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Introduction and Program Review

The 2008 INTSORMIL Annual Report presents the progress and notable achievements by the Sorghum/Millet and Other Grains CRSP during the period of September 30, 2007 through September 29, 2008. These results are an outcome of partnerships between scientists at six U.S. Land Grant Universities (Kansas State University, University of Nebraska, Ohio State University, Purdue University, Texas A&M University and West Texas A&M University), scientists of the Agricultural Research Service of the U.S. Department of Agriculture at Tifton, Georgia and the National Agricultural Research Systems (NARS) and National Universities in nineteen countries in Central America, West Africa, East Africa and Southern Africa.

Agricultural research provides benefits not only to producers but also to processors and consumers of agricultural products. Agricultural research has continuously shown that it is able to provide improved products of greater quantity and quality, as well as improved health to consumers and broad-based economic growth which goes beyond producers and consumers.

The Sorghum and Millet and Other Grains Collaborative Research Support Program (INTSORMIL CRSP) conducts collaborative research through partnerships between 17 U.S. university scientists and scientists of the National Agricultural Research Systems (NARS), IARCs, PVOs and other CRSPs. INTSORMIL is programmatically organized for efficient and effective operation and captures most of the public research expertise on sorghum and pearl millet in the United States. The INTSORMIL mission is to use collaborative research as a mechanism to develop human and institutional research capabilities to overcome constraints to sorghum and millet production, marketing and utilization for the mutual benefit of the Less Developed Countries (LDCs) and the U.S. Collaborating scientists in NARS, developing countries and the U.S. jointly plan and execute research that mutually benefits all participating countries, including the United States.

INTSORMIL takes a regional approach to sorghum and millet research and funds projects in four regions, western, eastern, and southern Africa, and in Central America. INTSORMIL support to these regions promotes the general goals of building NARS institutional capabilities and creating human and technological capital to solve problems constraining sorghum and millet production, marketing and utilization. INTSORMIL's activities are aimed at achieving a sustainable, global impact by promoting economic growth, enhancing food security, and encouraging entrepreneurial activities.

INTSORMIL continues to contribute to the transformation of sorghum and pearl millet from subsistence crops to value-added, cash crops. Because sorghum and millet are important food crops in moisture-stressed regions of the world, they are staple crops for millions in Africa and Asia. In their area of adaptation, sorghum and millet have a distinctly competitive advantage by yielding more grain than other cereals. The development of both open-pollinated and hybrid sorghums for food and feed, with improved properties, such as increased digestibility and reduced tannin content, is contributing to sorghum becoming a major feed grain in the U.S., Africa and Central and South America. Pearl millet is also becoming an important feed source for poultry in the southeastern United States. Improved varieties and hybrids of pearl millet and improved lines of sorghum can be grown in developing countries, as well as the United States. They have great potential for processing into high-value food products which can be sold in villages and urban markets, where they compete successfully with imported wheat and rice products. In the U.S., pearl millet is sold in niche markets, e.g., heads of pearl millet for bird food and for floral arrangements. These emerging markets, for sorghum and pearl millet, are results of the training and collaborative international scientific research that INTSORMIL has supported both in the United States and collaborating countries.

Although there have been significant advances in the improvement and production of sorghum and millet in the regions in which INTSORMIL serves, population growth continues to exceed rates of increase in cereal production capacity. Thus, there remains an urgent need to continue the momentum of our successes in crop improvement, improved processing and marketing of sorghum and millet, and strengthening the capabilities of NARS scientists to conduct research on constraints to production, utilization and marketing of sorghum and millet.

The INTSORMIL program maintains a flexible approach to accomplishing its mission. The success of INTSORMIL can be attributed to the following strategies which guide the program in its research and linkages with technology transfer entities.

Developing institutional and human capital: INTSORMIL provides needed support for education of agricultural scientists in both developing countries and the United States. The results of this support include strengthening the capabilities of institutions to conduct research on sorghum and millet, development of international collaborative research networks, promoting and linking to technology transfer activities and dissemination of technologies developed from research, and enhancing national, regional, and global communication linkages. INTSORMIL provides essential support to bridge gaps between developing countries and the United States. A major innovative aspect of the INTSORMIL program is to maintain continuing relationships with scientists of collaborating countries upon return to research posts in their countries after training. They become members of research teams with INTSORMIL and NARS scientists who conduct research on applications of existing technology and development of new technology. This integrated relationship prepares them for leadership roles in their national agricultural research systems and regional networks in which they collaborate.

Conserving biodiversity and natural resources: Results of the collaborative research supported by INTSORMIL include development and release of enhanced germplasm, development and improvement of sustainable production systems and development of sustainable technologies to conserve biodiversity and natural resources. The knowledge and technologies generated by INTSORMIL research also enhance society's quality of life and enlarge the range of agricultural and environmental choices available both in developing countries and the United States.

INTSORMIL promotes the conservation of millet and sorghum germplasm, resource-efficient cropping systems, integrated pest management strategies that conserve natural control agents and cultivars with improved nutrient and water use efficiencies and evaluates the impacts of sorghum/millet technologies on natural resources and biodiversity.

Developing research systems: Collaboration in the regional sites, in countries other than the United States, has been strengthened by employing multi-disciplinary research teams composed of U.S. and NARS scientists focused on unified plans to achieve common objectives. INTSORMIL scientists provide global leadership in biotechnology research on sorghum and pearl millet. The outputs from these disciplinary areas of research are linked to immediate results. INTSORMIL uses both traditional science of proven value and newer disciplines such as molecular biology in an integrated approach to provide products of research with economic potential. These research products, which alleviate constraints to production and utilization of sorghum and pearl millet, are key elements in the battle against hunger and poverty because they provide means for economic growth, generation of wealth, and improved health. New technologies developed by INTSORMIL collaborative research are extended to farmer's fields and to processors and marketers of sorghum and millet products in developing countries and the United States through partnerships with NGOs, research networks, national extension services and the private sector. In addition, economic analyses by INTSORMIL researchers play a crucial role in enabling economic policymakers to more intelligently consider policy options to help increase the benefits and competitiveness of sorghum and pearl millet as basic food staples and as components of value-added products.

Supporting information networking: INTSORMIL research emphasizes working with both national agricultural research systems and sorghum and millet networks to promote effective technology transfer from research sites within the region to local and regional institutions. Technology transfer is strengthened by continued links with regional networks, International Agricultural Research Centers, and local and regional institutions. Emphasis is placed on strong linkages with extension services, agricultural production schemes, private and public seed programs, agricultural product supply businesses, and nonprofit organizations such as NGOs and PVOs, for efficient transfer of INTSORMIL-generated technologies. Each linkage is vital to development, transfer, and adoption of new production and utilization technologies. The ultimate goal is to provide economic and physical well-being to those involved in the production and utilization of these two important cereals, both in developing countries, and the United States.

Promoting demand-driven processes: INTSORMIL economic analyses are all driven by the need for stable markets for the LDC farmer and processor. Thus, these analyses focus on prioritization of research, farm-level industry evaluation, development of sustainable food technology, processing and marketing systems. INTSORMIL seeks alternate food uses and new processing technologies to save labor and time required in preparation of sorghum/millet for food and feed, and to add value to the grain and fodder of the two crops. Research products transferred to the farm, to the livestock industry, and to processors and marketers of sorghum and millet are aimed at spurring rural and urban economic growth and providing direct economic benefits to producers and consumers. INTSORMIL assesses consumption shifts and socioeconomic policies to reduce effects of price collapses, and conducts research to improve processing for improved products of sorghum and millet which are attractive and useful to the consumer. Research by INTSORMIL agricultural economists and food scientists seeks to reduce effects of price collapse in high yield years, and to create new income opportunities through diversification of markets for sorghum and pearl millet. INTSORMIL socioeconomic projects measure impact and diffusion and evaluate constraints to rapid distribution and adoption of introduced, new technologies.

The INTSORMIL program addresses the continuing need for development of technologies for agricultural production, processing and utilization of sorghum and pearl millet for both the developing world, especially the semiarid tropics, and the United States. There is international recognition by the world donor community that National Agricultural Research Systems (NARS) in developing countries must assume ownership of their development problems and move toward achieving resolution of them. The INTSORMIL program is a proven model that empowers the NARS to develop the capacity to assume ownership of their development strategies, while at the same time resulting in significant benefits to the U.S. agricultural sector. These aspects of INTSORMIL present a win-win situation for international agricultural development as they strengthen developing countries' abilities to solve their problems in the agricultural sector while providing benefits to the United States.

Administration and Management

The University of Nebraska (UNL) hosts the Management Entity (ME) for the Sorghum/Millet and Other Grains CRSP and is the primary recipient of the Leader with Associates Cooperative Agreement from USAID. UNL makes sub-awards to the participating U.S. universities and USDA/ARS for research projects between U.S. scientists and their collaborating country counterparts. A portion of the project funds managed by the ME and U.S. participating institutions supports regional research activities. The Board of Directors (BOD) serves as the top management/policy body for the CRSP. USAID personnel advise and guide the ME and the Board in areas of policy, technical aspects, collaborating country coordination, budget management, and review.

Education

During the period of 2007-2008, there were 41 students from 24 different countries enrolled in an INTSORMIL advanced degree program and advised by an INTSORMIL principal investigator. Approximately 80% of these students came from countries other than the U.S. The number of students receiving 100% funding by INTSORMIL in 2007-2008 totaled 4. An additional 37 students received partial funding from INTSORMIL. INTSORMIL places high priority on training of women. During the period 2007-2008, 44% of all INTSORMIL graduate participants were female.

Another important category of education which INTSORMIL supports is non-degree research activities, namely postdoctoral research and research of visiting scientists with INTSORMIL PIs

in the United States. During this period, 13 host country scientists improved their education as either postdoctoral scientists (3) or visiting scientists (10). Their research activities were in the disciplines of agronomy, breeding, food science and pathology. These scientists came to the United States as postdoctoral scientists or visiting scientists from Argentina, China, Egypt, Ethiopia, Guatemala, India, Korea, Malawi, Senegal, Tanzania and Zambia. In addition to non-degree research activities there were 364 participants (177 male and 187 female) who were supported by INTSORMIL for participation in workshops and conferences.

Networking

The Sorghum/Millet CRSP global plan for collaborative research includes workshops and other networking activities such as newsletters, publications, exchange of scientists, and exchange of germplasm. The INTSORMIL global plan is designed for research coordination and networking within ecogeographic zones and, where relevant, between zones. The Global Plan:

- Promotes networking with IARCs, NGO/PVOs, regional networks (ASARECA, ECARSAM and others) private industry and government extension programs to coordinate research and technology transfer efforts.
- Supports INTSORMIL participation in regional research networks to promote professional activities of NARS scientists, to facilitate regional research activities (such as multi-location testing of breeding materials), promotes germplasm and information exchange and facilitates impact evaluation of new technologies.
- Develops regional research networks, short-term and degree training plans for sorghum and pearl millet scientists.

Established networking activities have been accomplished with ICRISAT in India, Mali, Niger, Kenya, Ethiopia, Uganda and Tanzania; Central America and with CORAF and ASARECA/ECARSAM in Africa and SICNA and the U.S. National Grain Sorghum Producers Association for the purpose of coordinating research activities to avoid duplication of effort and to promote the most effective expenditure of research funds. There also has been efficient collaboration with each of these programs in co-sponsoring workshops and conferences, and for coordination of research and long-term training. INTSORMIL currently cooperates with ICRISAT programs in east, southern and West Africa. During the period of 2004-2007 INTSORMIL executed a Marketing-Processing Project funded by the USAID West Africa Regional Program (WARP) which focused on responding to emerging market demand with improvements in the supply of consistent quality grain of sorghum and pearl millet. Initial activities (2002-2004 supported by INTSORMIL) were on making contracts between farmers' groups and the rapidly growing sector of millet food processors (couscous, arraw, degue, sankal, tchakri, and yogurt with tchakri) in four countries of the Sahel (Senegal, Mali, Burkina Faso, and Niger). Since October 1, 2007 the Marketing-Processing project has been supported by INTSORMIL in Senegal and Niger and by the USAID/Mali Mission in Mali. INTSORMIL continues to promote free exchange of germplasm, technical information, improved technology, and research techniques.

Regional Activities and Benefits

West Africa

The West Africa Regional Program now encompasses five countries of the Sahelian region – Burkina Faso, Mali, Niger, Nigeria, and Senegal and one U.S. PI collaborates in Ghana.

Scientists from the 5 countries in the INTSORMIL West Africa Regional Program met to discuss collaborative research and participate in a planning workshop for the West Africa regional program in April of 2008. In Niger, as compared to work plan expectations, farmers exceeded planned goals. They significantly increased the amount produced and marketed and trained groups in grain processing and business planning procedures. Facilities and control measures for stored grain pests were surveyed in Niger. In Mali, a grass, Andropogon was used as a trap crop to provide pesticide-free control of stalk borers in millet. Sorghum and millet varieties were evaluated for resistance to sorghum midge, stalk borers, and millet head miner in Mali and Niger. Most sorghum lines evaluated were resistant to anthracnose in Mali. INERA evaluated and demonstrated improved varieties and chemicals for control of diseases of sorghum and millet for hundreds of farmers in Burkina Faso. Millet resistant to downy mildew and Striga was identified and demonstrated to 200 farm families in Nigeria. Students from 3 countries were trained in insect and disease management. Farmer Field Schools and demonstrations taught integrated Striga management to 127 farmers in Senegal. Sorghums were evaluated for resistance to ALS herbicides in Mali and Niger. Hundreds of farmers were trained by INERA and an NGO in micro-dose fertilizer technology and the use of improved sorghum and millet varieties on hundreds of hectares. The warrant credit system was introduced in Burkina Faso. Hundreds of sorghum varieties were evaluated across the region for yield and resistance. Seed produced with assistance from farmer organizations was given to farmers in Mali, Niger, and Senegal. Funding was received too late to begin several activities on grain storage problems but these activities will be conducted in 2008-09.

Horn of Africa

The Horn of Africa Regional Program now encompasses four countries of the Horn of Africa Region - Tanzania, Uganda, Kenya and Ethiopia.

Scientists from the four countries within the Horn of Africa and U.S. Collaborators working with the INTSORMIL Horn of Africa Regional Program participated in a planning workshop in September, 2008 to discuss collaborative research. The Sorghum/Millet CRSP Grant program was closed after 27 years and the USAID created a new program, the Sorghum and Millet and Other Grains CRSP. This regional meeting was organized to develop workplans for the new program by building on the strengths of the previous program. There was discussion on whether the new framework should support country-specific goals and requirements or whether the program in each country should only support projects having regional significance (problems occurring in all four countries of the Horn of Africa Region). It was stated that only USAID Missions should be dealing with specific country programs and that the INTSORMIL Regional Program should emphasize

activities having regional significance. The CRSP should assist the national programs in identifying other potential resources and to coordinate these resources in order to meet the country-specific needs of each national program in the region.

Discussion also centered on how to disseminate information and technologies to the farmers in order to have an impact. There is a vital need for national programs to increase their investment in technology transfer activities. This investment includes support of training activities as declining human capacity is currently a severe constraint to progress in the development and transfer of agricultural technology in the Horn of Africa.

Southern Africa

The Southern Africa Regional Program now encompasses four countries of the Southern Africa region – Zambia, Mozambique, South Africa and Botswana.

Activities in the region were carried out as planned. Progress in achieving research objectives was made although field sorghum breeding activities in Zambia were hindered by too much rain early in the season followed by early cessation of rain later in the season. Research conducted will have an impact on sorghum production throughout the region. Technology development, testing and transfer can be used to partially quantify progress. In Mozambique, the national sorghum program has identified nine experimental breeding lines from the Texas A&M University sorghum improvement program as potentially useful varieties. The experimental lines were identified in the All Disease and Insect Nursery, the Grain Weathering Test, the Drought Line Test and the Midge Line Test. In the 2008-09 growing season the experimental lines will be grown at several locations in Mozambique and Texas to gather data on suitability for release and for potential release proposals. Collaboration in South Africa (and Botswana) has identified 16 experimental lines for the small farmer program. The lines, developed in a collaborative program, were used to produce new varieties with resistance to the sugarcane aphid. Agronomic and performance data will be collected in addition to end-use processing data. The releases will have improved grain yield potential and, depending on the germplasm, insect resistance, disease resistance, drought resistance, weathering resistance, and potentially enhanced end-use characteristics. It is anticipated there will be several releases of the experimental lines as varieties in years 4 and 5.

Food science research is directed at developing an understanding of the processing characteristics of sorghum and millet and identifying new products and uses. There is continued interest in new product development of sorghum especially for use in clear lager beer brewing. These activities will continue with private industry collaboration when possible.

There are no significant management issues which impede our research progress in the Southern Africa region at this time. However, budgetary constraints within the region limit participation in many of the opportunities for research and technology transfer. Additional scientists and institutions have expressed interest in participating in the INTSORMIL program should additional funds become available.

Central America

The Central America Regional Program now encompasses three countries of the Central America region - El Salvador, Nicaragua, and Honduras.

The INTSORMIL program in Central America continues to produce results based on the long term activities in the region. Research in plant breeding, agronomy, pest management and utilization have created varieties and hybrids with improved yield potential and management programs to capitalize on that potential followed by the development of end uses for the products that are produced. Support of extension programs provides the conduit to educate producers and end users on the effective use of these materials.

The program faces several significant hurdles to future success. First and foremost, the current budget is marginal and it has required significant cuts in research, both in scope and the depth of the programs. Current funding levels simply cover basic research activities; leaving few resources for capacity building or technology transfer activities. It is imperative that program coordinators identify new and creative ways to access funds for the support of programs in the regions. Second, the development of human capacity through education is becoming a critical need. Due to budget constraints there is insufficient funding for formal training and this limitation will eventually reduce the effectiveness of the program. We must find an effective approach to minimize this problem in the near future.

Associate Award

In 2007 INTSORMIL received a three year (September 29, 2007 – September 30, 2010) $250,000/year award “Transfer of Sorghum, Millet Production, Processing and Marketing Technologies in Mali” from the USAID/EGAT/AG/ATGO/ Mali. The project was based on successful activities through the INTSORMIL West Africa Regional Project and was designed to rapidly move sorghum and millet production technologies onto farmers’ fields, link farmers’ organizations to food and feed processors and commercialize processing technologies so as to enhance markets and to significantly expand the existing project, especially into the northern areas of Mali. The award allowed INTSORMIL to significantly increase its impact in Mali by (1) expanding to new sites with more concentration in the poorer northern Tombouctou region where food insecurity is a severe problem for the small scale farmers who depend on sorghum and millet for their daily diet, (2) upscaling the research and (3) upscaling the technology transfer component.

The Cooperative Agreement consists of three components: 1) Production - Marketing activities led by John Sanders, Purdue University Marketing Economist; 2) Food Processing Technology and Training activities, led by Bruce Hamaker, Purdue University Cereal Chemist and 3) Décrue Sorghum (post water recession sorghum planted at the edges of the Niger River and Lakes after the rainy season has ended) production activities led by Vara Prasad and Scott Staggenborg, Kansas State University Agronomists. The team implemented a system including technology introduction, development of farmer groups, marketing strategy innovation, and

linking of farmer groups to food and feed processors. Activities are conducted in collaboration with IER.

Progress toward meeting targets and benchmarks/indicators established is based on the following objectives set forth in the workplan:

1. Network establishment to enhance partnership development with relevant stakeholders
2. Increase farmer incomes by introducing better marketing strategies combined with new technologies.
3. Improve the efficiency of input markets for millet and sorghum in Mali
4. Developing alternative markets for sorghum and millet grain
5. Develop sorghum and millet production technology for the "culture de décrue" system
6. Upscaling the sorghum and millet seed production industry in collaboration with other agencies
7. Communications/ publications

Network Establishment

Décrue sorghum - Partnerships have been developed through visits to Mali and include, INTSORMIL PIs, IER scientists, USAID /EGAT Team, local administrators of the Lake Faguibine revitalization program in Goundam, farmers from two villages surrounding the lakes Bintagoungou and Mgoudou. Participation in the Production-Marketing Workshop held in Bamako in August 2008 provided an opportunity to develop additional partnerships with food processors.

Production-Marketing- A strong network had already been established prior to the initiation of this project. That network involves, IER, USAID, ICRISAT, Sasagawa2000, ULPC Dioila, ECONOMETRE, INTSORMIL PIs and the food processors; Mam Cocktail, Beau Céreale, Sahélienne de l'Alimentation, Musola Jama Sewa, DANAYA Céreales, La Maraîchere, Corbeille and UCODAL. The network was strengthened by the Production –Marketing Workshop.

Food Processing- A consultant, M. Diouf has been selected to manage the project on site. Partnerships have been established with the USAID Mission, Mali AEG team, food processors associations, FENATRA, and stakeholders in Mopti and GAO. Participation in the Production-Marketing Workshop served to develop partnerships with several Malian food processors.

Increase Farmer Incomes

The most successful marketing strategies were (1) getting the farmers' associations to sell later and (2) using the "bache" (tarps) to produce a cleaner product plus encouraging the processors to pay a quality premium. The Production-Marketing workshop lead to new markets (food processors) and expansion of current markets.

Yields of farmers in this program doubled in Year 1. Farmers made income gains from both yield and price increase. Price increase due to the marketing strategy alone was 31%. Total income gain increase due to higher sorghum yields (due to technology) and the higher prices received (due to marketing strategies) was 43% with the best farmers gaining 121%.

Production in the project area increased. In 2007-2008 the project area in Mali was 500 ha (350ha sorghum and 150 millet). Thus we have already reached our target area of 500 ha and will increase it to 900 ha by 2009. By 2009 we will double our Mali program and initiate activities in the north (Mopti Region) for both sorghum and millet.

Improve the Efficiency of Input Markets

Training of farmer associations (cooperatives etc.) in the Production-Marketing Project began in Tingoni the summer of 2008. The farmers' organization (Cooperative Yereta-Ton) has have been storing the grain which provides them with input credits. The farmers' organizations have been acquiring identities as successful economic units. They buy inputs, store and sell the grain. Repayment rates for the inputs have been very high, generally over 95%. This approach is being expanded to several new villages in 2009.

Alternative markets

1. Quantity of both millet and sorghum used for food processing by DANAYA Céréales in Bamako increased 300%.
2. Beau Céréales increased millet used for food processing by 33%.
3. La Maraîchére increased millet used for food processing by 25%.
4. Production-Marketing Workshop expected to result in an increase the number of entrepreneurs and the use of sorghum and millet
5. New processing technologies are currently under development

Décrue System Production Technology

Management practices evaluated in farmers' fields and compared to farmer's cultural practices include (1) varietal evaluation, plant density, row spacing, fertilizer levels and seed treatment

Sorghum and Millet Seed Production Industry

Activities conducted by IER décrue scientists include cultivar collections and testing to identify most suitable cultivars for the region. Twenty varieties from the IER sorghum breeding program and thirteen from the farmers were planted at Bintagoungoun and Toukabangou.

Production-Marketing scientists extended local seed production activities to include some regional testing of new cultivars. To produce local seed of high quality means increased uniformity which requires sufficient roguing and an understanding of crop isolation by farmers. Tingoni Cooperative Association farmers' received training in seed production, including hybrid seeds and marketing concepts. Training to additional sites will be expanded in Year 2.

Communications/ Publications

The Production-Marketing Workshop held in Bamako August 12-14, 2008 provided an opportunity to increase the awareness by entrepreneurs of opportunities for use of sorghum and millet in the food processing and poultry feed industries. The workshop brought the farmer producers of millet and sorghum in direct communication with the entrepreneurs (food processors).

Publications included (1) Transformation Commercial du Mil et du Sorgho au Mali, Projet Production-Marketing, INTSORMIL Bulletin No. 7, (2) Evaluation of Sorghum and Millet Technology and Marketing Strategy Introduction: 2006-07 Crop Year, Production-Marketing Project, INTSORMIL Bulletin No. 8, (3) INTSORMIL Impact, July 15, 2008. Sorghum Yields Doubled in Farmers' Fields in Three West African Countries, http://intsormil.org/, (4) INTSORMIL Impact, July 22, 2008. Sorghum Technology and Marketing Strategies Increase Farm Income in West Africa, http://intsormil.org/ and (5) Kansas State University Agronomists Help West African Farmers Increase Sorghum and Pearl Millet Production. KSU Ag Exp. Sta. & Coop. Ext. Service, Manhattan, Kansas, http://intsormil.org/. A bulletin on the intensive chicken industry in Mali and how to facilitate its growth with the availability of low cost sorghum is being produced for release in 2009.

Future Directions

Prices of many basic foods skyrocketed in 2008 resulting in a major food crisis that affected millions of poor people throughout the world. The causes of the crisis are many and complex. An increasing demand for food and energy at a time of low food stocks, poor harvests and weak credit have led to record prices for oil and food.

Without appropriate interventions, the food crisis is not likely to resolve itself. In determining the proper response we must take into consideration that "Food crop prices are expected to remain high in 2008 and 2009 and then start to decline as supply and demand respond to high prices; however, they are likely to remain well above the 2004 levels through 2015 for most food crops. Forecasts of other major organizations (FAO, OECD and USDA) that regularly monitor and project commodity prices are broadly consistent with the projections". It is unlikely that demand will decline markedly in the future so in order to lower prices supply must be increased. Increasing agricultural production will require input from developing countries, international organizations, and donors.

The new Sorghum, Millet and Other Grains CRSP was authorized and funded by USAID effective October 1, 2006. Strategies under this new CRSP have maintained the previous INTSORMIL's highly productive momentum, built on its record of success, and continues to work toward accomplishing a whole new set of goals. INTSORMIL's new vision to improve food security, enhance farm incomes, and improve economic activity in the major sorghum, millet and other grains-producing countries in Africa and Central America is proving to be successful as indicated in this report. The CRSP is demonstrating international leadership in leading efforts to promote profitable markets for sorghum, pearl millet and other grains by working with agencies that identify and develop markets, assess economics, and facilitate the evolution of a production-supply chain and by expanding markets that deliver quality grain to end users. Future strategies will maintain the new CRSP's highly productive momentum, continue building on the old CRSP's record of success, and accomplish a new set of goals.

During the past 29 years, INTSORMIL has educated more than one thousand scientists through degree programs, visiting scientist experiences, postdoctoral training, workshops, and conferences. About one-third of those trained are from the U.S. and two-thirds are from developing countries. The bridges built by this training are crucial to maintain scientific and peaceful linkages between the United States and developing countries. The collaborative research supported by INTSORMIL continues to produce benefits for both developing countries and the United States. Food production, utilization and marketing in both developing countries and the United States are strengthened by INTSORMIL. The health benefits of the two nutritious cereals, sorghum and millet, are enjoyed by millions of people. Sorghum is a significant element in the food chain of the United States, being a key feed for livestock. So what is the future for collaborative, international sorghum and millet research supported by INTSORMIL? The future is bright.

There continues to be a need for highly qualified researchers for these two crops both in developing countries and the United States. INTSORMIL fulfills a unique role in providing postgraduate training (M.S. and Ph.D. level) to meet this need. As the demand for water in cities continues to put greater pressure on the use of water for irrigated crop production, sorghum and millet, which are for the most part rainfed, will gain increased importance in meeting the caloric needs of developing countries, particularly in the semiarid tropics, and needs of the livestock feed industry in the United States. Recent INTSORMIL research on the nutritional benefits of sorghum and millet forms a strong base for future research to enable the commercialization of nutritionally superior sorghum Based on its achievements, the INTSORMIL team is well positioned to contribute even more effectively to ending hunger and raising incomes. With the increasing strength of scientific expertise in developing countries, INTSORMIL is now able to more effectively reduce constraints to production and utilization of sorghum and millet to the mutual benefit of developing countries and the United States. Advances in sorghum and millet research over INTSORMIL's 29 years and the training of sorghum and millet scientists in the United States, Africa and Central America by INTSORMIL now enables these scientists from developing countries and the United States to jointly plan and execute mutually beneficial collaborative research. These collaborative relationships are key components to INTSORMIL's success and will continue as fundamental approaches to meeting the INTSORMIL mission. In the future, INTSORMIL will target NARS collaborative ties that reflect regional needs for sorghum and/or millet production. These ties are in the sorghum and millet agroecological zones of western, eastern, and southern Africa, and Central America. By concentrating collaboration in selected sites, INTSORMIL optimizes its resources, builds an enhanced scientific capability on sorghum and millet, and creates technological and human capital that has a sustainable and global impact.