell later in the season when prices increase. These funds then will become a revolving fund to purchase inputs the next year. Moreover, the farmers' groups will gain the practical experience of storing and marketing. The CRSP will provide technical help from entomologists on storage practices and from economists on the various CRSP marketing strategies.

### **6. Innovative Technology Commercialization Strategy**

The basic concept of providing farmers with fertilizer and improved seeds is that low inputs mean low outputs as you cannot produce crops without soil nutrients. The CRSP will focus on raising farm-level prices rather than reducing input costs by trying to reduce the level of nutrients. The CRSP will introduce the series of marketing strategies discussed previously to do this. It is also possible to reduce the costs of inputs by using higher analysis fertilizers and by buying fertilizers in quantity with a farmers' group or cooperative. The CRSP will work on new local or regional credit organizations, which can reduce the risk premium and interest costs with greater knowledge of the farmers involved and by utilizing group pressure to increase repayment rates.

### **7. Strategy to Improve Extension**

The CRSP will work with a wide range of NGOs and national extension services, like ANCAR in Senegal for example. These agencies have already demonstrated farm-level successes. The CRSP technology package will be developed and made available for testing by the national agricultural research organizations with whom it will be defined for



the different regions where the program will operate. The research package will be discussed in detail with the farmers' groups. On the initiation of the project, the CRSP will provide the credit that will become a revolving fund for the farmers' groups. The CRSP will identify or develop new sources of credit for the farmers' groups. The CRSP will collaborate closely with the food and feed processors in the identification of improved cultivars and in assuring that a quality premium is paid for a cleaner grain supply. The main concept is to increase the profitability of the purchase of inputs for using the new technology because the various price collapses faced by farmers are expected to be the principal constraint to the use of the new technologies by farmers.

## **8. Dealing with Diverse Client Groups Facing Different Technology Requirements**

Farmers in all regions have to deal with soil fertility constraints. The CRSP will start with the higher rainfall regions in the semiarid zones of Africa because these areas have less risk for increasing input use and more potential to have a surplus for selling to food and feed processors. Even in these regions, the CRSP will emphasize the use of water harvesting techniques to reduce risks and increase returns during bad rainfall years. As noted previously, the advantage of these years is greater price fluctuation. Those farmers who stabilize their bad weather season yields with water harvesting will be able to benefit substantially from selling later in the crop season. To facilitate that, the CRSP will encourage farmers' groups to provide inventory credit, which will lead to more incentives for later selling.

As the program moves into the lower rainfall regions, the CRSP will put even more attention on water harvesting and recognize that less surplus will be for sale to food and feed processors. The lower resource farmers will see the new technologies in the fields of the other farmers and will be able to imitate parts of it. The technology introduction also will facilitate the growth of new institutions, such as regional and local credit institutions, which can then benefit other farmers.

## **9. Proposed Approach to Program Implementation**

### ***a. Conceptual Framework and Linkages***

The Sorghum, Millet, and Other Grains CRSP will focus on regional programs in West, East, and Southern Africa and in Central America. Each regional program will be composed of scientists from national research systems and universities who contribute to the effort based upon regional strategies. Each region will have a U.S. coordinator and one or more host country coordinators and may move to a management-team approach for coordination. Regional programs will focus on clearly defined problems addressed by multidisciplinary teams, with an emphasis on "demand pull" through development of value-added products and animal feed market opportunities and the supply chain to successfully commercialize these products, resulting in

increased income that will stimulate adoption of new cultivars and production practices. Successful regional programs will require development of close partnerships among different countries and national research, extension, and academic programs, well-educated scientists across disciplines, NGOs/PVOs, processors, farmer groups, and Future Harvest Centers. Functional regional teams among partners addressing priority problems will be essential to effective programming.

This CRSP will design a plan for communication and collaboration with organizations that address global sorghum and pearl millet and other grains research and development, including those that focus on eliminating poverty and hunger worldwide. The intent will be to maximize the impact of related programs through the sharing rather than redundancy of information, lessons learned, research activities, technology development, and public and private contacts. Partnerships will be developed with national agricultural research services (NARS) and international organizations, such as ICRISAT, IITA, CIAT, IFDC, and CIRAD. Partnerships will also be established with newer initiatives that are ongoing in Africa by various organizations.

Sorghum and pearl millet are important grains and forage crops in semi-arid countries and the Great Plains of the United States, thus mutual benefits have been found in the past and are anticipated for the future. Free movement of germplasm between developing and transforming countries and the United States will continue to be essential for genetic enhancement of both crops, which are critical for increased yield potential, pest tolerance/resistance, and improved grain and forage quality. Value/supply-chain principles and pest management problems are similar in developing and transforming countries and the United States, thus experience, knowledge, and technologies generated through research, market development, and technology transfer will have worldwide benefits. These activities will increase income and stimulate international export opportunities. International graduate students contribute to U.S. agriculture through knowledge and technologies generated through thesis and dissertation research on U.S. topics while learning research approaches and tools to improve agriculture of their home countries. Improvement of economies of developing and transforming countries has the potential to reduce poverty and conflict, thus generating social benefits for the world.

The CRSP will respond with research on production and utilization of other important grain/cereal crops as well as minor locally important crop species ("orphan crops") in sorghum-/millet-based cropping systems as associate awards from USAID Missions become available. When additional funding becomes available, the CRSP will also respond to needs in other areas of the world, such as Asia and Eastern Europe. Such opportunities are envisioned to include a limited number of other cereal crops such as fonio, finger millet, and teff, which are involved in the sorghum/millet cropping systems in Africa. These are generally considered to be underutilized species, which are those

species with underexploited potential to contribute to food security, nutrition and health, income generation, cultural values, and ecosystem stability.

### ***b. Orphan Crops***

Programs to improve teff, finger millet, and fonio genetics, production, and marketing are mostly fragmented. Only for teff, the national grain of Ethiopia, does any concerted research and economic development activity exist. Thus, it is necessary to identify personnel with whom to establish linkages. Within the U.S., there are no research programs on these crops. The research techniques and methodologies used in other crops will be analyzed to identify those applicable to these orphan crops. A research and economic development program on these orphan crops will be dependent on availability of associate awards from USAID Missions in those countries where the crops are cultivated.

These orphan crop species commonly have the following features:

- A strong link to cultural heritage at their place of origin
- Mostly local and traditional crops, wild species, ecotypes, and landraces
- Adapted to specific agro-ecological niches and marginal land
- Weak or no formal seed supply systems
- Traditional uses in localized areas
- Produced in traditional production systems with little or no external inputs if not collected from the wild
- Little attention from research, extension services, farmers, policy- and decision-makers, donors, technology providers, and consumers
- Poorly documented distribution, biology, cultivation, and uses
- Highly nutritious and/or have medicinal properties or may have other multiple uses
- Underexploited
- Able to grow under low inputs
- Underutilized markets or a lack of markets
- "Women's crops"

### ***Strategy to enhance sub-sector productivity of orphan crops***

The CRSP will conduct the following activities during the five-year period of this cooperative agreement. With the support (financial and logistical) of USAID Missions in the relevant countries, personnel involved in the research, production, and marketing of each crop will be identified. Expertise will be needed in the social sciences to identify how the crops are produced and consumed, and what types of activities will be needed to promote production and consumption beyond the farm. The orphan crops are perceived as women's crops, so the role of women in research, production, and marketing will be a key to their

success. Programs for income generation for producers will be especially important. For each crop, a meeting of stakeholders (supported by the local Missions) will be held to discuss research, production, and marketing constraints. Based upon the discussions, a participatory action plan will be developed for each crop and country, which will list constraints, programs (including personnel), and funds needed to address each constraint, projected outcomes and goals, and verifiable milestones. The participatory action plan will be provided to Missions to obtain financial support. The CRSP Management Entity will provide back-stopping and logistical support for each buy-in. CRSP investigators will serve as academic advisors for graduate education. In Year 5 of the cooperative agreement, meetings will be held to report progress and refine goals for the next 5 years.

With USAID Mission interest and support, the CRSP anticipate progress can be made in the production, marketing, and consumption of these grains. With renewed interest and support, the CRSP foresees the following successes:

- Increased cultivation of underutilized species
- Greater partnerships in developing underutilized species
- Availability of products based on underutilized species in mainstream supermarkets
- Improved income for farmers and others from the sale of underutilized plant products
- Increased consumption of underutilized food plants or foods made with ingredients from underutilized plants will result in improved nutrition
- More involvement of the private sector in underutilized crop development
- Greater policy support for underutilized species such as fonio, teff, and finger millet

## **Fonio**

Fonio (*Digitaria exilis* (Kippist) Stapf) is a glumaceous monocot of the genus *Digitaria* of the family Gramineae (or Poaceae). There are more than 300 *Digitaria* species, which are sometimes grown as fodder crops. Only two species are grown as cereals in West Africa: *Digitaria exilis* (or fonio, white fonio, fundi or findi, acha, hungry rice) and *Digitaria iburua* (or black fonio, iburu).

### **Economic Significance**

Fonio (*Digitaria exilis*) is considered to be the oldest cereal in West Africa where it has been grown for centuries and is the only orphan species considered to be of importance there. It has been of marginal importance as a cereal due to its small seeds but it is now becoming the object of renewed interest as consumers begin to recognize its flavor and nutritional qualities. Research to mechanize several processing stages has been conducted to increase fonio sales in urban areas. Fonio can be grown in rotation systems, in which case it often follows rice, millet/sorghum, or groundnut.

Almost 380,000 ha of fonio are grown each year, and with production running at around 250,000 t (an average of 660 kg/ha), the crop feeds several million people during what are the most difficult months of the year in terms of food supply.

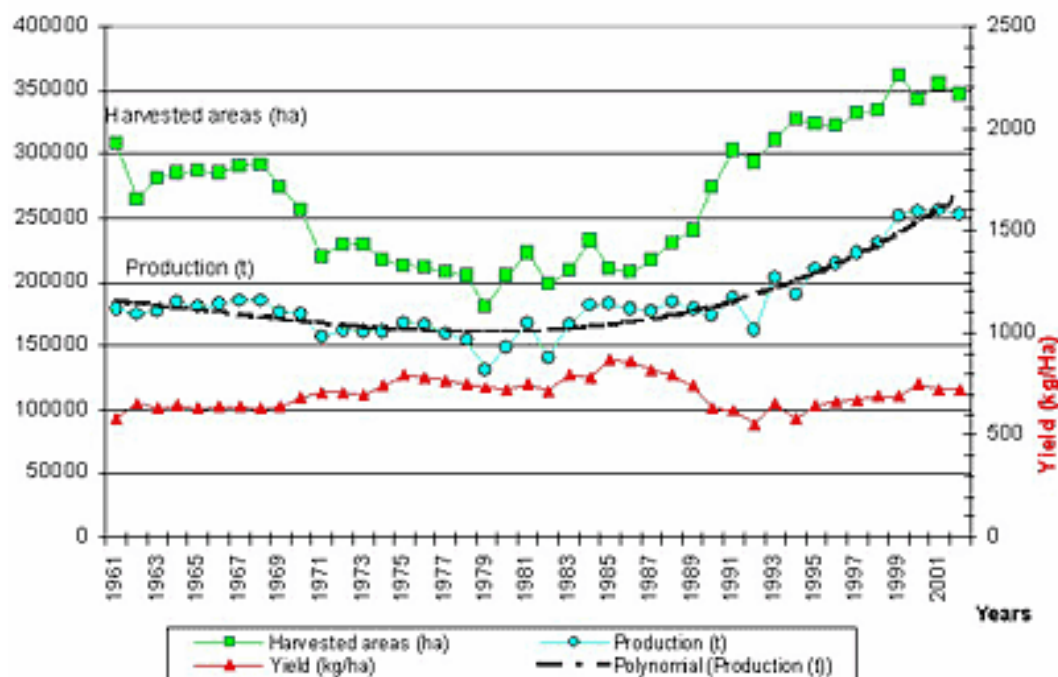
### **Analysis of Trends, Constraints, and Opportunities**

Research on improving fonio postharvest technologies has been conducted within the framework of a project funded by the CFC (Common Fund for Commodities), an intergovernmental financial body, and supervised by the FAO.

By comparison to other grain crops, no regional or international research network exists. Thus, no progress has been made in the improvement on fonio, mainly because fonio is only consumed in West Africa and requires intensive labor to produce. Hence, contrary to wheat, maize, or rice, the combined research funds in billions of dollars and the efforts of thousands of scientists from different nations have not been oriented to its improvement. Therefore, the lack of rapid progress in research is not because the crop cannot be improved, but only because of limitations in funds and research personnel. There is an opportunity to engage social scientists, plant breeders, crop production scientists, plant protection scientists, and food scientists in an integrated approach to understanding and recommending an approach to improving the production, utilization, and marketing of this valuable crop.

**Area and production**

**Fonio production in Africa**



<u>Country</u>	<u>Production (t)</u>	<u>Area (ha)</u>
Guinea	120,000	160,000
Nigeria	70,000	130,000
Mali	21,000	30,000
Burkina Faso	17,000	26,000
Ivory Coast	15,000	22,000
Guinea Bissau	3,000	5,000
Benin	1,500	2,500
Senegal	1,500	2,500
Niger	1,000	2,000
<b>Total</b>	<b>250,000</b>	<b>380,000</b>

Production trends over the past 40 years (FAOSTAT) show a sharp fall (from 180,000 to 130,000t) in the 1960s and 70s, followed by a steady increase from 1980 onward. As yields have remained relatively stable, this increase in production clearly stems from an expansion of the area planted.

In response to demand from housewives in urban areas, small firms (small-scale factories, women's groups) are now marketing processed fonio. In Mali, Burkina Faso, Guinea, and Senegal, private processors sell pre-cooked fonio in 500-g and 1-kg plastic bags. These products are sold through corner shops or supermarkets in large towns and are even exported to Europe or the United States. However, this type of fonio, which is often prepared on a small scale, is still expensive,

as processing operations are not very productive, which has considerably hampered product development. Thus, it is crucial to mechanize postharvest operations to facilitate raw product processing, reduce the workload for women, and improve end-product quality.

### **Finger millet**

Finger millet is an annual robust grass that grows to a height of 40-100cm. It's mainly grown as a grain cereal in the semi-arid tropics and sub-tropics under rain-fed conditions. It is productive in a wide range of environments and growing conditions throughout the middle-elevation areas of Eastern and Southern Africa, where it has been grown for thousands of years. The straw can be used as fodder and the fields are often grazed after harvesting.

As a food, finger millet is an excellent dietary source of methionine, an amino acid lacking in the diets of hundred of millions of the poor who live on starchy foods such as cassava, plantain, polished rice, and maize meal. Finger millet can be ground and cooked into cakes, puddings or porridge. The grain is made into a fermented drink (or beer) in many parts of Africa. The straw from finger millet is used as animal fodder. However, like pearl millet, finger millet also has a nemesis - *Pyricularia* blight, a very close relative of rice blast disease.

### **Economic Significance**

Annual world production is at least 4.5 million tons of grain, of which Africa produces perhaps 2 million tons. Although statistics on individual millet species are not collected in detail and are sometimes combined with sorghum, it is estimated that finger millet is grown on approximately 3.8 million hectares. Finger millet is a staple food crop in drought-prone areas and in these communities is an important component of the food security strategies. Also known as African millet or ragi, finger millet (*Eleusine coracana*) is grown as a cereal in the arid regions of Africa and Asia. Originally native to the Ugandan and Ethiopian highlands, it is one of the few species that currently support the world's food supplies.

Finger millet is often intercropped with legumes such as peanuts (*Arachis hypogea*), cowpeas (*Vigna sinensis*), and pigeon peas (*Cajanus cajan*), or other plants such as Niger seeds (*Guizotia abyssinica*). Once harvested, the seeds keep extremely well and are seldom attacked by insects or moulds. The long storage characteristics of finger millet make it an important crop in risk avoidance strategies for subsistence farmers.

### **Analysis of Trends, Constraints, and Opportunities**

Finger millet has traditionally provided food, employment, and income for a substantial portion of smallholder producers in the vast arid and semi-arid lands of Sub-Saharan Africa.

Historical trends, however, show that this grain is declining in absolute and relative importance in terms of production and consumption, thus, also in terms of income and employment in rural areas of Sub-Saharan Africa. Such a decline cannot be explained solely in terms of constraints imposed by climate, soil, and production technology. For example, farmers have been successful in increasing production of maize, a less well-adapted crop, in the semi-arid lands of Sub-Saharan Africa.

Indications about what should be done next lie with the relatively low productivity of these crops. However, postharvest constraints also contribute to the situation. Therefore, the potential and position of these crops in the arid and semi-arid lands' production-to-consumption food systems should receive a comprehensive analysis from the various perspectives of producers, processors, marketers, and consumers. A stakeholders meeting (supported by the local Missions) should be held to discuss research, production, and marketing constraints. Based upon the discussions, a participatory action plan can be developed for each crop and country, which will list constraints, programs (including personnel), and funds needed to address each constraint, projected outcomes and goals, and verifiable milestones.

### **Teff**

Teff is a species of lovegrass native to northeastern Africa, originating in Ethiopia between 4000 BCE and 1000 BCE. It is an important food grain in Ethiopia and Eritrea, where it is used to make injera, which is a fermented bread, and of less importance in India and Australia. In fact, teff produces up to two-thirds of the total food provision of Ethiopia. Because of its small seeds (less than 1 mm diameter), a person can hold enough to sow an entire field in one hand, which makes teff particularly suited to a semi-nomadic lifestyle. Teff is adapted to environments ranging from drought stress to water-logged soil conditions.

### **Economic Significance**

It would seem that because of its superior nutritional qualities, teff would be available to all persons in Ethiopia to make injera. However, while it is the preferred grain in making injera, its availability is limited by its high cost. Teff is currently the most expensive grain to purchase in Ethiopia because it requires labor-intensive harvesting and processing techniques, and produces especially low yields. Although teff covers the greatest land space in Ethiopia, it has the lowest yield, an average of 910 kg/ha. In 1996-1997, teff covered 31% of the total landmass, as compared to 17% and 13% for corn and wheat respectively. Research is currently under way to improve the yield of this cereal crop both in Ethiopia and in the U.S.

In Ethiopia, teff has multiple other uses including acting as reinforcement for thatched roofs and mud bricks. It is sometimes used as an alcoholic beverage base. Teff is used in mixtures with soybean, chickpea, and other grains and is becoming popular as baby food because of its high mineral content.



Teff is high in dietary fiber, complex carbohydrates (80%), iron, and protein (11%) and provides calcium and fat (3%). Teff has an excellent amino acid composition (including all 8 essential amino acids for humans) and has lysine levels (the amino acid that is most often deficient in grain foods) higher than wheat or barley; thus, teff stimulates the flora of the large intestine. It contains no gluten, so it is appropriate for those with gluten intolerance or Celiac disease. It has been reported that a big advantage is that the iron from teff is easily absorbed by the body.

Because of its high fiber content, teff can be particularly important in dealing with diabetes and assisting with blood sugar control. Because of its small size, the grain cannot be separated into germ, bran and endosperm to create a variety of other products. Although this creates a disadvantage for the use of the grain, it does allow teff to yield a much higher fiber content than other grains (15.3 grams of fiber/4 oz flour, second only to dark rye flour).

Almost no research is available regarding the risk and prevalence of diabetes specifically among Ethiopian immigrants in the United States. However, a study done in Israel showed that new immigrants from Ethiopia had diabetes prevalence rates as low as 0.4% and 0% and Ethiopian immigrants who had been in Israel for about 2-4 years had a rate of 8.9%. It can be inferred from this study that when the traditional Ethiopian diet is replaced by Western foods, the rate of diabetes among the population will increase. These statistics suggest a unique opportunity for food scientists to follow up on the uses of teff and its application as an alternate grain in diets for persons vulnerable to diabetes or gluten intolerance.

#### **Analysis of Trends, Constraints, and Opportunities**

The direct selection from the landraces and the intra-specific hybridization program that has been employed in Ethiopia to effect gene recombination were successful in developing several improved cultivars of teff with desired traits. All the improved cultivars were accepted by farmers and currently are in production. Direct selection from the landraces, mutation breeding, and intra-specific hybridization were attempted to develop lodging-resistant varieties, but so far no success has been achieved. Lodging is still one of the production constraints; therefore, one of the objectives of a breeding program would be the development of lodging resistant varieties. Other production constraints are low-yielding cultivars, low-moisture stress resistance, water logging, frost, weeds, poor soil fertility, diseases, and insects. Generally, the crop improvement program in teff attempts to solve these production constraints through a multidisciplinary research approach. Specifically, breeding programs should be able to overcome the problems of low grain yield and also develop cultivars that are resistant to lodging, low moisture, water logging, and disease because of the wealth of genetic diversity within the teff germplasm.

#### **c. Approach to Primary Research Areas by Objective**

The Sorghum, Millet, and Other Grains CRSP will support projects in six primary research and technology transfer areas: Supply Chain/Market Development; Nutrition, Health, and Grain Quality; Crop, Soil, and Water Management (ICSM); Biotic Stress Management (IPM); Genetic Enhancement; and Genetic Resources and Biodiversity. Each primary research area is further defined by the CRSP's approach to achieving seven objectives.

**Objective 1. *Facilitate the growth of the rapidly expanding markets for sorghum and pearl millet (Primary Research Area: Supply Chain/Market Development)***

Activities to achieve this objective are to identify the necessary quality components, move technology from the lab onto farmers' fields, and identify markets and strategies to increase farmers' incomes and reduce the risks of adoption of new technologies. A backlog of technologies is available in sorghum and pearl millet production. Moreover, food and feed processors are willing to pay for increased supplies of clean grain. A number of applied research programs are oriented to new markets and introducing new technologies. These technologies involve the integrated *Striga* resistance program in the Horn of Africa, sorghum for beer production in Southern Africa, servicing the rapidly growing intensive poultry production in West Africa, and responding to exponentially increasing demand for processed pearl millet food products in West Africa. Markets to address human health issues, such as diabetes and gluten intolerance, will be pursued. In Central America, flour-substitution technology is being adopted for bread and snack foods. Introduction of new technology can be combined with a series of new market strategies so farmers' groups can take advantage of new markets and price variations and afford to use greater input levels necessary to increase productivity. Pilot programs introducing new technology to farmers and linking them to food and feed processors will be established as appropriate. National policy makers will also be invited to pilot program workshops to assist them in understanding how to support emerging markets and farmer groups.

Measurable impacts to be generated:

- Increased farmers' yields and incomes
- Increased quantities of clean grain delivered to processors
- Increased utilization of sorghum in poultry feeds

**Objective 2. *Improve the food and nutritional quality of sorghum and pearl millet to enhance marketability and consumer health (Primary Research Area: Nutrition, Health, and Grain Quality)***

Objective 2 activities will exploit the treasure trove of sorghum characteristics considered positive for human health, i.e., reduced glycemic index for diabetics and the obesity problem, high levels of antioxidants, and negligible production of aflatoxins and fumonisins in the field. Progress has been made in determining these characteristics, and further efforts will document and enhance these positive attributes and move them into products. High-quality, profitable urban foods and beverages require specific grain-quality attributes that will be more fully defined. Promotion and marketing of these grains will be through identity preservation of the harvested grain (i.e., where grain is physically separated from commodity grain) and supply-chain management systems to expand markets and generate income for farmers. Improvements will be made in grain nutritional quality that will be incorporated into adapted germplasm.

The status of sorghum and pearl millet will be improved through development of higher-value, healthful grains, based on emerging documentation on positive nutritional and health attributes. Additional research will document and enhance these positive health-related characteristics through genetic improvement and processing. As part of the crop improvement program, high-yielding, high-quality cultivars with traits needed for value-added processing will be produced. This will build on past USAID investment in the successful development of tan-plant, white-grain sorghums in Mali, Central America, and Southern Africa. Research will emphasize reduction or avoidance of grain molds and weathering that adversely affect grain quality and significantly reduce the quality of processed products. Research on fundamental physical and chemical properties of grain relating to improvement in processing characteristics will be conducted.

Achievements have been made with past USAID assistance to improve grain nutritional quality for food and feed. Research will be conducted to incorporate better protein quality, macronutrient digestibility, and greater amounts of micronutrients into cultivars. Poultry trials will demonstrate the feeding value of sorghum versus maize, as well as differences between tannin and non-tannin sorghums. This will provide updated information to dispel myths about tannins and to promote the use of sorghum as feed.

Improved grains will be used in the delivery system described under Objective 1, where grain identity will be preserved through supply-chain management to expand markets and increase profitability. Emphasis will be on assisting entrepreneurs develop new start-up businesses through training in technologies and business skills. These activities are necessary to allow farmers to capitalize on these improvements and to benefit economically.

Measurable impacts to be generated:

- Sorghum and pearl millet cultivars with improved nutritional quality
- Sorghum and pearl millet health-food products developed for niche markets
- Greater amounts of high food-quality sorghum available to processors and poultry feed operations
- Farmers benefiting from enhanced markets

***Objective 3. Increase the stability and yield level of sorghum and pearl millet through crop, soil, and water management while maintaining or improving the natural resources of soil (land) and water (Primary Research Area: Crop, Soil, and Water Management [ICSM])***

Integrated crop and soil management (ICSM) systems will be developed in collaboration with other scientists and organizations through progression of verifiable milestones and involving on-station research, on-farm and farmer participatory research, training of extension and NGO/PVO personnel, technical support to technology-

transfer activities, links with diverse stakeholders, adoption studies, and eventually impact assessment. Collaborative ICSM research will be organized on a regional basis to contribute to increased production and income generation for small producers through involvement in technology generation and transfer. Sorghum and pearl millet production systems of resource-poor farmers are diverse. New practices tend to be adopted individually rather than as packages. Adoption of packages generally requires improved infrastructure and policy for extension, credit, input supply, and markets. Social and economic benefits will be derived by rural farmers, food processors, livestock feeders, and urban consumers of sorghum and pearl millet grain.

Measurable impacts to be generated:

- Increased sorghum and pearl millet grain and forage yields and water- and nutrient-use efficiencies in diverse cropping systems, which may include other grains, through generation and adoption of best management practices
- Production of a stable sorghum and pearl millet grain supply of high quality for value-added products
- Reduction of soil degradation, erosion, and nutrient depletion resulting from development of ICSM systems that maintain land (soil, water, vegetation) natural resources
- Greater influence on government policy regarding input supply and grain markets through generation and dissemination of ICSM research data

***Objective 4. Develop and disseminate information on management of biotic stresses in an integrated system to increase grain yield and quality in the field and in storage (Primary Research Area: Biotic Stress Management [IPM])***

An integrated system of management of biotic (disease, insect, weed, and bird) pests will be required to increase grain yield and quality of sorghum, pearl millet, and other grains in the field and reduce storage losses in a sustainable way that prevents pesticide residues and harm to non-target organisms, including humans.

Measurable impacts to be generated:

- Understanding of pest biology and ecology in diverse habitats to develop economically profitable and environmentally sustainable IPM programs
- Development of pest management strategies, including biological and cultural controls and plant resistance, which will reduce yield and quality loss
- Protection against storage pests to increase sorghum and pearl millet grain quality
- Use of computer models to predict occurrence of and response to pest outbreaks

**Objective 5. Enhance the stability and yield of sorghum and pearl millet through use of genetic technologies (Primary Research Area: Genetic Enhancement)**

This CRSP will conduct research on the primary production and utilization constraints of sorghum and pearl millet. The overarching objective will focus on maximizing production and value of grain and forage for use in human consumption and animal nutrition. Important abiotic constraints for sorghum and pearl millet (tolerance to heat and drought stress, acid soil, and cold temperatures) and biotic constraints (*Striga*, sorghum midge, greenbugs, grain molds, and various leaf, stalk, and storage pests) will be addressed.

During the last 10 years, the changing world of privatization, mergers, and acquisitions of the global seed industry, coupled with diminishing public resource support to Future Harvest Centers, has resulted in less investment in sorghum and pearl millet genetic enhancement research globally. The private sector has opted to increase its research investments into commodities with marketable GMO products (maize, soybean, and cotton) at the expense of crops such as sorghum and pearl millet. Resource support by USAID will allow the Sorghum, Millet, and Other Grains CRSP to become an international center of excellence that will drive research, knowledge, and technology generation for genetic enhancement of sorghum and pearl millet.

Development of genetic technologies to address these constraints will focus on deployment of genes for tolerance to biotic and abiotic stresses into locally adapted, high-yielding cultivars and hybrids. Plant-breeding efforts will focus on identifying and transferring useful genes derived from landraces or other genetic resources into improved cultivars through conventional phenotypic selection or DNA marker-assisted selection. During deployment of improved cultivars and hybrids, links with potential end-users will ensure demand and acceptance of the grain or forage products developed. Plant breeding programs will benefit from recent and ongoing advancements in DNA genotyping and marker technologies. Of particular interest will be development and use of high-throughput, chip-based genotyping technologies produced from analysis of the sorghum DNA sequence currently being generated by the U.S. Department of Energy Joint Genome Institute (DOE-JGI) program .

Transgene or other biotechnologies are being developed to enhance traits, such as nutritional value. These genetic technologies will be used for crop improvement as they are developed within this program or become available through collaborating partner programs, such as the African Bio-fortified Sorghum Program funded by the Bill and Melinda Gates Foundation.

***Measurable impacts to be generated:***

- Greater knowledge of the genetic inheritance of important traits and the genes involved in expression of these traits
- Reduced production constraints through use of genetic technologies
- Release of cultivars and hybrids with higher yield, improved adaptation to biotic and abiotic stresses, and enhanced value for end-users in target environments
- Open exchange and distribution of genetic resources of these crops

**Objective 6. Enhance global sorghum and pearl millet genetic resources and the conservation of biodiversity (Primary Research Area: Genetic Resources and Biodiversity)**

This CRSP will be a world leader of conservation and management of sorghum and pearl millet genetic resources. Diverse ecological conditions in major sorghum- and pearl millet-growing environments, coupled with diverse ethnic customs and preferences, have resulted in the rich genetic diversity of these important crops. This diversity has imparted great resilience and broad adaptation, making these crops of enormous benefit to humanity with particular significance in the economies of nations in the semi-arid tropics. Conservation and management of these genetic resources are, therefore, important considerations for further enhancement and exploitation of these commodities.

Measurable impacts to be generated:

- Conservation, characterization, and documentation of ex-situ and in-situ genetic resources
- Enhancement of the genetic diversity base of sorghum and pearl millet breeding programs
- Understanding of the extent of genetic erosion of sorghum and pearl millet in natural habitats and fragile environments
- Repatriation and/or new introduction of valuable but displaced landraces to areas of critical need

**Objective 7. Develop effective partnerships with national and international agencies engaged in the improvement of sorghum and pearl millet production and the betterment of people dependent on these crops for their livelihoods**

Global research and development concerns of sorghum and pearl millet are addressed by a number of organizations. Research programs at U.S. institutions have provided leadership in the generation of basic scientific information and the education of future leaders in the field. Close collaboration has been developed with national agricultural research services (NARS) and other international organizations, such as ICRISAT, IITA, CIAT, IFDC, and CIRAD. Linked to collaborating national programs throughout the developing world, these institutions are involved in the generation of appropriate technologies, transfer of technologies to end-users, and deployment of profitable technologies within the greater economic and policy environments of participating nations. These efforts need to be carefully woven into the efforts of other organizations for maximum impact and more efficient use of resources. In addition to NARS in collaborating countries, partnerships will be cultivated with regional research programs in different regions of Africa (ASARECA, CORAF), working directly with the respective networks in each of these regions (ECARSAM in East and Central Africa; ROCARCE in West Africa). In Sub-Saharan Africa, an umbrella organization recently created, Forum for Agricultural Research in Africa (FARA), has taken up the leadership for the organization and coordination of research and development efforts in African agriculture. The Sorghum, Millet, and Other Grains CRSP will develop appropriate association and linkage with FARA and similar organizations. Partnerships will be developed with newly emerging organizations and programs with substantive research and development programs in sorghum and pearl millet. These include the African Biofortified Sorghum (ABS) project funded by the Bill and

Melinda Gates Foundation, the African Food Security program funded by the Rockefeller Foundation, and the Global 2000 program supported by the Sasakawa Foundation. Furthermore, the CRSP will be sensitive to emerging African transcontinental initiatives, such as the New Partnerships for African Development (NEPAD) of the African Union (AU), with particular interest in the new African Fertilizer Summit recently held in Abuja, Nigeria.

Measurable impacts to be generated:

- Improved effectiveness of technology generation and transfer by coordinating human resources and funding
- Joint sponsorship of workshops, seminars, and short-term training

## **10. Lessons Learned and Emerging Issues**

### ***a. Facilitating Domestic Market Growth Catalyzes Rapid Technological Change and Increases Farmers' Incomes***

The first prerequisite for facilitating growth of domestic markets is to increase the supply of high-quality grain. INTSORMIL worked closely with food scientists and food and feed processors to identify preferred cultivars and emphasize clean grain. Sorghum and pearl millet farmers must reduce the amount of impurities (dirt, sand, and rocks) in grain sold for processing into food products. Processors often resist paying a quality premium, so it is necessary to convince them of the importance that suppliers of high-quality grain make a profit. A grain quality premium is an important component of higher prices to farmers.

For livestock and poultry, the common perception is that sorghum has lower feeding value than maize however recent research with large-seeded sorghum lines and hybrids showed equal or greater feeding value than maize. This kind of technological backlog, when delivered to the market place in yield-competitive cultivars, will increase the use of sorghum as a feed grain.

### ***b. Improved Grain Quality to Stimulate Development of Food-processing Enterprises***

Research has demonstrated that tan-plant, white-grain sorghum can be produced and made into high-quality, profitable foods in Mali, Central America, and Southern Africa. Supply-chain management must be used to maintain quality from the farm to the processor. Progress has occurred in West Africa, especially Senegal, where pearl millet food products are generating income and stimulating demand for improved grain quality. This has been a difficult learning process because many excellent products developed in the laboratory have failed due to the inconsistent availability of quality grains. Products produced from low-quality grain will not be purchased by urban consumers. Improved grain quality is vital to stimulate production of sorghum and pearl millet health-food products.

Two examples of successes led by USAID-supported activities are 1) production of high food-quality sorghum cultivars in El Salvador and

Nicaragua and their processing into value-added bakery products and 2) a yogurt with pearl millet produced in Senegal whose processor is presently extending operations into other West African countries and is a leader in using supply-chain management to produce quality products.

**c. An Integrated, Multidisciplinary Systems Approach is Needed for Solving Pest Problems in the Field and Storage**

Teams of collaborating-country and U.S. scientists and technology transfer agents, including agronomists, plant breeders, entomologists, plant pathologists, economists, and weed scientists, are needed to develop and transfer integrated crop management technology. Teams of cereal chemists, entomologists, plant pathologists, and plant breeders are needed to solve pest problems of grain in storage. Pest management scientists are needed to develop procedures and computer models to be able to forecast and respond to evolving pest problems and outbreaks. Pest biology and adaptation to diverse production systems must be understood to develop sustainable management strategies. Technology transfer agents are needed to work in conjunction with the other scientists to disseminate information to end-users.

Integrated teams have been successful in addressing some of these issues. In a production environment, the equilibrium between host and pest is changed when new technology enters the system. In West Africa, an integrated team of scientists identified the panicle bug complex as an obstacle to introduction of improved cultivars. Through research, new cultivars have been developed and their usefulness proven in on-farm evaluation. These cultivars now form the basis for supply-chain management projects.

**d. Integrated Striga Management Yields Dramatic Results**

The parasitic weed *Striga* ("witchweed") is the scourge of agriculture in much of Africa and parts of Asia. It also is present in the United States and could become a pest problem. *Striga* attacks the major cereal grains and legumes in Sub-Saharan Africa, significantly reducing the already low yields of subsistence farmers. *Striga* is the major reason that sorghum and pearl millet productivity has remained at a subsistence level. For many decades, research on *Striga* targeted eradication, suppression, or breeding for cultivars that support fewer emerged *Striga* plants. Decades of such effort have led to few successes. More recently, basic research efforts at U.S. universities focusing on the fundamental biology of the parasite led to better understanding of the enemy. This new knowledge, in turn, led to on-farm successes in the field that are being expanded slowly throughout Africa. Newly derived biotechnological information integrated with basic agronomic practices of water conservation and soil fertility led to development of an intervention program dubbed Integrated Striga Management (ISM). In this program, the synergistic effects of improved *Striga*-resistant cultivars, use of modest amounts of nitrogen fertilizers, and water conservation using tied-ridges resulted in a



dramatic reduction in infestation by *Striga* and an increased grain yield of sorghum on farmers' fields in several countries in Eastern Africa.

**e. *Research on Forage Sorghum and Pearl Millet is Needed to Meet the Growing Demand for Milk and Meat Products***

Ruminant animals are important, integral components of sorghum and pearl millet production systems in Africa and Central America, and an important part of strategies to increase the income and well-being of small farmers in semi-arid climates. High-quality forage is needed year-round to maintain productivity of dairy and beef cattle. Demand for milk products and meat is increasing rapidly because of rapid population growth and improving economies, particularly in urban areas. In the United States, pearl millet is primarily a forage crop, and the production area of both forage sorghum and pearl millet is increasing rapidly.

In semi-arid regions, limited rainfall occurs only during three to six months each year, creating need for drought-tolerant forage crops and/or methods to store forage. Sorghum and pearl millet are important forage sources in these climates because of drought tolerance, water-use efficiency, superior quality for green chop, and the flexibility to store high-quality forage as silage or hay to feed during the dry season. Many small, poor producers use crop residues as a feed source, thus high-quality, dual-purpose (grain and forage) genotypes are important for small farmers worldwide.

Recent experience in Central America shows that through improved plant genetics and agronomic practices the forage protein concentration and quality of green-chop forage will increase, resulting in a 25% increase in milk production. Improved, dual-purpose cultivars with both good grain and forage production, combined with improved silage storage methods, have provided high-quality forage for cattle during the dry season. Laboratory and station research shows that forage quality can be improved even further using the "brown midrib" (BMR) gene in improved cultivars. Opportunities exist to develop superior BMR cultivars that have lower lignin content and increased digestibility. Improved cultivars combined with proper plant population to minimize lodging result in production of superior-quality forage, thus increasing milk and meat production. This CRSP will build on this experience to not only focus on sorghum and pearl millet grain production, but also on forage production to improve small farmer incomes to help meet the growing demand for milk and meat products.

**f. *Education Provides the Human Resource Base Needed to Enable Cutting-edge Research throughout the World***

A new generation of educated African and Central American scientists will provide the scientific basis for generating new technologies that produce sustainable income for farmers and grain end-users. Hundreds of scientists have been educated in sorghum and pearl millet research

during the last 25 years. Many of these scientists are now in non-research positions or are nearing retirement. Advanced degree training is a continual process because of the time needed to receive a degree (M.S. = ~2 years, Ph.D. = ~4 years). Mentoring new degree scientists ensures retention and helps develop their ability to solve problems and take advantage of opportunities. Educated NARS scientists are better able to contribute to effective regional teams. Complex problems require educated scientists participating in integrated, multidisciplinary teams to solve problems in sorghum and pearl millet production and produce high-quality grain and forage for profit.

***g. Networking Plays a Key Role in Enhancing Researcher Performance and Program Productivity and is Necessary for Efficient Technology Transfer***

Networking consists of several key elements: 1) exchange of research information and results on a formal or informal basis, 2) sharing research materials (e.g., seeds of improved cultivars or genetic materials), 3) interaction with external partners, such as NGOs/PVOs and private companies for technology transfer, and 4) communication with government officials and other policy makers. Successful communication through networking contributes to formation of interdisciplinary teams of scientists and technology transfer agents, increased opportunities for collaborative research among partners, and greater synergy among scientists in solving problems. The ease of networking has increased with the development of high-speed Internet, but efficient networking also requires investments in regional and international meetings to allow face-to-face interactions among scientists and potential end-users. Networking will play an increasingly important role as programs seek to transfer technologies and products developed through basic research for application in agricultural industries. The Sorghum, Millet, and Other Grains CRSP will provide opportunities for and take advantage of networking situations with USAID missions, regional networks, other agencies, donors, farmers, processors, and policy makers, and provide the resources and contacts needed to research production and utilization constraints of these crops.

## **11. Dissemination**

***a. Technology Transfer Agents, Farmers, Processors, and Government Policy Makers***

All Sorghum, Millet, and Other Grains CRSP projects will have a technology transfer component. U.S. project leaders, together with NARS collaborators, will focus research on areas likely to produce technology perceived by farmers and/or processors as being useful and will actively work with extension and NGOs/PVOs to promote adoption. Market development activities will provide economic stimulus, and genetic enhancement projects will release improved cultivars and hybrid parental lines for use by farmers and private seed companies. Other dissemination activities will include on-farm demonstrations, preparation and distribution of extension materials (print, video, Internet), and short-term training (including seminars, workshops) of transfer agents (extension agents, NGOs/PVOs). Adoption and economic impact will be assessed not only to document dissemination, but also to improve future delivery of technology and knowledge to farmers and processors and to influence host country decision makers on related policy issues. Sorghum, Millet, and Other Grains CRSP project leaders will regularly discuss

policy issues with research directors, ministries of agriculture, and other relevant host-country government officials. The intent is to focus on adoption and impact, not just dissemination of information.

#### ***b. Researchers and Educators***

All Sorghum, Millet, and Other Grains CRSP project leaders and collaborators will communicate new knowledge to other scientists and educators through publication in scientific journals and proceedings, presentations at workshops and scientific meetings, guest lectures at universities in collaborating countries, and through other opportunities. Some projects will develop distance-education materials for educational audiences, which will be distributed by the most appropriate vehicle, including Internet, Intranet, two-way satellite, and/or email communication. The Sorghum, Millet, and Other Grains CRSP Internet site will not only be a repository of information about CRSP research, but also will provide other dissemination vehicles, such as modules for specific educational topics and/or courses, question and answer capability, podcasts for viewing of field demonstrations and tours. Included on the Internet site will be annual reports, publication bibliographies, and links to other relevant Internet sites. Joint workshops with Future Harvest Centers, regional and national research programs, universities, and other organizations will provide opportunity for sharing knowledge throughout the development, education, and scientific communities.

#### ***c. USAID Missions, Policy Makers, and Donor Organizations***

Knowledge generated by the Sorghum, Millet, and Other Grains CRSP will provide the technological basis to increase production and income of farmers. However, it is possible to make information available through the use of the Internet to anyone with computer access. The full benefit of the technology generated cannot be effective without associated policy decisions and implementation by relevant organizations. USAID missions, related bureaus, NARS administrators involved in policy decisions, and donor organizations with related interests will be kept abreast of knowledge and activities generated by the CRSP. A multi-faceted approach will be developed to reach all interested parties. Reports, publications, and items of interest generated by the CRSP will be available on the Internet site and as hard copies. The Internet site will provide links to other sorghum and pearl millet information as well as other CRSPs and development activity. A yearly CRSP information CD providing a record of activity that can be readily searched and organized will be provided to relevant USAID staff, NARS administrators, and donors. Regular visits with USAID missions and bureaus, NARS administrators, and donors will provide opportunities to provide updates on CRSP programs, discuss how CRSP programs can interface with other ongoing programs, and provide feedback on suggested adjustments to CRSP programs.

### **D. ACHIEVING DEVELOPMENT IMPACT**

The strategy for achieving long-term development impacts will involve maintaining a comprehensive, multidisciplinary systems research and technology transfer team program to address present and future needs. The Sorghum, Millet, and Other Grains CRSP will create alliances with national research and extension services and NGOs/PVOs. Through these alliances, the CRSP will work with farmer groups and cooperatives to introduce technologies and local private enterprises to promote commercialization of products. Pilot projects will be established and strategies will be developed to scale up these activities.

General benchmarks will include yield levels in farmers' fields, number and quantity of food and feed products in the marketplace, and economic benefit accrued to farmers and processors. Economic impact and adoption will be assessed at logical points in time for each effort.

Once regional and disciplinary projects have been competitively selected, they will be expected to work with research and technology transfer collaborators, farmer groups, and processors to identify specific benchmarks and indicators, which will be used for evaluation and measuring economic impact. General targets, benchmarks, throughputs and milestones by developmental impact objectives are shown in Table 1.

**Table 1. Objectives, notional targets, benchmarks and indicators, throughputs, and milestones**

<b>Objectives</b>	<b>Targets</b>	<b>Benchmarks and Indicators</b>	<b>Throughputs</b>	<b>Milestones</b>
1. Supply chain/market development	<ul style="list-style-type: none"> <li>- Increased yields and incomes</li> <li>- Increased pearl millet quality</li> <li>-Increased use of sorghum as a feed source</li> </ul>	<ul style="list-style-type: none"> <li>- Increased farmer incomes</li> <li>- Increase in production area</li> <li>- Elimination of tannin in feed–type cultivars</li> </ul>	<ul style="list-style-type: none"> <li>- Farmer incomes increased by 30%</li> <li>- Farmer incomes increased by 20%</li> <li>- 200% increase in markets for sorghum as a feed source</li> </ul>	<ul style="list-style-type: none"> <li>- 15% increase by Yr 3 and 30% by Yr 5</li> <li>- 5% increase by Yr 3 and 20% by Yr 5</li> <li>- 60% increase by Yr 3 and 200% by Yr 5</li> </ul>
2. Nutrition, health and grain quality	<ul style="list-style-type: none"> <li>-Higher grain quality cultivars</li> <li>-New cultivar acceptance</li> <li>- Increased nutrition of food and feed products</li> </ul>	<ul style="list-style-type: none"> <li>- High digestibility cultivars selected</li> <li>- Widespread adoption of cultivars</li> <li>- High starch digestibility cultivars developed</li> </ul>	<ul style="list-style-type: none"> <li>- 10 high grain quality varieties developed</li> <li>- 60% of farmers accept new cultivars</li> <li>- Nutritional deficiencies in diets decreased by 25%</li> </ul>	<ul style="list-style-type: none"> <li>- 4 varieties released by Yr 3 and 10 by Yr 5</li> <li>- 20% of farmers accept new cultivars by Yr 3 and 60% by Yr 5</li> <li>- 10% decrease by Yr 3 and 25% by Yr 5</li> </ul>
3. ICSM	<ul style="list-style-type: none"> <li>- Increased and stable grain yields</li> <li>- Improved crop, soil and water management</li> </ul>	<ul style="list-style-type: none"> <li>-ICSM components identified</li> <li>- Integration of ICSM components into packages</li> </ul>	<ul style="list-style-type: none"> <li>- 30% yield increase due to ICSM adoption</li> <li>- 70% of farmers using ICSM practices</li> </ul>	<ul style="list-style-type: none"> <li>- 10% increase by Yr 3 and 30% by Yr 5</li> <li>- 25% using ICSM practices by Yr 3 and 70% by Yr 5</li> </ul>
4. IPM	<ul style="list-style-type: none"> <li>-Increased grain quality</li> <li>- Efficient pest management tactics</li> <li>-Reduced pesticide use</li> </ul>	<ul style="list-style-type: none"> <li>- Tolerance to grain insects, pathogens</li> <li>- IPM packages developed</li> <li>- Non-pesticidal strategies developed</li> </ul>	<ul style="list-style-type: none"> <li>- 20% decrease in insect-damaged grain</li> <li>- 4 varieties with insect resistance released</li> <li>- 50% decrease in kg pesticide used/ha</li> </ul>	<ul style="list-style-type: none"> <li>- 5% decrease by Yr 4 and 20% by Yr 5</li> <li>- 1 variety released by Yr 3 and 4 released by Yr 5</li> <li>- 20% decrease by Yr 3 and 50% by Yr 5</li> </ul>
5. Genetic enhancement	<ul style="list-style-type: none"> <li>-Stable yielding genotypes</li> <li>-More efficient water use by genotypes</li> <li>-More efficient nutrient use by genotypes</li> </ul>	<ul style="list-style-type: none"> <li>- Genotypes with less variation in yields</li> <li>- Decrease in drought damage</li> <li>- Savings in fertilizer costs</li> </ul>	<ul style="list-style-type: none"> <li>- 6 stable yielding genotypes released</li> <li>- 10 drought tolerant genotypes released</li> <li>- 4 N efficient genotypes released</li> </ul>	<ul style="list-style-type: none"> <li>- 2 genotypes released by Yr 3 and 6 by Yr 5</li> <li>- 4 genotypes released by Yr 3 and 10 by Yr 5</li> <li>- 1 genotype released by Yr 3 and 4 by Yr 5</li> </ul>
6. Genetic resources and biodiversity	<ul style="list-style-type: none"> <li>-Higher yielding genotypes</li> <li>-Conservation of genetic biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>- Selection of high yielding genotypes</li> <li>- Decrease in rate of loss of biodiversity sensitive areas</li> </ul>	<ul style="list-style-type: none"> <li>- 25% increase in yield of new genotypes</li> <li>- 20% decrease in use of biodiversity sensitive areas due to increased yields</li> </ul>	<ul style="list-style-type: none"> <li>- 10% increase in yield by Yr 3 and 25% by Yr 5</li> <li>-5% decrease in use of biodiversity sensitive areas by Yr 3 and 20% by Yr 5</li> </ul>
7. Partnerships and networking	<ul style="list-style-type: none"> <li>- Increased joint programs with partners</li> </ul>	<ul style="list-style-type: none"> <li>- Networks established involving all stakeholders (private industry, NGOs, farmers,</li> </ul>	<ul style="list-style-type: none"> <li>- High research throughputs and high level of technology transfer activity</li> </ul>	<ul style="list-style-type: none"> <li>- 20% increase in grain production and 75% of farmers using best management practices by Yr 5</li> </ul>

international  
agencies, CG  
centers, research  
and technology  
transfer  
agencies )

This Sorghum, Millet, and Other Grains CRSP proposal focuses on promoting transformational development in countries where these crops are important. Many of the countries are fragile states of strategic importance, thus activities will be linked to the Policy Framework for Bilateral Foreign Aid by contributing to stability, security, and economic development of these countries. Sorghum and pearl millet are important crops in the IEHA countries in Africa (Burkina Faso, Chad, Ghana, Kenya, Mali, Malawi, Nigeria, Mozambique, Tanzania, Uganda, and Zambia), and more than 25% of the CRSP budget will be committed to research, education/training, and technology transfer activities to these countries. The Sorghum, Millet, and Other Grains CRSP will not be a humanitarian aid organization but will be able to assist in projects to produce and disseminate improved sorghum and pearl millet seed when merited due to natural disaster.

Issues of HIV/AIDS, other infectious diseases, climate change, support of international trade agreements, and countering narcotics efforts are not central to the Sorghum, Millet, and Other Grains CRSP. However, increased production of sorghum and pearl millet grain and increased income from market development will improve human nutrition and immune systems to reduce the effects of infectious diseases, sustainable management likely would reduce “greenhouse gas” emission with a positive influence on climate change, and market development could be impacted by international trade agreements.

#### **E. SUPPORT OF THE IEHA STRATEGY, ESPECIALLY PILLAR 5 – PROTECTING THE VULNERABLE**

The Sorghum, Millet and Other Grains CRSP will support Pillars 1, 2 4 and 5 of IEHA. Pillar 1, Science and Technology, is central as the CRSP will form collaborations with the national research systems Mali, Niger, Senegal, Nigeria, Burkina Faso, Ghana, Zambia, Mozambique, Kenya, Uganda, and Tanzania. Also, ties will be built to extension agencies, farmers’ groups (Pillar 4), and private sector food and feed processors. The initial program focus is on maximizing the production of clean grain for these private sector clients for the traditional grains of millet and sorghum, i.e., food and feed processors (Pillar 2-Agricultural Trade and Marketing Systems) so the regional focus will be on the higher rainfall regions of the semiarid West Africa and Southern Africa.

However, most West African semiarid agricultural production is by small, vulnerable farmers (Pillar 5). This is especially true of millet production, which is concentrated on the sandier soils with lower rainfall and lower soil fertility. Note that millet is preferred over sorghum by most of the food processors in the Sahel with sorghum being preferred over millet for feed. For both sorghum and millet producers, the Sorghum, Millet, and Other Grains CRSP will seek to increase their incomes with the combined introduction of new technologies and new marketing strategies. We also will concentrate on reducing their risks by a) including water harvesting techniques as a

central component of the technology strategy; b) a policy focus on inventory credit enabling farmers or farmers' groups to sell later in the season after the price recovery from the post harvest price collapse. The principal defense for farmers' incomes in bad rainfall years is actually the seasonal price increase in these years, which is the greatest.

Enabling farmers and farmer groups to obtain greater benefits from price variations in these bad rainfall years will help offset the adverse yield effect of bad weather. In addition, water harvesting by better utilizing available water reduces adverse rainfall effects of bad rainfall years.

These two components to respond to the low returns and risks of semiarid agriculture in bad rainfall years will be built into the program from the beginning. As the program is extended to regions with less rainfall, water harvesting and inventory credit will become even more important. Also, as we move into lower rainfall regions, more of the grain harvested will be used for alleviating nutritional deficits rather than for sale to the private sector. Nevertheless, with higher yields, even the more vulnerable population will be able to increase grain sales. For some we may also need to consider other diversification alternatives, especially out-of-season market gardens. ICRISAT has developed technologies to do this, and this CRSP should be linked to their programs once the cereal sector is well-covered and the emerging food and feed markets are taken care of.

## **F. FOCAL AREAS FOR DEVELOPMENT RESULTS**

Achievement of the seven objectives of the Sorghum, Millet, and Other Grains CRSP will contribute to all eight focal areas for development stated in the RFA, but advancement of focal areas 3 (broadening market access) and 7 (increasing incomes) is expected to result in particularly far-reaching benefits and impact. Soil and water quality and integrated pest management activities will be incorporated into CRSP research activities as appropriate.

### **1. Broadening Market Access and Increasing Farmers' Incomes**

Development of markets is the key strategy to increase incomes of producers and processors, and to spur economic development and increase adoption of inputs and practices necessary to increase grain yield and quality. The three key factors for human food markets are (a) identification of specific markets and supply and quality requirements of enterprises, (b) production of sufficient grain with desired quality attributes, and (c) development of market strategies with farmers' groups to assure they are compensated for producing the grain quality needed.

The three key factors for utilizing sorghum (or pearl millet) in poultry and livestock feed rations are (a) production of high-quality, tannin-free grain, (b) production of sorghum (or pearl millet) competitively priced with maize, and (c) firms with market flexibility as sorghum (or pearl millet) will be available for livestock feed in normal and good rainfall years but will be used for food in poor rainfall years. As stated previously, one advantage of sorghum over maize is a lower probability of aflatoxin in grain. Aflatoxin is toxic to poultry and causes liver cancer in humans.

An important feature of responding to new markets is to increase farmers' incomes with improved market strategies. Educating farmers about the need to sell after the post-harvest price recovery for obtaining a

price premium for quality are important components of increasing the supply of high-quality sorghum and pearl millet grain for the food processors. With poultry feed, the critical requirement to increase farmers' incomes is to substantially increase yields so costs per output unit are less and profits increase even with lower prices.

Another important component is working with public policy makers to convince them not to drive down farm-level prices in bad rainfall years. Other policy measures can be used to maintain the welfare of consumers without reducing farmers' incentives to utilize new technologies and make economic investments in the farm enterprise.

The economic focus of this CRSP will be on price and income issues associated with getting farmers' groups to respond to emerging markets. Access to improved credit, seed, and fertilizer markets will also be important. Economics research is done in a systems framework considering the potential of various activities as compared with other activities constrained by on-farm and off-farm resources available to the farmer.

Once pilot programs have been successful, a scaling-up process to move them from pilot to national programs is necessary. This requires a systematic knowledge management program to get other NGOs/PVOs, national and international organizations, and the private sector to adopt similar programs. This involves systematic interchanges with policy makers in developing and transforming countries on the requirements to accelerate introduction of new technologies and the responses to increasing demands of domestic food and feed processors.

Other complementary activities of the economics program will be to analyze market evolution and make policy recommendations on the development of the input markets supporting sorghum and pearl millet producers, especially for credit, seed, and fertilizer. The economics program will undertake diffusion or impact studies, which will contribute to the types of technologies that may emerge and be delivered to farmers and processors.

## **2. Relevance of Soil and Water Quality**

The integrated management of crop, soil, and water to meet the demand for quality grain and forage is a critical component of a sustainable production and natural resource preservation system and thus of extreme importance to both rural and urban populations where sorghum and pearl millet are produced.

Sorghum and pearl millet production is becoming more intensive as demand for grain and forage increases due to population growth, increasing use of livestock products in diets and as agricultural land is taken out of production for urban growth. An estimated additional 100 million ha of urban land will be needed in developing countries by 2030, mostly from prime agricultural land. This is likely to bring more land with serious soil constraints into crop production. The shortage of agricultural land is leading to the improper management of existing land. Improper crop management can lead to increased soil erosion, mining of soil nutrients, soil quality losses (particularly soil organic matter content), and contamination of ground water (particularly nitrate) and surface water (sediment, nitrate, phosphate). Clearly crop, soil, and water management are intertwined with the issues of meeting food security, commercial development

of food-product enterprises, providing feed for increasing livestock production, natural resource management (i.e., soil, water, biodiversity), and water quality.

The principal constraint to raising sorghum yields is the simultaneous improvement in water availability and soil fertility. The strategy to remove this constraint should be to (1) utilize labor-intensive methods for the water harvesting technique, (2) increase cash expenditures for inorganic fertilizers, and (3) plant genetically improved cultivars that respond well to this improved environment. To assure that the use of higher input levels is profitable, Sorghum, Millet, and Other Grains CRSP market experts must make sure that farmers receive good prices and that price collapses, as are a common occurrence in Sub Saharan Africa, are minimized if not eliminated. A CRSP marketing specialist will direct a project that defines the marketing strategies and markets so that these technologies are sufficiently profitable for there to be incentives for farmers to utilize them.

### **3. IPM Issues**

Disease, insect, weed, and bird pests of sorghum, pearl millet, and other grains annually cause hundreds of millions of dollars in damage and costs for control. Persistent, major pests of sorghum and pearl millet include many insects, pathogens, and *Striga*. Other pests annually fluctuate in abundance and the damage they cause.

Changes from traditional cultural practices and/or landrace cultivars can result in changes in pest population and damage. Pest problems have greater impact because of the higher economic value and quality concerns of value-added grains. Stored grain pests are likely to become even more problematic, particularly in humid areas, when grain is stored for longer periods to seek better prices through organized inventory credit systems currently being implemented. Pest management strategies are needed to provide sustainable solutions to pest problems without relying on chemical controls that can adversely affect non-target organisms, including humans, and the environment. An integrated, multi-faceted, ecological system of pest management strategies used when pest abundance or damage exceeds economic thresholds will improve nutrition and health, maximize soil and quality, and help mitigate post-harvest constraints, enhance productivity and livelihoods of people in marginal areas, and improve food quality and safety without relying on chemical controls and associated pesticide residues.

The Sorghum, Millet, and Other Grains CRSP will study and develop integrated pest management strategies against major pests of sorghum and pearl millet and be prepared to prevent outbreaks into new areas. Research on existing and potential pests will be organized in an integrated and multidisciplinary way with scientists in allied sciences to evaluate and develop cultural controls, biological controls, and molecular techniques for sustainable management of pests. For example, sorghum and pearl millet cultivars adapted for production in agriculturally marginal lands and with high-yield and food/feed qualities will be developed and transferred to end-users by a team of plant breeders, entomologists, plant pathologists, cereal chemists, and technology transfer agents. Agronomic research will be



used to determine the best agricultural inputs for production in marginal areas.

## **G. TRAINING AND CAPACITY BUILDING**

The overall strategy for the Sorghum, Millet, and Other Grains CRSP is to strengthen the capacity of both, institutions and individuals, with the objective of developing a sustainable approach to grain production research and technology transfer.

### **1. Building the Capacity of Institutions**

The Sorghum, Millet, and Other Grains CRSP will stress two important concepts in capacity building of institutions: (a) Build upon past successes of the INTSORMIL CRSP and (b) Create links and working relationships with other agencies up and down the supply chain.

#### ***Build upon Successes***

Problems will be considered as opportunities, rather than as barriers, in order to create a shift in thinking. Public sector discussions throughout Africa customarily focus on the listing of constraints rather than on the planning of new alternative approaches. This is a recipe for failure as no project can successfully resolve all these constraints. A more effective approach is to try things and be prepared to be flexible and respond to problems as they occur. This project will simplify the constraints, take technology that has previously been developed, and transfer the technology to farmers' fields utilizing existent institutions for extension. Where such institutions do not exist, farmers' groups will be created based upon utilizing the technology package and implementing marketing strategies. Processors will be encouraged to make contracts or at least contacts with farmers' groups.

Successes at the farm level provide the best incentive for capacity development for both research and extension agencies. It is important to be successful by moving the technology backlog onto farmers' fields and ensuring that with the marketing strategies farmers financially profit from this combination and that food and feed processors get larger quantities of uniform, clean grain.

#### ***Create Links and Working Relationships with all Relevant Agencies and Institutions up and down the Supply Chain***

The national agricultural research organization (NARO) must link with the extension agencies, the extension agencies must motivate and coordinate the farmers' groups and the farmers' groups should work with the food and feed processors. The whole chain must interact and understand each others' problems and respond to problems as they occur. This is not a relay race where each agency passes things on to the next and then forgets about the next steps. All the agencies must be involved with the whole process. Researchers will observe the on-farm results and modify the technologies. Extension will be concerned with the demand for the product and the prices received, not just in supplying the inputs. The farmers' groups need to respond to the food

processors' demands for a uniform variety and clean grain and to the feed sector for a non-tannin sorghum that is price competitive with maize.

As successes are achieved, better ties will be created between organizations and the public sector, which will then be motivated to supply additional resources. When Ethiopia, following the Global 2000 recommendations, substantially increased cereal yields and output nationally in the mid to late '90s, the government doubled salaries in the national agricultural research organization from which the recommendations had come.

## **2. Building the Capacity of Individuals**

The overall strategy for the Sorghum, Millet, and Other Grains CRSP involves graduate-degree education, short-term training, and distance education that link researchers, policy makers, and development practitioners. All projects will have an education and/or training component. This CRSP will serve as a catalyst to leverage funds and in-kind resources from participating U.S. universities, USAID missions, other externally funded programs, and other organizations into a comprehensive advanced-degree and short-term training program to serve the development needs of collaborating countries and the United States.

Advanced-degree programs will provide the technical expertise required to develop new production and technology transfer packages from the experimental site to farmers' fields. Past experience has demonstrated that such a long-term activity gives impetus to new technology that farmers and end-users capture to drive sustainable income generation. An excellent example is the USAID/WARP/INTSORMIL CRSP Production and Utilization Project. Training in a range of disciplines is a continuous need. The Sorghum, Millet, and Other Grains CRSP will develop an overall training program by region and country. Candidate selection will be based on academic qualifications, professional interest, need to promote advancement of traditionally disadvantaged groups, and candidate commitment to their national program. A range of programs, including traditional U.S. graduate degree programs, will contribute to this activity. The capacities of appropriate African universities will be used in "sandwich" programs with U.S. universities or entirely universities in developing and transforming countries. Much of the training will be conducted in host countries. The Internet will be used to develop unique distance education experiences that provide relevant and economically efficient educational programming in non-traditional settings. Collaborative research and interaction will aid the new scientists when they return after training.

Continuing education through non-degree (short-term) training will help scientists maintain and update their research expertise and improve the research skills of non-professional staff. These training programs will be developed and appropriate candidates selected as

based on a participatory appraisal to determine needs. Topics will include research methods (data analysis, technical writing), extension methods (technology and methodology), and entrepreneurship (commercialization of food and feed products, input supply). Short-term training will provide a cost-efficient way to expand the Sorghum, Millet, and Other Grains CRSP outreach to NGOs/PVOs and extension personnel. Effectiveness of these programs will be based on the total number of participants, number of participants who adopt the new technology and methodology, and the number of participants who transfer their knowledge to other professionals, scientists, and entrepreneurs.

The information technology revolution provides new opportunities to transfer knowledge and methodologies cost-efficiently throughout the world. The Internet will facilitate degree and short-term training programs through distance-education courses. Servers and appropriate software given to collaborators at strategic locations will provide access to the Internet and the opportunity to develop intranets with education and training programs tailored to the culture and gender of the participants. The Sorghum, Millet, and Other Grains CRSP Internet site will be the central point for information on sorghum, pearl millet, and other grains, link to other Internet sites for research and extension information, and discussion boards on important sorghum and pearl millet topics.

**Table 2. Benchmarks for Capacity-building Programs**

<b>Capacity Building Programs</b>	<b>Benchmarks</b>
Degree Education	Number of M.S. and Ph.D. Graduates
Visiting Scientists and Post-Doctoral Fellows	Number of Visiting Scientists and Post-Doctoral Fellows
Short-Term Training	Number of Participants in Workshops, Seminars, Conferences Number of Participants Who Adopt the New Technologies and Methodologies Number of Participants Who Transfer Information Learned to Other Professionals, Scientists, and Entrepreneurs
Internet – Distance Education	Functioning Interactive Internet Site Number of Participants in Distance-education Programs

#### **H. GENDER – ISSUES AND PROGRAM ACTIVITIES**

Women often depend on incomes that are sensitive to the production of sorghum, millet, and other grains. At the farm level, the number of women-headed households is growing due to out-migration of men and the scourge of HIV/AIDS, phenomena occurring at a rapid rate in all developing countries. The growing feminization of agriculture, especially food crop production, has profound implications for user needs for research and on the ability and resources of poorer farmers and households to adopt improved technology.

The choice of technological approach is based on more than the production process itself; it is based on the food and economic context of the household, and women play an active part in that choice. The economic contribution of women to the household can be disrupted and disadvantaged by the introduction of well-intentioned technological change, particularly when biased toward male heads of households.

The importance of training women in the diffusion of crop production technology to village farmers is evident in the fact that, in Africa, women who participate in training programs are much more likely than men to return to the village and tell other men and women of their experience. Thus, each regional program will have at least one U.S. and one host country social scientist to determine and address the production, processing, storage, and marketing constraints as they affect women as well as men. Participatory appraisals will delineate women's roles in productive labor and decision-making related to sorghum, millet, and other grains production. Farmer-collaborative field research will incorporate women farmers and, where relevant, include women's productive activities. Additionally, women scientists will play important roles in project research and management and must be a key component of capacity building and institutional development. Training for women and gender issues overall will be included in the rating criteria in all Sorghum Millet, and Other Grains CRSP RFPs.

#### **I. CONCLUSION**

The Sorghum, Millet, and Other Grains CRSP will pursue integrated strategies that link genetic enhancement of sorghum, pearl millet, and potentially other grains with integrated pest management, integrated crop and soil management, and social and economic issues for the development and deployment of profitable production systems that increase grain and forage yields and quality on existing cropland while increasing water- and nutrient-use efficiency. In addition to system-based research undertakings, this CRSP will be actively engaged in the human capacity and institutional development efforts of collaborating institutions and nations. A well-trained, motivated team of scientists is the key factor around which all activities in the CRSP will be based. Interdisciplinary and inter-institutional linkages and partnerships will be encouraged. The CRSP will address and maintain a deliberate mandate in advancing the cause of research directed to solving problems of agriculture and natural resources, education and mentoring of young professionals, strengthening of institutions, and linking technology generation with business and enterprise endeavors implemented via carefully designed pilot projects. Hence, sorghum and pearl millet research results will be directed to enhancing production and use of high-quality grain to meet food security needs and economic development of nations, but will also target initiation and development of products and enterprises for rural and urban consumers. Development of technologies will be pursued in an environmentally friendly manner to maintain or improve soil and water quality. Technology transfer through traditional or new delivery forums will involve the range of organizations and groups interested in promoting sorghum and pearl millet as key components of a national economic development strategy. Successful implementation of these strategies will lead to social and economic benefits for rural producers and processors as well as urban consumers of sorghum and pearl millet.

## Attachment C

### STANDARD PROVISIONS FOR U.S., NONGOVERNMENTAL RECIPIENTS

- I. MANDATORY STANDARD PROVISIONS FOR U.S. NONGOVERNMENTAL RECIPIENTS
  1. APPLICABILITY OF 22 CFR PART 226 (May 2005)
  2. INELIGIBLE COUNTRIES (May 1986)
  3. NONDISCRIMINATION (May 1986)
  4. NONLIABILITY (November 1985)
  5. AMENDMENT (November 1985)
  6. NOTICES (November 1985)
  7. SUBAGREEMENTS (June 1999)
  8. OMB APPROVAL UNDER THE PAPERWORK REDUCTION ACT (December 2003)
  9. USAID ELIGIBILITY RULES FOR GOODS AND SERVICES (April 1998)
  10. DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS (January 2004)
  11. DRUG-FREE WORKPLACE (January 2004)
  12. EQUAL PROTECTION OF THE LAWS FOR FAITH-BASED AND COMMUNITY ORGANIZATIONS (February 2004)
  13. IMPLEMENTATION OF E.O. 13224 – EXECUTIVE ORDER ON TERRORIST FINANCING (March 2002)
  14. BRANDING STRATEGY – ASSISTANCE (December 2005)
  15. MARKING PLAN (December 2005)
  16. MARKING UNDER USAID-FUNDED ASSISTANCE INSTRUMENTS (December 2005)
  17. REGULATIONS GOVERNING EMPLOYEES (August 1992)
  18. CONVERSION OF UNITED STATES DOLLARS TO LOCAL CURRENCY (November 1985)
  19. USE OF POUCH FACILITIES (August 1992)
  20. INTERNATIONAL AIR TRAVEL AND TRANSPORTATION (June 1999)
  21. OCEAN SHIPMENT OF GOODS (JUNE 1999)
  22. LOCAL PROCUREMENT (April 1998)
  23. VOLUNTARY POPULATION PLANNING ACTIVITIES – MANDATORY REQUIREMENTS (MAY 2006)
  
- II. REQUIRED AS APPLICABLE STANDARD PROVISIONS FOR U.S. NONGOVERNMENTAL RECIPIENTS
  1. NEGOTIATED INDIRECT COST RATES – PREDETERMINED (April 1998)
  2. PUBLICATIONS AND MEDIA RELEASES (March 2006)
  3. PARTICIPANT TRAINING (April 1998)
  4. PUBLIC NOTICES (March 2004)
  5. COST SHARE (July 2002)
  6. PROHIBITION OF ASSISTANCE TO DRUG TRAFFICKERS (June 1999)

7. INVESTMENT PROMOTION (November 2003)
8. REPORTING OF FOREIGN TAXES (March 2006)
9. FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (January 2002)
10. USAID DISABILITY POLICY – ASSISTANCE (December 2004)

## **I. MANDATORY STANDARD PROVISIONS FOR U.S. NONGOVERNMENTAL RECIPIENTS**

### **1. APPLICABILITY OF 22 CFR PART 226 (MAY 2005)**

a. All provisions of 22 CFR Part 226 and all Standard Provisions attached to this agreement are applicable to the recipient and to subrecipients which meet the definition of "Recipient" in Part 226, unless a section specifically excludes a subrecipient from coverage. The recipient shall assure that subrecipients have copies of all the attached standard provisions.

b. For any subawards made with Non-US subrecipients the Recipient shall include the applicable "Standard Provisions for Non-US Nongovernmental Recipients." Recipients are required to ensure compliance with monitoring procedures in accordance with OMB Circular A-133.

[END OF PROVISION]

### **2. INELIGIBLE COUNTRIES (MAY 1986)**

Unless otherwise approved by the USAID Agreement Officer, funds will only be expended for assistance to countries eligible for assistance under the Foreign Assistance Act of 1961, as amended, or under acts appropriating funds for foreign assistance.

[END OF PROVISION]

### **3. NONDISCRIMINATION (MAY 1986)**

(This provision is applicable when work under the cooperative agreement is performed in the U.S. or when employees are recruited in the U.S.)

No U.S. citizen or legal resident shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity funded by this award on the basis of race, color, national origin, age, handicap, or sex.

[END OF PROVISION]

### **4. NONLIABILITY (NOVEMBER 1985)**

USAID does not assume liability for any third party claims for damages arising out of this award.

[END OF PROVISION]

### **5. AMENDMENT (NOVEMBER 1985)**



The award may be amended by formal modifications to the basic award document or by means of an exchange of letters between the Agreement Officer and an appropriate official of the recipient.

[END OF PROVISION]

**6. NOTICES (NOVEMBER 1985)**

Any notice given by USAID or the recipient shall be sufficient only if in writing and delivered in person, mailed, or cabled as follows:

To the USAID Agreement Officer, at the address specified in the award.

To recipient, at recipient's address shown in the award or to such other address designated within the award

Notices shall be effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

[END OF PROVISION]

**7. SUBAGREEMENTS (JUNE 1999)**

Subrecipients, subawardees, and contractors have no relationship with USAID under the terms of this agreement. All required USAID approvals must be directed through the recipient to USAID.

[END OF PROVISION]

**8. OMB APPROVAL UNDER THE PAPERWORK REDUCTION ACT (DECEMBER 2003)**

\*Information collection requirements imposed by this cooperative agreement are covered by OMB approval number 0412-0510; the current expiration date is 04/30/2005. The Standard Provisions containing the requirement and an estimate of the public reporting burden (including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information) are

<u>Standard Provision</u>	<u>Burden Estimate</u>
Air Travel and Transportation	1 (hour)
Ocean Shipment of Goods	.5
Patent Rights	.5
Publications	.5
Negotiated Indirect Cost Rates - (Predetermined and Provisional)	1
Voluntary Population Planning	.5
Protection of the Individual as a Research Subject	1

<u>22 CFR 226</u>	<u>Burden Estimate</u>
22 CFR 226.40-.49 Procurement of Goods and Services	1
22 CFR 226.30 - .36 Property Standards	1.5

Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, may be sent to the Office of Procurement, Policy Division (M/OP/P) U.S. Agency for International Development, Washington, DC 20523-7801 and to the Office of Management and Budget, Paperwork Reduction Project (0412-0510), Washington, D.C 20503.

[END OF PROVISION]

**9. USAID ELIGIBILITY RULES FOR GOODS AND SERVICES (APRIL 1998)**

(This provision is not applicable to goods or services which the recipient provides with private funds as part of a cost-sharing requirement, or with Program Income generated under the award.)

- a. Ineligible and Restricted Goods and Services: USAID's policy on ineligible and restricted goods and services is contained in ADS Chapter 312.
  - (1) Ineligible Goods and Services. Under no circumstances shall the recipient procure any of the following under this award:
    - (i) Military equipment,
    - (ii) Surveillance equipment,
    - (iii) Commodities and services for support of police or other law enforcement activities,
    - (iv) Abortion equipment and services,
    - (v) Luxury goods and gambling equipment, or
    - (vi) Weather modification equipment.
  - (2) Ineligible Suppliers. Funds provided under this award shall not be used to procure any goods or services furnished by any firms or individuals whose name appears on the "Lists of Parties Excluded from Federal Procurement and Nonprocurement Programs." USAID will provide the recipient with a copy of these lists upon request.
  - (3) Restricted Goods. The recipient shall not procure any of the following goods and services without the prior approval of the Agreement Officer:
    - (i) Agricultural commodities,
    - (ii) Motor vehicles,
    - (iii) Pharmaceuticals,

- (iv) Pesticides,
- (v) Used equipment,
- (vi) U.S. Government-owned excess property, or
- (vii) Fertilizer.

Prior approval will be deemed to have been met when:

- (i) the item is of U.S. source/origin;
- (ii) the item has been identified and incorporated in the program description or schedule of the award (initial or revisions), or amendments to the award; and
- (iii) the costs related to the item are incorporated in the approved budget of the award.

Where the item has not been incorporated into the award as described above, a separate written authorization from the Agreement Officer must be provided before the item is procured.

- b. **Source and Nationality:** The eligibility rules for goods and services based on source and nationality are divided into two categories. One applies when the total procurement element during the life of the award is over \$250,000, and the other applies when the total procurement element during the life of the award is not over \$250,000, or the award is funded under the Development Fund for Africa (DFA) regardless of the amount. The total procurement element includes procurement of all goods (e.g., equipment, materials, supplies) and services. Guidance on the eligibility of specific goods or services may be obtained from the Agreement Officer. USAID policies and definitions on source, origin and nationality are contained in 22 CFR Part 228, Rules on Source, Origin and Nationality for Commodities and Services Financed by the Agency for International Development, which is incorporated into this Award in its entirety.

- (1) For DFA funded awards or when the total procurement element during the life of this award is valued at \$250,000 or less, the following rules apply:
  - (i) The authorized source for procurement of all goods and services to be reimbursed under the award is USAID Geographic Code 935, "Special Free World," and such goods and services must meet the source, origin and nationality requirements set forth in 22 CFR Part 228 in accordance with the following order of preference:
    - (A) The United States (USAID Geographic Code 000),
    - (B) The Cooperating Country,
    - (C) USAID Geographic Code 941, and
    - (D) USAID Geographic Code 935.

(ii) Application of order of preference: When the recipient procures goods and services from other than U.S. sources, under the order of preference in paragraph (b)(1)(i) above, the recipient shall document its files to justify each such instance. The documentation shall set forth the circumstances surrounding the procurement and shall be based on one or more of the following reasons, which will be set forth in the Recipient's documentation:

(A) The procurement was of an emergency nature, which would not allow for the delay attendant to soliciting U.S. sources,

(B) The price differential for procurement from U.S. sources exceeded by 50% or more the delivered price from the non-U.S. source,

(C) Compelling local political considerations precluded consideration of U.S. sources,

(D) The goods or services were not available from U.S. sources, or

(E) Procurement of locally available goods and services, as opposed to procurement of U.S. goods and services, would best promote the objectives of the Foreign Assistance program under the award.

(2) When the total procurement element exceeds \$250,000 (unless funded by DFA), the following applies: Except as may be specifically approved or directed in advance by the Agreement Officer, all goods and services financed with U.S. dollars, which will be reimbursed under this award must meet the source, origin and nationality requirements set forth in 22 CFR Part 228 for the authorized geographic code specified in the schedule of this award. If none is specified, the authorized source is Code 000, the United States.

c. Printed or Audio-Visual Teaching Materials: If the effective use of printed or audio-visual teaching materials depends upon their being in the local language and if such materials are intended for technical assistance projects or activities financed by USAID in whole or in part and if other funds including U.S.-owned or U.S.-controlled local currencies are not readily available to finance the procurement of such materials, local language versions may be procured from the following sources, in order of preference:

- (1) The United States (USAID Geographic Code 000),
- (2) The Cooperating Country,
- (3) "Selected Free World" countries (USAID Geographic Code 941), and
- (4) "Special Free World" countries (USAID Geographic Code 899).

d. If USAID determines that the recipient has procured any of these goods or services under this award contrary to the requirements of this provision, and has received payment for

such purposes, the Agreement Officer may require the recipient to refund the entire amount of the purchase.

This provision must be included in all subagreements which include procurement of goods or services which total over \$5,000.

[END OF PROVISION]

**10. DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS  
(JANUARY 2004)**

- a. The recipient agrees to notify the Agreement Officer immediately upon learning that it or any of its principals:
- (1) Are presently excluded or disqualified from covered transactions by any Federal department or agency;
  - (2) Have been convicted within the preceding three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, receiving stolen property, making false claims, or obstruction of justice; commission of any other offense indicating a lack of business integrity or business honesty that seriously and directly affects your present responsibility;
  - (3) Are presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b); and
  - (4) Have had one or more public transactions (Federal, State, or local) terminated for cause or default within the preceding three years.
- b. The recipient agrees that, unless authorized by the Agreement Officer, it will not knowingly enter into any subagreements or contracts under this cooperative agreement with a person or entity that is included on the Excluded Parties List System (<http://epls.arnet.gov>). The recipient further agrees to include the following provision in any subagreements or contracts entered into under this award:

**DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION  
(DECEMBER 2003)**

The recipient/contractor certifies that neither it nor its principals is presently excluded or disqualified from participation in this transaction by any Federal department or agency.

- c. The policies and procedures applicable to debarment, suspension, and ineligibility under USAID-financed transactions are set forth in 22 CFR Part 208.

[END OF PROVISION]

**11. DRUG-FREE WORKPLACE (JANUARY2004)**

- a. The recipient agrees that it will publish a drug-free workplace statement and provide a copy to each employee who will be engaged in the performance of any Federal award. The statement must
  - (1) Tell the employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in its workplace;
  - (2) Specify the actions the recipient will take against employees for violating that prohibition; and
  - (3) Let each employee know that, as a condition of employment under any award, he or she
    - (i) Must abide by the terms of the statement, and
    - (ii) Must notify you in writing if he or she is convicted for a violation of a criminal drug statute occurring in the workplace, and must do so no more than five calendar days after the conviction.
- b. The recipient agrees that it will establish an ongoing drug-free awareness program to inform employees about
  - (i) The dangers of drug abuse in the workplace;
  - (ii) Your policy of maintaining a drug-free workplace;
  - (iii) Any available drug counseling, rehabilitation and employee assistance programs; and
  - (iv) The penalties that you may impose upon them for drug abuse violations occurring in the workplace.
- c. Without the Agreement Officer's expressed written approval, the policy statement and program must be in place as soon as possible, no later than the 30 days after the effective date of this award or the completion date of this award, whichever occurs first.

- d. The recipient agrees to immediately notify the Agreement Officer if an employee is convicted of a drug violation in the workplace. The notification must be in writing, identify the employee's position title, the number of each award on which the employee worked. The notification must be sent to the Agreement Officer within ten calendar days after the recipient learns of the conviction.
- e. Within 30 calendar days of learning about an employee's conviction, the recipient must either
  - (1) Take appropriate personnel action against the employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973 (29 USC 794), as amended, or
  - (2) Require the employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for these purposes by a Federal, State or local health, law enforcement, or other appropriate agency.
- f. The policies and procedures applicable to violations of these requirements are set forth in 22 CFR Part 210.

[END OF PROVISION]

**12. EQUAL PROTECTION OF THE LAWS FOR FAITH-BASED AND COMMUNITY ORGANIZATIONS (FEBRUARY 2004)**

- a. The recipient may not discriminate against any beneficiary or potential beneficiary under this award on the basis of religion or religious belief. Accordingly, in providing services supported in whole or in part by this agreement or in its outreach activities related to such services, the recipient may not discriminate against current or prospective program beneficiaries on the basis of religion, a religious belief, a refusal to hold a religious belief, or a refusal to actively participate in a religious practice;
- b. The Federal Government must implement Federal programs in accordance with the Establishment Clause and the Free Exercise Clause of the First Amendment to the Constitution. Therefore, if the recipient engages in inherently religious activities, such as worship, religious instruction, and proselytization, it must offer those services at a different time or location from any programs or services directly funded by this award, and participation by beneficiaries in any such inherently religious activities must be voluntary.
- c. If the recipient makes subawards under this agreement, faith-based organizations should be eligible to participate on the same basis as other organizations, and should not be discriminated against on the basis of their religious character or affiliation.

[END OF PROVISION]

### **13. IMPLEMENTATION OF E.O. 13224 -- EXECUTIVE ORDER ON TERRORIST FINANCING (MARCH 2002)**

The Recipient is reminded that U.S. Executive Orders and U.S. law prohibits transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the legal responsibility of the recipient to ensure compliance with these Executive Orders and laws. This provision must be included in all contracts/subawards issued under this agreement.

[END OF PROVISION]

### **14. BRANDING STRATEGY - ASSISTANCE (DECEMBER 2005)**

#### **(a) Definitions**

*Branding Strategy* means a strategy that is submitted at the specific request of a USAID Agreement Officer by an Apparently Successful Applicant after evaluation of an application for USAID funding, describing how the program, project, or activity is named and positioned, and how it is promoted and communicated to beneficiaries and host country citizens. It identifies all donors and explains how they will be acknowledged.

*Apparently Successful Applicant(s)* means the applicant(s) for USAID funding recommended for an award after evaluation, but who has not yet been awarded a grant, cooperative agreement or other assistance award by the Agreement Officer. The Agreement Officer will request that the Apparently Successful Applicants submit a Branding Strategy and Marking Plan. Apparently Successful Applicant status confers no right and constitutes no USAID commitment to an award.

*USAID Identity (Identity)* means the official marking for the Agency, comprised of the USAID logo and new landmark, which clearly communicates that our assistance is from the American people. The USAID Identity is available on the USAID website and is provided without royalty, license, or other fee to recipients of USAID-funded grants or cooperative agreements or other assistance awards or subawards.

#### **(b) Submission**

The Apparently Successful Applicant, upon request of the Agreement Officer, will submit and negotiate a Branding Strategy. The Branding Strategy will be included in and made a part of the resulting grant or cooperative agreement. The Branding Strategy will be negotiated within the time that the Agreement Officer specifies. Failure to submit and negotiate a Branding Strategy will make the applicant ineligible for award of a grant or cooperative agreement. The Apparently Successful Applicant must include all estimated costs associated with branding and marking USAID programs, such as plaques, stickers, banners, press events and materials, and the like.

#### **(c) Submission Requirements**



At a minimum, the Apparently Successful Applicant's Branding Strategy will address the following:

### **(1) Positioning**

*What is the intended name of this program, project, or activity?*

**Guidelines:** USAID prefers to have the USAID Identity included as part of the program or project name, such as a "title sponsor," if possible and appropriate. It is acceptable to "co-brand" the title with USAID's and the Apparently Successful Applicant's identities. For example: "The USAID and [Apparently Successful Applicant] Health Center."

If it would be inappropriate or is not possible to "brand" the project this way, such as when rehabilitating a structure that already exists or if there are multiple donors, please explain and indicate how you intend to showcase USAID's involvement in publicizing the program or project. *For example: School #123, rehabilitated by USAID and [Apparently Successful Applicant]/ [other donors].* Note: the Agency prefers "made possible by (or with) the generous support of the American People" next to the USAID Identity in acknowledging our contribution, instead of the phrase "funded by." USAID prefers local language translations.

*Will a program logo be developed and used consistently to identify this program? If yes, please attach a copy of the proposed program logo.*

Note: USAID prefers to fund projects that do NOT have a separate logo or identity that competes with the USAID Identity.

### **(2) Program Communications and Publicity**

*Who are the primary and secondary audiences for this project or program?*

**Guidelines:** Please include direct beneficiaries and any special target segments or influencers. *For Example: Primary audience: schoolgirls age 8-12, Secondary audience: teachers and parents—specifically mothers.*

*What communications or program materials will be used to explain or market the program to beneficiaries?*

**Guidelines:** These include training materials, posters, pamphlets, Public Service Announcements, billboards, websites, and so forth.

*What is the main program message(s)?*

**Guidelines:** *For example: "Be tested for HIV-AIDS" or "Have your child inoculated."* Please indicate if you also plan to incorporate USAID's primary message – this aid is "from the American people" – into the narrative of program materials. This is optional; however, marking with the USAID Identity is required.

*Will the recipient announce and promote publicly this program or project to host country citizens? If yes, what press and promotional activities are planned?*

**Guidelines:** These may include media releases, press conferences, public events, and so forth. Note: incorporating the message, “USAID from the American People”, and the USAID Identity is required.

*Please provide any additional ideas about how to increase awareness that the American people support this project or program.*

**Guidelines:** One of our goals is to ensure that both beneficiaries and host-country citizens know that the aid the Agency is providing is "from the American people." Please provide any initial ideas on how to further this goal.

### **(3) Acknowledgements**

*Will there be any direct involvement from a host-country government ministry? If yes, please indicate which one or ones. Will the recipient acknowledge the ministry as an additional co-sponsor?*

Note: it is perfectly acceptable and often encouraged for USAID to "co-brand" programs with government ministries.

*Please indicate if there are any other groups whose logo or identity the recipient will use on program materials and related communications.*

**Guidelines:** Please indicate if they are also a donor or why they will be visibly acknowledged, and if they will receive the same prominence as USAID.

(d) **Award Criteria.** The Agreement Officer will review the Branding Strategy for adequacy, ensuring that it contains the required information on naming and positioning the USAID-funded program, project, or activity, and promoting and communicating it to cooperating country beneficiaries and citizens. The Agreement Officer also will evaluate this information to ensure that it is consistent with the stated objectives of the award; with the Apparently Successful Applicant’s cost data submissions; with the Apparently Successful Applicant’s project, activity, or program performance plan; and with the regulatory requirements set out in 22 CFR 226.91. The Agreement Officer may obtain advice and from technical experts while performing the evaluation.

[END OF PROVISION]

## **15. MARKING PLAN – ASSISTANCE (DECEMBER 2005)**

### **(a) Definitions**

**Marking Plan** means a plan that the Apparently Successful Applicant submits at the specific request of a USAID Agreement Officer after evaluation of an application for USAID funding, detailing the public

communications, commodities, and program materials and other items that will visibly bear the USAID Identity. Recipients may request approval of Presumptive Exceptions to marking requirements in the Marking Plan.

***Apparently Successful Applicant(s)*** means the applicant(s) for USAID funding recommended for an award after evaluation, but who has not yet been awarded a grant, cooperative agreement or other assistance award by the Agreement Officer. The Agreement Officer will request that Apparently Successful Applicants submit a Branding Strategy and Marking Plan. Apparently Successful Applicant status confers no right and constitutes no USAID commitment to an award, which the Agreement Officer must still obligate.

***USAID Identity (Identity)*** means the official marking for the Agency, comprised of the USAID logo and new brandmark, which clearly communicates that our assistance is from the American people. The USAID Identity is available on the USAID website and USAID provides it without royalty, license, or other fee to recipients of USAID funded grants, cooperative agreements, or other assistance awards or subawards.

A ***Presumptive Exception*** exempts the applicant from the general marking requirements for a *particular* USAID-funded public communication, commodity, program material or other deliverable, or a *category* of USAID-funded public communications, commodities, program materials or other deliverables that would otherwise be required to visibly bear the USAID Identity. The Presumptive Exceptions are: Presumptive Exception (i). USAID marking requirements may not apply if they would compromise the intrinsic independence or neutrality of a program or materials where independence or neutrality is an inherent aspect of the program and materials, such as election monitoring or ballots, and voter information literature; political party support or public policy advocacy or reform; independent media, such as television and radio broadcasts, newspaper articles and editorials; and public service announcements or public opinion polls and surveys (22 C.F.R. 226.91(h)(1)).

Presumptive Exception (ii). USAID marking requirements may not apply if they would diminish the credibility of audits, reports, analyses, studies, or policy recommendations whose data or findings must be seen as independent (22 C.F.R. 226.91(h)(2)).

Presumptive Exception (iii). USAID marking requirements may not apply if they would undercut host-country government “ownership” of constitutions, laws, regulations, policies, studies, assessments, reports, publications, surveys or audits, public service announcements, or other communications better positioned as “by” or “from” a cooperating country ministry or government official (22 C.F.R. 226.91(h)(3)).

Presumptive Exception (iv). USAID marking requirements may not apply if they would impair the functionality of an item, such as sterilized equipment or spare parts (22 C.F.R. 226.91(h)(4)).

Presumptive Exception (v). USAID marking requirements may not apply if they would incur substantial costs or be impractical, such as items too small or otherwise unsuited for individual marking, such as food in bulk (22 C.F.R. 226.91(h)(5)).

Presumptive Exception (vi). USAID marking requirements may not apply if they would local cultural or social norms, or be considered inappropriate on such items as condoms, toilets, bed pans, or similar commodities (22 C.F.R. 226.91(h)(6)).

Presumptive Exception (vii). USAID marking requirements may not apply if they would conflict with international law (22 C.F.R. 226.91(h)(7)).

(b) **Submission.** The Apparently Successful Applicant, upon the request of the Agreement Officer, will submit and negotiate a Marking Plan that addresses the details of the public communications, commodities, program materials that will visibly bear the USAID Identity. The marking plan will be customized for the particular program, project, or activity under the resultant grant or cooperative agreement. The plan will be included in and made a part of the resulting grant or cooperative agreement. USAID and the Apparently Successful Applicant will negotiate the Marking Plan within the time specified by the Agreement Officer. Failure to submit and negotiate a Marking Plan will make the applicant ineligible for award of a grant or cooperative agreement. The applicant must include an estimate of all costs associated with branding and marking USAID programs, such as plaques, labels, banners, press events, promotional materials, and so forth in the budget portion of its application. These costs are subject to revision and negotiation with the Agreement Officer upon submission of the Marking Plan and will be incorporated into the Total Estimated Amount of the grant, cooperative agreement or other assistance instrument.

(c) **Submission Requirements.**

The Marking Plan will include the following:

(1) A description of the public communications, commodities, and program materials that the recipient will be produced as a part of the grant or cooperative agreement and which will visibly bear the USAID Identity. These include:

(i) program, project, or activity sites funded by USAID, including visible infrastructure projects or other programs, projects, or activities that are physical in nature;

(ii) technical assistance, studies, reports, papers, publications, audio-visual productions, public service announcements, Web sites/Internet activities and other promotional, informational, media, or communications products funded by USAID;

(iii) events financed by USAID, such as training courses, conferences, seminars, exhibitions, fairs, workshops, press conferences, and other public activities; and (iv) all commodities financed by USAID, including commodities or equipment provided under humanitarian assistance or disaster relief programs, and all other equipment, supplies and other materials funded by USAID, and their export packaging.

(2) A table specifying:

(i) the program deliverables that the recipient will mark with the USAID Identity,

(ii) the type of marking and what materials the applicant will be used to mark the program deliverables with the USAID Identity, and

(iii) when in the performance period the applicant will mark the program deliverables, and where the applicant will place the marking.

(3) A table specifying:

(i) what program deliverables will not be marked with the USAID Identity, and (ii) the rationale for not marking these program deliverables.

**(d) Presumptive Exceptions.**

(1) The Apparently Successful Applicant may request a Presumptive Exception as part of the overall Marking Plan submission. To request a Presumptive Exception, the Apparently Successful Applicant must identify which Presumptive Exception applies, and state why, in light of the Apparently Successful Applicant's technical proposal and in the context of the program description or program statement in the USAID Request For Application or Annual Program Statement, marking requirements should not be required.

(2) Specific guidelines for addressing each Presumptive Exception are:

(i) For Presumptive Exception (i), identify the USAID Strategic Objective, Interim Result, or program goal furthered by an appearance of neutrality, or state why the program, project, activity, commodity, or communication is 'intrinsically neutral.' Identify, by category or deliverable item, examples of program materials funded under the award for which you are seeking exception 1.

(ii) For Presumptive Exception (ii), state what data, studies, or other deliverables will be produced under the USAID funded award, and explain why the data, studies, or deliverables must be seen as credible.

(iii) For Presumptive Exception (iii), identify the item or media product produced under the USAID funded award, and explain why each item or product, or category of item and product, is better positioned as an item or product produced by the cooperating country government.

(iv) For Presumptive Exception (iv), identify the item or commodity to be marked, or categories of items or commodities, and explain how marking would impair the item's or commodity's functionality.

(v) For Presumptive Exception (v), explain why marking would not be cost-beneficial or practical.

(vi) For Presumptive Exception (vi), identify the relevant cultural or social norm, and explain why marking would violate that norm or otherwise be inappropriate.

(vii) For Presumptive Exception (vii), identify the applicable international law violated by marking.

(3) The Agreement Officer will review the request for adequacy and reasonableness.

In consultation with the Cognizant Technical Officer and other agency personnel as necessary, the Agreement Officer will approve or disapprove the requested Presumptive Exception. Approved exceptions will be made part of the approved Marking Plan, and will apply for the term of the award, unless provided otherwise.

**(e) Award Criteria:** The Agreement Officer will review the Marking Plan for adequacy and reasonableness, ensuring that it contains sufficient detail and information concerning public communications, commodities, and program materials that will visibly bear the USAID Identity. The Agreement Officer will evaluate the plan to ensure that it is consistent with the stated objectives of the award; with the applicant's cost data submissions; with the applicant's actual project, activity, or program performance plan; and with the regulatory requirements of 22 C.F.R.226.91. The Agreement Officer will approve or disapprove any requested Presumptive Exceptions (see paragraph (d)) on the basis of adequacy and reasonableness. The Agreement Officer may obtain advice and recommendations from technical experts while performing the evaluation.

[END OF PROVISION]

**16. MARKING UNDER USAID-FUNDED ASSISTANCE INSTRUMENTS  
(DECEMBER 2005)**

**(a) Definitions**

*Commodities* mean any material, article, supply, goods or equipment, excluding recipient offices, vehicles, and non-deliverable items for recipient's internal use, in administration of the USAID funded grant, cooperative agreement, or other agreement or subagreement.

*Principal Officer* means the most senior officer in a USAID Operating Unit in the field, e.g., USAID Mission Director or USAID Representative. For global programs managed from Washington but executed across many countries, such as disaster relief and assistance to internally displaced persons, humanitarian emergencies or immediate post conflict and political crisis response, the cognizant Principal Officer may be an Office Director, for example, the Directors of USAID/W/Office of Foreign Disaster Assistance and Office of Transition Initiatives. For non-presence countries, the cognizant Principal Officer is the Senior USAID officer in a regional USAID Operating Unit responsible for the non-presence country, or in the absence of such a responsible operating unit, the Principal U.S Diplomatic Officer in the non-presence country exercising delegated authority from USAID.

*Programs* mean an organized set of activities and allocation of resources directed toward a common purpose, objective, or goal undertaken or proposed by an organization to carry out the responsibilities assigned to it.

*Projects* include all the marginal costs of inputs (including the proposed investment) technically required to produce a discrete marketable output or a desired result (for example, services from a fully functional water/sewage treatment facility).

*Public communications* are documents and messages intended for distribution to audiences external to the recipient's organization. They include, but are not limited to, correspondence, publications, studies, reports, audio visual productions, and other informational products; applications, forms, press and promotional materials used in connection with USAID funded programs, projects or activities, including signage and plaques; Web sites/Internet activities; and events such as training courses, conferences, seminars, press conferences and so forth.

*Subrecipient* means any person or government (including cooperating country government) department, agency, establishment, or for profit or nonprofit organization that receives a USAID subaward, as defined in 22 C.F.R. 226.2.

*Technical Assistance* means the provision of funds, goods, services, or other foreign assistance, such as loan guarantees or food for work, to developing countries and other USAID recipients, and through such recipients to subrecipients, in direct support of a development objective – as opposed to the internal management of the foreign assistance program.

**USAID Identity (Identity)** means the official marking for the United States Agency for International Development (USAID), comprised of the USAID logo or seal and new brandmark, with the tagline that clearly communicates that our assistance is “from the American people.” The USAID Identity is available on the USAID website at [www.usaid.gov/branding](http://www.usaid.gov/branding) and USAID provides it without royalty, license, or other fee to recipients of USAID-funded grants, or cooperative agreements, or other assistance awards

**(b) Marking of Program Deliverables**

- (1) All recipients must mark appropriately all overseas programs, projects, activities, public communications, and commodities partially or fully funded by a USAID grant or cooperative agreement or other assistance award or subaward with the USAID Identity, of a size and prominence equivalent to or greater than the recipient’s, other donor’s, or any other third party’s identity or logo.
- (2) The Recipient will mark all program, project, or activity sites funded by USAID, including visible infrastructure projects (for example, roads, bridges, buildings) or other programs, projects, or activities that are physical in nature (for example, agriculture, forestry, water management) with the USAID Identity. The Recipient should erect temporary signs or plaques early in the construction or implementation phase. When construction or implementation is complete, the Recipient must install a permanent, durable sign, plaque or other marking.
- (3) The Recipient will mark technical assistance, studies, reports, papers, publications, audio-visual productions, public service announcements, Web sites/Internet activities and other promotional, informational, media, or communications products funded by USAID with the USAID Identity.
- (4) The Recipient will appropriately mark events financed by USAID, such as training courses, conferences, seminars, exhibitions, fairs, workshops, press conferences and other public activities, with the USAID Identity. Unless directly prohibited and as appropriate to the surroundings, recipients should display additional materials, such as signs and banners, with the USAID Identity. In circumstances in which the USAID Identity cannot be displayed visually, the recipient is encouraged otherwise to acknowledge USAID and the American people’s support.
- (5) The Recipient will mark all commodities financed by USAID, including commodities or equipment provided under humanitarian assistance or disaster relief programs, and all other equipment, supplies, and other materials funded by USAID, and their export packaging with the USAID Identity.
- (6) The Agreement Officer may require the USAID Identity to be larger and more prominent if it is the majority donor, or to require that a cooperating country government’s identity be larger and more prominent if circumstances warrant, and as appropriate depending on the audience, program goals, and materials produced.

(7) The Agreement Officer may require marking with the USAID Identity in the event that the recipient does not choose to mark with its own identity or logo.

(8) The Agreement Officer may require a pre-production review of USAID-funded public communications and program materials for compliance with the approved Marking Plan.

(9) Subrecipients. To ensure that the marking requirements “flow down” to subrecipients of subawards, recipients of USAID funded grants and cooperative agreements or other assistance awards will include the USAID-approved marking provision in any USAID funded subaward, as follows:

*“As a condition of receipt of this subaward, marking with the USAID Identity of a size and prominence equivalent to or greater than the recipient’s, subrecipient’s, other donor’s or third party’s is required. In the event the recipient chooses not to require marking with its own identity or logo by the subrecipient, USAID may, at its discretion, require marking by the subrecipient with the USAID Identity.”*

(10) Any ‘public communications’, as defined in 22 C.F.R. 226.2, funded by USAID, in which the content has not been approved by USAID, must contain the following disclaimer:

*“This study/report/audio/visual/other information/media product (specify) is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of [insert recipient name] and do not necessarily reflect the views of USAID or the United States Government.”*

(11) The recipient will provide the Cognizant Technical Officer (CTO) or other USAID personnel designated in the grant or cooperative agreement with two copies of all program and communications materials produced under the award. In addition, the recipient will submit one electronic or one hard copy of all final documents to USAID’s Development Experience Clearinghouse.

**(c) Implementation of marking requirements.**

(1) When the grant or cooperative agreement contains an approved Marking Plan, the recipient will implement the requirements of this provision following the approved Marking Plan.

(2) When the grant or cooperative agreement does not contain an approved Marking Plan, the recipient will propose and submit a plan for implementing the requirements of this provision within [Previously submitted] days after the effective date of this provision. The plan will include:



- (i) A description of the program deliverables specified in paragraph (b) of this provision that the recipient will produce as a part of the grant or cooperative agreement and which will visibly bear the USAID Identity.
  - (ii) the type of marking and what materials the applicant uses to mark the program deliverables with the USAID Identity,
  - (iii) when in the performance period the applicant will mark the program deliverables, and where the applicant will place the marking,
- (3) The recipient may request program deliverables not be marked with the USAID Identity by identifying the program deliverables and providing a rationale for not marking these program deliverables. Program deliverables may be exempted from USAID marking requirements when:
- (i) USAID marking requirements would compromise the intrinsic independence or neutrality of a program or materials where independence or neutrality is an inherent aspect of the program and materials;
  - (ii) USAID marking requirements would diminish the credibility of audits, reports, analyses, studies, or policy recommendations whose data or findings must be seen as independent;
  - (iii) USAID marking requirements would undercut host-country government “ownership” of constitutions, laws, regulations, policies, studies, assessments, reports, publications, surveys or audits, public service announcements, or other communications better positioned as “by” or “from” a cooperating country ministry or government official;
  - (iv) USAID marking requirements would impair the functionality of an item;
  - (v) USAID marking requirements would incur substantial costs or be impractical;
  - (vi) USAID marking requirements would offend local cultural or social norms, or be considered inappropriate;
  - (vii) USAID marking requirements would conflict with international law.
- (4) The proposed plan for implementing the requirements of this provision, including any proposed exemptions, will be negotiated within the time specified by the Agreement Officer after receipt of the proposed plan. Failure to negotiate an approved plan with the time specified by the Agreement Officer may be considered as noncompliance with the requirements is provision.

**(d) Waivers.**

(1) The recipient may request a waiver of the Marking Plan or of the marking requirements of this provision, in whole or in part, for each program, project, activity, public communication or commodity, or, in exceptional circumstances, for a region or country, when USAID required marking would pose compelling political, safety, or security concerns, or when marking would have an adverse impact in the cooperating country. The recipient will submit the request through the Cognizant Technical Officer. The Principal Officer is responsible for approvals or disapprovals of waiver requests.

(2) The request will describe the compelling political, safety, security concerns, or adverse impact that require a waiver, detail the circumstances and rationale for the waiver, detail the specific requirements to be waived, the specific portion of the Marking Plan to be waived, or specific marking to be waived, and include a description of how program materials will be marked (if at all) if the USAID Identity is removed. The request should also provide a rationale for any use of recipient's own identity/logo or that of a third party on materials that will be subject to the waiver.

(3) Approved waivers are not limited in duration but are subject to Principal Officer review at any time, due to changed circumstances.

(4) Approved waivers "flow down" to recipients of subawards unless specified otherwise. The waiver may also include the removal of USAID markings already affixed, if circumstances warrant.

(5) Determinations regarding waiver requests are subject to appeal to the Principal Officer's cognizant Assistant Administrator. The recipient may appeal by submitting a written request to reconsider the Principal Officer's waiver determination to the cognizant Assistant Administrator.

(e) **Non-retroactivity.** The requirements of this provision do not apply to any materials, events, or commodities produced prior to January 2, 2006. The requirements of this provision do not apply to program, project, or activity sites funded by USAID, including visible infrastructure projects (for example, roads, bridges, buildings) or other programs, projects, or activities that are physical in nature (for example, agriculture, forestry, water management) where the construction and implementation of these are complete prior to January 2, 2006 and the period of the cooperative agreement does not extend past January 2, 2006.

[END OF PROVISION]

## **17. REGULATIONS GOVERNING EMPLOYEES (AUGUST 1992)**

(The following applies to the recipient's employees working in the cooperating country under the agreement who are not citizens of the cooperating country.)

- a. The recipient's employees shall maintain private status and may not rely on local U.S. Government offices or facilities for support while under this cooperative agreement.

- b. The sale of personal property or automobiles by recipient employees and their dependents in the foreign country to which they are assigned shall be subject to the same limitations and prohibitions which apply to direct-hire USAID personnel employed by the Mission, including the rules contained in 22 CFR Part 136, except as this may conflict with host government regulations.
- c. Other than work to be performed under this award for which an employee is assigned by the recipient, no employee of the recipient shall engage directly or indirectly, either in the individual's own name or in the name or through an agency of another person, in any business, profession, or occupation in the foreign countries to which the individual is assigned, nor shall the individual make loans or investments to or in any business, profession or occupation in the foreign countries to which the individual is assigned.
- d. The recipient's employees, while in a foreign country, are expected to show respect for its conventions, customs, and institutions, to abide by its applicable laws and regulations, and not to interfere in its internal political affairs.
- e. In the event the conduct of any recipient employee is not in accordance with the preceding paragraphs, the recipient's chief of party shall consult with the USAID Mission Director and the employee involved and shall recommend to the recipient a course of action with regard to such employee.
- f. The parties recognize the rights of the U.S. Ambassador to direct the removal from a country of any U.S. citizen or the discharge from this cooperative agreement award of any third country national when, in the discretion of the Ambassador, the interests of the United States so require.
- g. If it is determined, either under (e) or (f) above, that the services of such employee should be terminated, the recipient shall use its best efforts to cause the return of such employee to the United States, or point of origin, as appropriate.

[END OF PROVISION]

**18. CONVERSION OF UNITED STATES DOLLARS TO LOCAL CURRENCY  
(NOVEMBER 1985)**

(This provision applies when activities are undertaken outside the United States.)

Upon arrival in the Cooperating Country, and from time to time as appropriate, the recipient's chief of party shall consult with the Mission Director who shall provide, in writing, the procedure the recipient and its employees shall follow in the conversion of United States dollars to local currency. This may include, but is not limited to, the conversion of currency through the cognizant United States Disbursing Officer or Mission Controller, as appropriate.

[END OF PROVISION]

**19. USE OF POUCH FACILITIES (AUGUST 1992)**

(This provision applies when activities are undertaken outside the United States.)

a. Use of diplomatic pouch is controlled by the Department of State. The Department of State has authorized the use of pouch facilities for USAID recipients and their employees as a general policy, as detailed in items (1) through (6) below. However, the final decision regarding use of pouch facilities rest with the Embassy or USAID Mission. In consideration of the use of pouch facilities, the recipient and its employees agree to indemnify and hold harmless, the Department of State and USAID for loss or damage occurring in pouch transmission:

(1) Recipients and their employees are authorized use of the pouch for transmission and receipt of up to a maximum of .9 kgs per shipment of correspondence and documents needed in the administration of assistance programs.

(2) U.S. citizen employees are authorized use of the pouch for personal mail up to a maximum of .45 kgs per shipment (but see (a)(3) below).

(3) Merchandise, parcels, magazines, or newspapers are not considered to be personal mail for purposes of this standard provision and are not authorized to be sent or received by pouch.

(4) Official and personal mail pursuant to a.1. and 2. above sent by pouch should be addressed as follows:

Name of individual or organization (followed by  
letter symbol "G")  
City Name of post (USAID/\_\_\_\_\_)  
Agency for International Development  
Washington, D.C. 20523-0001

(5) Mail sent via the diplomatic pouch may not be in violation of U.S. Postal laws and may not contain material ineligible for pouch transmission.

(6) Recipient personnel are NOT authorized use of military postal facilities (APO/FPO). This is an Adjutant General's decision based on existing laws and regulations governing military postal facilities and is being enforced worldwide.

b. The recipient shall be responsible for advising its employees of this authorization, these guidelines, and limitations on use of pouch facilities.

- c. Specific additional guidance on Recipient use of pouch facilities in accordance with this standard provision is available from the Post Communication Center at the Embassy or USAID Mission.

[END OF PROVISION]

## **20. INTERNATIONAL AIR TRAVEL AND TRANSPORTATION (JUNE 1999)**

(This provision is applicable when costs for international travel or transportation will be paid for with USAID funds. This provision is not applicable if the recipient is providing for travel with private funds as part of a cost-sharing requirement, or with Program Income generated under the award.)

### **a. PRIOR BUDGET APPROVAL**

In accordance with OMB Cost Principles, direct charges for foreign travel costs are allowable only when each foreign trip has received prior budget approval. Such approval will be deemed to have been met when:

- (1) the trip is identified. Identification is accomplished by providing the following information: the number of trips, the number of individuals per trip, and the destination country(s).
- (2) the information noted at (a)(1) above is incorporated in: the proposal, the program description or schedule of the award, the implementation plan (initial or revisions), or amendments to the award; and
- (3) the costs related to the travel are incorporated in the approved budget of the award.

The Agreement Officer may approve travel which has not been incorporated in writing as required by paragraph (a)(2). In such case, a copy of the Agreement Officer's approval must be included in the agreement file.

### **b. NOTIFICATION**

- (1) As long as prior budget approval has been met in accordance with paragraph (a) above, a separate Notification will not be necessary unless:
  - (i) the primary purpose of the trip is to work with USAID Mission personnel, or
  - (ii) the recipient expects significant administrative or substantive programmatic support from the Mission.

Neither the USAID Mission nor the Embassy will require Country Clearance of employees or contractors of USAID Recipients.

(2) Where notification is required in accordance with paragraph (1)(i) or (ii) above, the recipient will observe the following standards:

(i) Send a written notice to the cognizant USAID Technical Office in the Mission. If the recipient's primary point of contact is a Technical Officer in USAID/W, the recipient may send the notice to that person. It will be the responsibility of the USAID/W Technical Officer to forward the notice to the field.

(ii) The notice should be sent as far in advance as possible, but at least 14 calendar days in advance of the proposed travel. This notice may be sent by fax or e-mail. The recipient should retain proof that notification was made.

(iii) The notification shall contain the following information: the award number, the cognizant Technical Officer, the traveler's name (if known), date of arrival, and the purpose of the trip.

(iv) The USAID Mission will respond only if travel has been denied. It will be the responsibility of the Technical Officer in the Mission to contact the recipient within 5 working days of having received the notice if the travel is denied. If the recipient has not received a response within the time frame, the recipient will be considered to have met these standards for notification, and may travel.

(v) If a subrecipient is required to issue a Notification, as per this section, the subrecipient may contact the USAID Technical Officer directly, or the prime may contact USAID on the subrecipient's behalf.

#### c. SECURITY ISSUES

Recipients are encouraged to obtain the latest Department of State Travel Advisory Notices before traveling. These Notices are available to the general public and may be obtained directly from the State Department, or via Internet.

Where security is a concern in a specific region, recipients may choose to notify the US Embassy of their presence when they have entered the country. This may be especially important for long-term posting.

#### d. USE OF U.S.-OWNED LOCAL CURRENCY

Travel to certain countries shall, at USAID's option, be funded from U.S.-owned local currency. When USAID intends to exercise this option, USAID will either issue a U.S. Government S.F. 1169, Transportation Request (GTR) which the Recipient may exchange for tickets, or issue the

tickets directly. Use of such U.S.-owned currencies will constitute a dollar charge to this cooperative agreement.

e. **THE FLY AMERICA ACT**

The Fly America Act (49 U.S.C. 40118) requires that all air travel and shipments under this award must be made on U.S. flag air carriers to the extent service by such carriers is available. The Administrator of General Services Administration (GSA) is authorized to issue regulations for purposes of implementation. Those regulations may be found at 41 CFR part 301, and are hereby incorporated by reference into this award.

f. **COST PRINCIPLES**

The recipient will be reimbursed for travel and the reasonable cost of subsistence, post differentials and other allowances paid to employees in international travel status in accordance with the recipient's applicable cost principles and established policies and practices which are uniformly applied to federally financed and other activities of the Recipient.

If the recipient does not have written established policies regarding travel costs, the standard for determining the reasonableness of reimbursement for overseas allowance will be the Standardized Regulations (Government Civilians, Foreign Areas), published by the U.S. Department of State, as from time to time amended. The most current subsistence, post differentials, and other allowances may be obtained from the Agreement Officer.

g. **SUBAWARDS.**

This provision will be included in all subawards and contracts which require international air travel and transportation under this award.

[END OF PROVISION]

**21. OCEAN SHIPMENT OF GOODS (JUNE 1999)**

(This provision is applicable for awards and subawards for \$100,000 or more and when goods purchased with funds provided under this award are transported to cooperating countries on ocean vessels whether or not award funds are used for the transportation.)

- a. At least 50% of the gross tonnage of all goods purchased under this agreement and transported to the cooperating countries shall be made on privately owned U.S. flag commercial ocean vessels, to the extent such vessels are available at fair and reasonable rates for such vessels.
- b. At least 50% of the gross freight revenue generated by shipments of goods purchased under this agreement and transported to the cooperating countries on dry cargo liners shall be paid to or for the benefit of privately owned U.S. flag commercial ocean vessels to the extent such vessels are available at fair and reasonable rates for such vessels.

- c. When U.S. flag vessels are not available, or their use would result in a significant delay, the Recipient may request a determination of non-availability from the USAID Transportation Division, Office of Procurement, Washington, D.C. 20523, giving the basis for the request which will relieve the Recipient of the requirement to use U.S. flag vessels for the amount of tonnage included in the determination. Shipments made on non-free world ocean vessels are not reimbursable under this cooperative agreement.
- d. The recipient shall send a copy of each ocean bill of lading, stating all of the carrier's charges including the basis for calculation such as weight or cubic measurement, covering a shipment under this agreement to:
  - U.S. Department of Transportation,  
Maritime Administration, Division of National Cargo,  
400 7th Street, S.W.,  
Washington, DC 20590, and
  - U.S. Agency for International Development,  
Office of Procurement, Transportation Division  
1300 Pennsylvania Avenue, N.W.  
Washington, DC 20523-7900
- e. Shipments by voluntary nonprofit relief agencies (i.e., PVOs) shall be governed by this standard provision and by USAID Regulation 2, "Overseas Shipments of Supplies by Voluntary Nonprofit Relief Agencies" (22 CFR Part 202).
- f. Shipments financed under this cooperative agreement must meet applicable eligibility requirements set out in 22 CFR 228.21.

[END OF PROVISION]

## **22. LOCAL PROCUREMENT (APRIL 1998)**

(This provision applies when activities are undertaken outside the United States.)

- a. Financing local procurement involves the use of appropriated funds to finance the procurement of goods and services supplied by local businesses, dealers or producers, with payment normally being in the currency of the cooperating country.
- b. Locally financed procurements must be covered by source and nationality waivers as set forth in 22 CFR 228, Subpart F, except as provided for in mandatory standard provision, "USAID Eligibility Rules for Goods and Services," or when one of the following exceptions applies:



- (1) Locally available commodities of U.S. origin, which are otherwise eligible for financing, if the value of the transaction is estimated not to exceed \$100,000 exclusive of transportation costs.
  - (2) Commodities of geographic code 935 origin if the value of the transaction does not exceed the local currency equivalent of \$5,000.
  - (3) Professional Services Contracts estimated not to exceed \$250,000.
  - (4) Construction Services Contracts estimated not to exceed \$5,000,000.
  - (5) Commodities and services available only in the local economy (no specific per transaction value applies to this category). This category includes the following items:
    - (i) Utilities including fuel for heating and cooking, waste disposal and trash collection;
    - (ii) Communications - telephone, telex, fax, postal and courier services;
    - (iii) Rental costs for housing and office space;
    - (iv) Petroleum, oils and lubricants for operating vehicles and equipment;
    - (v) Newspapers, periodicals and books published in the cooperating country;
    - (vi) Other commodities and services and related expenses that, by their nature or as a practical matter, can only be acquired, performed, or incurred in the cooperating country, e.g., vehicle maintenance, hotel accommodations, etc.
- c. The coverage on ineligible and restricted goods and services in the mandatory standard provision entitled, "USAID Eligibility Rules for Goods and Services," also apply to local procurement.
- d. This provision will be included in all subagreements where local procurement of goods or services is a supported element.

[END OF PROVISION]

**23. VOLUNTARY POPULATION PLANNING ACTIVITIES – MANDATORY REQUIREMENTS (MAY 2006)**

Requirements for Voluntary Sterilization Programs

- (1) None of the funds made available under this award shall 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 individual to practice sterilization.

Prohibition on Abortion-Related Activities:

- (1) No funds made available under this award will be used to finance, support, or be attributed to the following activities: (i) procurement or distribution of equipment intended to be used for the purpose of inducing abortions as a method of family planning; (ii) special fees or incentives to any person to coerce or motivate them to have abortions; (iii) payments to persons to perform abortions or to solicit persons to undergo abortions; (iv) information, education, training, or communication programs that seek to promote abortion as a method of family planning; and (v) lobbying for or against abortion. The term “motivate”, as it relates to family planning assistance, shall not be construed to prohibit the provision, consistent with local law, of information or counseling about all pregnancy options.
- (2) No funds made available under this award will 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 sterilizations as a means of family planning. Epidemiologic or descriptive research to assess the incidence, extent or consequences of abortions is not precluded.

**[END OF MANDATORY PROVISIONS]**

**II. REQUIRED AS APPLICABLE STANDARD PROVISIONS FOR U.S., NONGOVERNMENTAL RECIPIENTS**

**1. NEGOTIATED INDIRECT COST RATES - PREDETERMINED (April 1998)**

- a. The allowable indirect costs shall be determined by applying the predetermined indirect cost rates to the bases specified in the schedule of this award.
- b. Within the earlier of 30 days after receipt of the A-133 audit report or nine months after the end of the audit period, the recipient shall submit to the cognizant agency for audit the required OMB Circular A-133 audit report, proposed predetermined indirect cost rates, and supporting cost data. If USAID is the cognizant agency or no cognizant agency has been designated, the recipient shall submit four copies of the audit report, the proposed predetermined indirect cost rates, and supporting cost data to the Overhead, Special Costs, and Closeout Branch, Office of Procurement, USAID, Washington DC 20523-

7802. The proposed rates shall be based on the recipient's actual cost experience during that fiscal year. Negotiations of predetermined indirect cost rates shall begin soon after receipt of the recipient's proposal.

- c. Allowability of costs and acceptability of cost allocation methods shall be determined in accordance with the applicable cost principles.
- d. The results of each negotiation shall be set forth in an indirect cost rate agreement signed by both parties. Such agreement is automatically incorporated into this award and shall specify (1) the agreed upon predetermined rates, (2) the bases to which the rates apply, (3) the fiscal year for which the rates apply, and (4) the specific items treated as direct costs. The indirect cost rate agreement shall not change any monetary ceiling, award obligation, or specific cost allowance or disallowance provided for in this award.
- e. Pending establishment of predetermined indirect costs rates for any fiscal year, the recipient shall be reimbursed either at the rates fixed for the previous fiscal year or at billing rates acceptable to the USAID Agreement Officer, subject to appropriate adjustment when the final rates for the fiscal year or other period are established.

[END OF PROVISION]

## **2. PUBLICATIONS AND MEDIA RELEASES (MARCH 2006)**

- a. The recipient shall provide the USAID Cognizant Technical Officer one copy of all published works developed under the award with lists of other written work produced under the award. In addition, the recipient shall submit final documents in electronic format unless no electronic version exists at the following address:

Online (preferred)

<http://www.dec.org/submit.cfm>

Mailing address:

Document Acquisitions

USAID Development Experience Clearinghouse (DEC)

8403 Colesville Road Suite 210

Silver Spring, MD 20910-6368

Contract Information

Telephone (301) 562-0641

Fax (301) 588-7787

E-mail: [docsubmit@dec.cdie.org](mailto:docsubmit@dec.cdie.org)

Electronic documents must consist of only one electronic file that comprises the complete and final equivalent of a hard copy. They may be submitted online (preferred); on 3.5" diskettes, a Zip disk, CD-R, or by e-mail. Electronic documents should be in PDF (Portable Document Format). Submission in other formats is acceptable but discouraged.

Each document submitted should contain essential bibliographic elements, such as 1) descriptive title; 2) author(s) name; 3) award number; 4) sponsoring USAID office; 5) strategic objective; and 6) date of publication;:

- b. In the event award funds are used to underwrite the cost of publishing, in lieu of the publisher assuming this cost as is the normal practice, any profits or royalties up to the amount of such cost shall be credited to the award unless the schedule of the award has identified the profits or royalties as program income.
- c. Except as otherwise provided in the terms and conditions of the award, the author or the recipient is free to copyright any books, publications, or other copyrightable materials developed in the course of or under this award, but USAID reserves a royalty-free nonexclusive and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use the work for Government purposes.

[END OF PROVISION]

### **3. PARTICIPANT TRAINING (April 1998)**

- a. Definition: A participant is any non-U.S. individual being trained under this award outside of that individual's home country.
- b. Application of ADS Chapter 253: Participant training under this award shall comply with the policies established in ADS Chapter 253, Participant Training, except to the extent that specific exceptions to ADS 253 have been provided in this award with the concurrence of the Office of International Training.
- c. Orientation: In addition to the mandatory requirements in ADS 253, recipients are strongly encouraged to provide, in collaboration with the Mission training officer, predeparture orientation and orientation in Washington at the Washington International Center. The latter orientation program also provides the opportunity to arrange for home hospitality in Washington and elsewhere in the United States through liaison with the National Council for International Visitors (NCIV). If the Washington orientation is determined not to be feasible, home hospitality can be arranged in most U.S. cities if a request for such is directed to the Agreement Officer, who will transmit the request to NCIV through EGAT/ED/PT.

[END OF PROVISION]

### **4. PUBLIC NOTICES (MARCH 2004)**

It is USAID's policy to inform the public as fully as possible of its programs and activities. The recipient is encouraged to give public notice of the receipt of this award and, from time to time,

to announce progress and accomplishments. Press releases or other public notices should include a statement substantially as follows:

"The U.S. Agency for International Development administers the U.S. foreign assistance program providing economic and humanitarian assistance in more than 120 countries worldwide."

The recipient may call on USAID's Bureau for Legislative and Public Affairs for advice regarding public notices. The recipient is requested to provide copies of notices or announcements to the cognizant technical officer and to USAID's Bureau for Legislative and Public Affairs as far in advance of release as possible.

[END OF PROVISION]

**5. COST SHARING (MATCHING) (July 2002)**

- a. If at the end of any funding period, the recipient has expended an amount of non-Federal funds less than the agreed upon amount or percentage of total expenditures, the Agreement Officer may apply the difference to reduce the amount of USAID incremental funding in the following funding period. If the award has expired or has been terminated, the Agreement Officer may require the recipient to refund the difference to USAID.
- b. The source, origin and nationality requirements and the restricted goods provision established in the Standard Provision entitled "USAID Eligibility Rules for Goods and Services" do not apply to cost sharing (matching) expenditures.

[END OF PROVISION]

**6. PROHIBITION OF ASSISTANCE TO DRUG TRAFFICKERS (JUNE 1999)**

- a. USAID reserves the right to terminate assistance to, or take other appropriate measures with respect to, any participant approved by USAID who is found to have been convicted of a narcotics offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.
- b. (1) For any loan over \$1000 made under this agreement, the recipient shall insert a clause in the loan agreement stating that the loan is subject to immediate cancellation, acceleration, recall or refund by the recipient if the borrower or a key individual of a borrower is found to have been convicted of a narcotics offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.  
  
(2) Upon notice by USAID of a determination under section (1) and at USAID's option, the recipient agrees to immediately cancel, accelerate or recall the loan, including refund in full of the outstanding balance. USAID reserves the right to have the loan refund returned to USAID.

- c. (1) The recipient agrees not to disburse, or sign documents committing the recipient to disburse, funds to a subrecipient designated by USAID ("Designated Subrecipient") until advised by USAID that: (i) any United States Government review of the Designated Subrecipient and its key individuals has been completed; (ii) any related certifications have been obtained; and (iii) the assistance to the Designated Subrecipient has been approved. Designation means that the subrecipient has been unilaterally selected by USAID as the subrecipient. USAID approval of a subrecipient, selected by another party, or joint selection by USAID and another party is not designation.

(2) The recipient shall insert the following clause, or its substance, in its agreement with the Designated Subrecipient:

“The recipient reserves the right to terminate this [Agreement/Contract] or take other appropriate measures if the [Subrecipient] or a key individual of the [Subrecipient] is found to have been convicted of a narcotic offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.”

[END OF PROVISION]

## **7. INVESTMENT PROMOTION (NOVEMBER 2003)**

- a. Except as specifically set forth in this award or otherwise authorized by USAID in writing, no funds or other support provided hereunder may be used for any activity that involves investment promotion in a foreign country.
- b. In the event the recipient is requested or wishes to provide assistance in the above area or requires clarification from USAID as to whether the activity would be consistent with the limitation set forth above, the recipient must notify the Agreement Officer and provide a detailed description of the proposed activity. The recipient must not proceed with the activity until advised by USAID that it may do so.
- c. The recipient must ensure that its employees and sub-recipients and contractors providing investment promotion services hereunder are made aware of the restrictions set forth in this clause and must include this clause in all contracts and other sub-agreements entered into hereunder.

[END OF PROVISION]

## **8. REPORTING OF FOREIGN TAXES (March 2006)**

- a. The recipient must annually submit a report by April 16 of the next year.
- b. Contents of Report. The report must contain:
  - (i) Contractor/recipient name.

- (ii) Contact name with phone, fax and email.
  - (iii) Agreement number(s).
  - (iv) Amount of foreign taxes assessed by a foreign government [each foreign government must be listed separately] on commodity purchase transactions valued at \$500 or more financed with U.S. foreign assistance funds under this agreement during the prior U.S. fiscal year.
  - (v) Only foreign taxes assessed by the foreign government in the country receiving U.S. assistance is to be reported. Foreign taxes by a third party foreign government are not to be reported. For example, if an assistance program for Lesotho involves the purchase of commodities in South Africa using foreign assistance funds, any taxes imposed by South Africa would not be reported in the report for Lesotho (or South Africa).
  - (vi) Any reimbursements received by the Recipient during the period in (iv) regardless of when the foreign tax was assessed and any reimbursements on the taxes reported in (iv) received through March 31.
  - (vii) Report is required even if the recipient did not pay any taxes during the report period.
  - (viii) Cumulative reports may be provided if the recipient is implementing more than one program in a foreign country.
- c. Definitions. For purposes of this clause:
- (i) “Agreement” includes USAID direct and country contracts, grants, cooperative agreements and interagency agreements.
  - (ii) “Commodity” means any material, article, supply, goods, or equipment.
  - (iii) “Foreign government” includes any foreign governmental entity.
  - (iv) “Foreign taxes” means value-added taxes and custom duties assessed by a foreign government on a commodity. It does not include foreign sales taxes.
- d. Where. Submit the reports to: [insert address and point of contact at the Embassy, Mission or FM/CMP as appropriate. see b. below] [optional with a copy to ]
- e. Subagreements. The recipient must include this reporting requirement in all applicable subcontracts, subgrants and other subagreements.
- f. For further information see <http://www.state.gov/m/rm/c10443.htm>.

[END OF PROVISION]

**9. FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (January 2002)**

Funds in this agreement may not be used to finance the travel, per diem, hotel expenses, meals, conference fees or other conference costs for any member of a foreign government's delegation to an international conference sponsored by a public international organization, except as provided in ADS Mandatory Reference "Guidance on Funding Foreign Government Delegations to International Conferences or as approved by the Agreement Officer.

These provisions also must be included in the Standard Provisions of any new grant or cooperative agreement to a public international organization or a U.S. or non-U.S. non-governmental organization financed with FY04 HIV/AIDS funds or modification to an existing grant or cooperative agreement that adds FY04 HIV/AIDS.

[END OF PROVISION]

**10. USAID DISABILITY POLICY - ASSISTANCE (DECEMBER 2004)**

a. The objectives of the USAID Disability Policy are (1) to enhance the attainment of United States foreign assistance program goals by promoting the participation and equalization of opportunities of individuals with disabilities in USAID policy, country and sector strategies, activity designs and implementation; (2) to increase awareness of issues of people with disabilities both within USAID programs and in host countries; (3) to engage other U.S. government agencies, host country counterparts, governments, implementing organizations and other donors in fostering a climate of nondiscrimination against people with disabilities; and (4) to support international advocacy for people with disabilities. The full text of the policy paper can be found at the following website:

<http://www.usaid.gov/about/disability/DISABPOL.FIN.html>

b. USAID therefore requires that the recipient not discriminate against people with disabilities in the implementation of USAID funded programs and that it make every effort to comply with the objectives of the USAID Disability Policy in performing the program under this grant or cooperative agreement. To that end and to the extent it can accomplish this goal within the scope of the program objectives, the recipient should demonstrate a comprehensive and consistent approach for including men, women and children with disabilities.

[END OF PROVISION]

[END OF STANDARD PROVISIONS]



## **Attachment D.**

### **Branding/Marking**

#### ***Branding Strategy***

The Program is named the Sorghum, Millet, and Other Grains Collaborative Research Support Program (i.e., SMOG CRSP). Promotion of the Program to donors will be via:

- Sorghum, Millet, and Other Grains CRSP Website
- Short-term training programs for farmers, scientists, extension workers, etc.
- Academic degree training
- Conferences and workshops in host countries
- Symposia at international and national scientific meetings
- Publications including (1) the Annual Report, (2) Research and Technology Transfer Highlight and Impact articles, (3) the Sorghum, Millet, and Other Grains CRSP brochure, (4) scientific publications in professional journals, (5) articles in the popular press, (6) sorghum and millet production manuals and guides, and (7) newspaper and farmer magazine articles. Also in (8) PowerPoint presentations at meetings and on (9) television and (10) radio.
- The Program will be promoted by the Management Entity with the collaboration of the Regional Coordinators and the U.S. and host country PIs and their collaborators including NARS, NGOs, IARCs, and other international organizations. All collaborators will be informed of USAID requirements in branding, and branding requirements will be included in all subcontracts.
- Acknowledgement of donors: All donors to the Program, including USAID, the University of Nebraska, Host Country organizations, NGOs, international organizations, and IARCs, will be acknowledged when supporting meetings and workshops and in publications, media releases, reports, etc.

#### ***Marking Plan***

- Laboratory equipment, field equipment, computers, projectors, cameras, vehicles, and other appropriate items will be marked with a suitable USAID logo, usually adhesive labels.
- Each item valued at more than \$500 will be marked.
- When logos other than USAID are displayed along with the USAID logo, the USAID logo will be of a size and prominence equivalent to that of the other logos.
- The USAID logo will be prominently displayed for maximum visibility.
- The support of USAID will be mentioned in media releases and in radio and television programs.

#### **Scope of the Marking Requirement**

Marking will be done for all Sorghum, Millet, and Other Grains CRSP implementation activities overseas under the USAID funded Award No. XXXXXXXXX.

#### **Threshold for Marking Requirements**

The marking rule applies to Sorghum, Millet, and Other Grains CRSP Award No. XXXXXXXXX.

**Extent of the Marking Requirements**

The USAID logo will be of a size and prominence equivalent to that of the Sorghum, Millet, and Other Grains CRSP logo, Host Country Institution logo, collaborating NGO logos, and any other logo of Sorghum, Millet, and Other Grains CRSP collaborators on all marked items. When USAID is the majority donor of a project, activity, or public communication, the USAID logo will be of a greater size or prominence on a per case basis as requested by USAID. In the event that the Sorghum, Millet, and Other Grains CRSP does not choose to mark with its own graphic identity or logo, the USAID logo will be displayed if requested by USAID.

**Exceptions**

Where marking interferes with USAID and Sorghum, Millet, and Other Grains CRSP goals or where marking is inefficient or ineffective, the “Presumptive Exceptions” clause will be invoked. In those cases, the Sorghum, Millet, and Other Grains CRSP will request the USAID Agreement Officer to approve the Presumptive Exception as part of the marking plan. Any approved exceptions will apply for the life of the award, unless provided otherwise.

**Waiver Provisions**

Erring on the side of safety, the Sorghum, Millet, and Other Grains CRSP will request a waiver from a USAID Principal Officer if deemed necessary.

***Costs of branding and marking***

The Sorghum, Millet, and Other Grains CRSP will submit proposed costs for branding and marking as part of the total cost estimate under the “Supplies” line item to be funded by USAID.