

PN ACL-847
109581

REPORT TO CONGRESS ON TITLE XII:

FAMINE PREVENTION AND FREEDOM FROM HUNGER

FISCAL YEAR 1998



United States Agency for
International Development



A



U.S. AGENCY FOR
INTERNATIONAL
DEVELOPMENT

Americans don't want to live in a world of failed states, civil wars, terrorism, competition for scarce resources, and endless refugee crises. Such a world threatens our national interests and the security and well being of our own citizens. I believe that USAID serves our national interests, by addressing the root causes of conflict.

**Remarks of J. Brady Anderson, USAID Administrator, to the
Advisory Committee on Voluntary Foreign Aid, Sept. 8, 1999**



I am pleased to present this report entitled Famine Prevention and Freedom from Hunger, that describes USAID implementation of the Title XII legislation.

The United States is the world leader in agricultural research and development and food production. Title XII helped us marshal the strength of the U.S. research community to begin to meet the global hunger challenge.

The International Food Policy Research Institute (IFPRI) identified hunger and food insecurity as root causes of conflict. That is why our support for agriculture is so important. Before countries can develop responsive democracies and provide basic services such as health and education, their citizens need access to affordable food. In most developing countries, agriculture is the cornerstone on which sound economic development builds.

USAID, in partnership with the U.S. university community, supports agricultural development initiatives around the world. Working through the Collaborative Research Support Programs, the International Agricultural Research Centers, and with NGO partners, we have much progress to report.

Together we have met Title XII's first mandate, to increase world food production substantially. But we still struggle to meet the second mandate: solving food and nutrition problems in developing countries. More than 800 million people currently face chronic hunger. During

the World Food Summit, the United States joined its partners in pledging to cut in half that number by the year 2015. This year, we took a major step toward meeting that commitment when USAID, in conjunction with the Departments of State and Agriculture, issued the *U.S. Action Plan on Food Security: Solutions to Hunger*. The Action Plan provides guidance and direction for U.S. programs that address the global hunger problem.

Of particular concern is hunger in Africa, where more than 200 million people suffer from undernourishment. In November 1998 Congress passed the *Africa: Seeds of Hope Act* which recognizes the importance of agricultural development to address hunger problems in Africa. This legislation gives special emphasis to the constraints faced by women farmers in Africa. My personal experience in Africa taught me about the central role women play in producing and preparing food for their families. This legislation, in conjunction with the African Food Security Initiative, will help USAID work for better food supplies and improved livelihoods for Africans.

Ending hunger is in everybody's best interests. We have the framework to overcome food shortages and to increase income and employment through agricultural development. With a partnership among the U.S. Government, U.S. universities, the U.S. agricultural community and Congress, we will fight to overcome hunger and food insecurity in the 21st Century.

**J. Brady Anderson
Administrator**

**Report to Congress on Title XII:
Famine Prevention and Freedom from Hunger
September 1999**

Table of Contents

Executive Summary

Introduction	1
I. Title XII Activities in FY 1998, By Region	2
New Initiatives in 1998	2
Africa	2
Asia and the Near East (ANE)	3
Europe and the New Independent States (ENI)	4
Latin America and the Caribbean (LAC)	6
The Global Bureau	7
Global Scientific Research: the CRSPs	7
Global Scientific Research: the International Agricultural Research Centers	11
Knowledge Dissemination and Training	12
The Association Liaison Office (ALO) for University Cooperation in Development	12
II. Activities and Recommendations of the BIFAD	12
III. Future Programs and Activities	14
A Positive Policy Environment	14
Trade and Investment Liberalization	15
Strengthened Research and Education Capacity	16
Sustainable Food Systems and the Environment	17
Food Security Safety Nets and Improved Nutrition	18
Information and Mapping	19
Ensuring Food Quality and Safety Standards	19
IV. Conclusion	21
Annex	
CRSP and Direct Linkages between U.S. Institutions and Collaborating Host Countries	
Acronyms	

C

Report to Congress on Title XII: Famine Prevention and Freedom from Hunger Fiscal Year (FY) 1998

Executive Summary

This report summarizes implementation of Title XII legislation by the U.S. Agency for International Development (USAID) in FY 1998. USAID's collaboration with U.S. land-grant institutions and partner organizations in public and private sectors continues to strengthen their capacity to develop solutions to food and nutrition problems in developing countries.

During FY 1998, USAID's Africa Bureau emphasized the Africa Food Security Initiative (AFSI) and the Africa Trade and Investment Initiative (ATRIP), programs aimed at increasing rural incomes and productivity, reducing malnutrition, improving market efficiency and access as well as expanding agricultural trade and investment. In Asia and the Near East, the focus was on economic policy reform, privatization, economic growth, health, population, agriculture policy, food security and malnutrition aversion, private sector export-oriented growth and water resources management. USAID programs in Europe and the New Independent States highlighted market-oriented policies and institutional and commercial agribusiness development. The Latin American and Caribbean Bureau promoted economic growth and participation of the poor by providing access to credit and financial services, formal title to property and land, education, enhanced sustainability and increased productivity. A major commitment also was made to regional integration as part of a Free Trade Area of the Americas (FTAA).

USAID's Global Bureau addressed food security, agricultural policy and the research and development programs of the International Agricultural Research Centers (IARCs) and the Collaborative Research Support Programs (CRSPs) which involve 50 U.S. land-grant universities in 34 states working in 50 countries.

The Board for International Food and Agricultural Development (BIFAD) emphasized the importance of scientific excellence, strengthening programs in Russia, advancing biotechnology, and promoting food security.

With the current world population exceeding six billion, the challenge of providing adequate food, nutrition and gainful income for the billion people hardest hit by poverty will remain the critical focal point for USAID's Title XII based programs.

Future USAID programs such as support for the *Africa: Seeds for Hope Act* will be shaped by priorities addressed in *the U.S. Action Plan on Food Security*. Areas of emphasis will be: ensuring a positive policy environment; trade and investment liberalization; strengthening research and educational capacity; integrating environmental perspectives to assure sustainability; improving and extending the food and nutrition assistance "safety net;" enhancing food security monitoring and mapping; and, ensuring food quality standards.

d

Report to Congress on Title XII Famine Prevention and Freedom from Hunger

INTRODUCTION

The Title XII legislation was enacted in 1975, a time of widespread hunger and famine, to strengthen the capacity of U.S. land-grant and other eligible universities in agricultural institutional development and research and to enhance their ability to increase world food production through applied science internationally particularly in identifying solutions to food and nutrition problems in developing countries.

The legislation was enacted because:

- Support of U.S. land-grant universities contributes to U.S. economic progress.
- Land-grant and other U.S. universities effectively work with foreign agricultural institutions to expand indigenous food production for both domestic and international markets.
- Increased food production and improved distribution, storage and marketing in developing countries prevent hunger and build the economic base for growth.
- The poorest majority in the developing world reap the greatest benefit from increased and secure food supply.
- Research, teaching, extension activities and institutional development are prime factors in increasing agricultural production and in improving food distribution, storage and marketing.
- Agricultural research abroad continues to benefit the U.S. Increasing the availability of higher nutritional quality food is of benefit to all.
- Universities need a dependable source of Federal funding in order to expand and continue their efforts to assist in increasing agricultural production in developing countries.

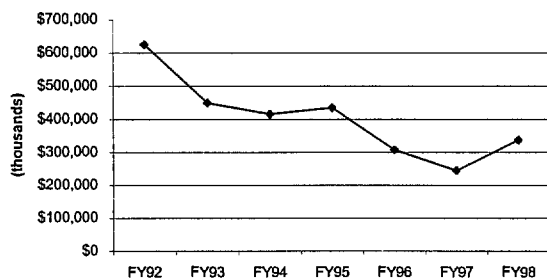
The rationale for the legislation remains strong with over 800 million people worldwide still suffering from inadequate food supplies and associated malnutrition.

This report details accomplishments of the land-grant university system and its partners in the public and private sectors in FY 1998. Over \$300 million in USAID funding was invested in these efforts. While nearly 40 percent of the investments were concentrated in the Middle East, significant investments in Africa and in global programs also continued. In the future, USAID food and agricultural programs will be shaped around the priorities outlined in the *U.S. Action Plan for Food Security*, a joint effort of the sub-Cabinet level Interagency Working Group on Food Security and the non-governmental Food Security Advisory Committee, a subcommittee of the Board for International Food and Agricultural Development (BIFAD).

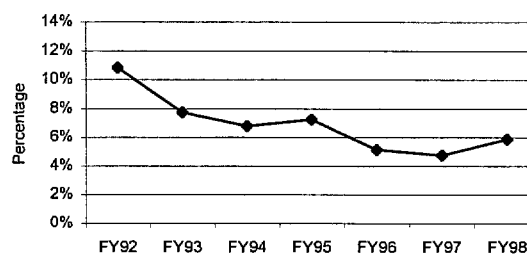
TITLE XII ACTIVITIES IN FY 1998, BY REGION

Obligations for agriculture programs in FY 1998 increased by some \$92 million over the level of \$245 million in FY 1997. About 80 percent of the FY 1998 increases over FY 1997 can be attributed to funding actions in Asia and the Near East (ANE). In Egypt, an additional \$57 million was obligated for private sector led, export-oriented economic growth and, in Jordan, funding was increased by about \$31.9 million for improved water resource management.

USAID Agriculture Commitments



Percentage Agriculture Obligations of Total USAID Budget



Agriculture Obligations by Bureau

	FY92	FY93	FY94	FY95	FY96	FY97	FY98
AFR	\$186,368	\$115,215	\$124,517	\$111,734	\$80,123	\$80,186	\$77,912
ANE	\$221,625	\$111,230	\$94,883	\$114,329	\$93,569	\$56,828	\$131,906
ENI	\$50,148	\$87,968	\$87,090	\$60,983	\$32,109	\$31,525	\$34,200
LAC	\$68,595	\$48,084	\$43,919	\$50,182	\$32,682	\$28,958	\$28,777
G	\$86,203	\$78,919	\$56,297	\$85,016	\$64,040	\$42,663	\$57,738
BHR	\$8,532	\$5,195	\$6,191	\$12,286	\$5,302	\$2,736	\$4,239
PPC	\$3,806	\$2,978	\$2,361	\$0	\$0	\$1,858	\$2,300
Total	\$625,277	\$449,589	\$415,258	\$434,530	\$307,825	\$244,754	\$337,073

New Initiatives in 1998

With limited funding growth in FY 1998, USAID launched few new initiatives related to Title XII. President Clinton announced the Africa Food Security Initiative (AFSI) on his trip to Africa in early 1998. AFSI -- with its emphasis on increasing rural incomes and decreasing malnutrition -- is implemented in five pilot countries: Mali, Mozambique, Ethiopia, Uganda, and Malawi.

The Global Bureau instituted a new institutional linkage program in support of AFSI. The \$2 million competitive grant program emphasizes partnerships between U.S. universities and the International Agricultural Research Centers (IARCs) to address key problems affecting food security in Africa. Three-year grants, averaging approximately \$250,000 each, were made to seven U.S. institutions, enabling them to complement IARC technical staff capabilities or facilities. The program exposes U.S. scientists to international issues and develops long-term working relationships with counterparts overseas in efforts to solve global hunger problems.

Africa

In addition to the AFSI, the Africa Bureau (AFR) also began implementing the Africa Trade and Investment Initiative (ATRIP). ATRIP, not expected to gain momentum until FY 99, will

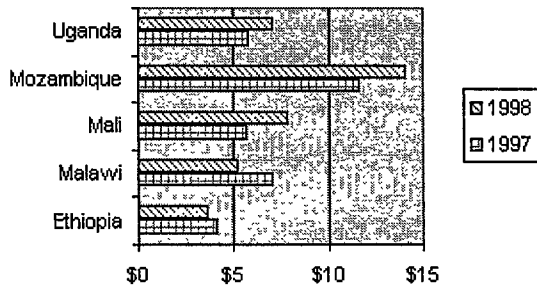
improve the enabling environment for commercial trade and remove regulatory and legal impediments to trade and investment.

Although AFSI obligations in the five pilot countries increased those programs' emphasis on agriculture and food security overall (by \$ 3.48 million), only Mali, Mozambique, and Uganda obligations show net increases. The FY 1998 agricultural funding increase in Ghana reflects the importance of agribusiness in that country's economy. The figures for Rwanda and Liberia reflect post-crisis investment choices.

Michigan State University completed several excellent policy briefs in 1998 that continue – as recommendations are gradually adopted – to support market liberalization reforms so badly needed in East Africa.

Results from programs launched in earlier years also began to be seen in FY 1998. In West and Central Africa, for example, Purdue University's Economic Assessment of Agricultural Interventions program developed and extended new techniques for impact assessments by local institutions, enabling them to guide their own investments toward high-impact agricultural projects. Seventy-eight individuals have been trained during the last five years. They are now employed in strategic positions at the African Development Bank, national governments and at the International Agricultural Research Centers (ILRI, ICRISAT, WARDA and IITA). Policymakers are more aware of the substantial effects agricultural research can have on the welfare of society through higher incomes for farmers and lower prices for consumers.

AFSI Country Agriculture Obligations



AFR Agriculture Obligations by Country

	1997	1998
Angola	\$8.170	\$6.600
Eritrea	\$3.225	\$2.005
Ethiopia	\$4.080	\$3.614
Ghana	\$1.270	\$3.456
Guinea	\$0.150	
Guinea-Bissau	\$1.665	
Kenya	\$2.200	\$2.703
Liberia	\$0.927	\$6.093
Madagascar	\$1.000	\$1.500
Malawi	\$7.000	\$5.175
Mali	\$5.627	\$7.749
Mozambique	\$11.600	\$14.000
Niger	\$0.600	
Rwanda	\$0.873	\$2.800
Senegal	\$3.428	\$0.445
Somalia	\$0.270	\$0.875
Uganda	\$5.790	\$7.039
Zambia	\$0.749	\$2.195
REDSO/East	\$7.225	\$0.635
Southern Africa	\$1.598	\$2.675
Regional		
Sahel Regional	\$1.694	\$2.382
Africa-wide (AFR/SD and DP)	\$10.567	\$5.971
GHA1	\$0.478	
Total	\$80.186	\$77.912

Asia and the Near East (ANE)

USAID's programs in Asia and the Near East underwent significant change in FY 1998. Southeast Asia struggled with a financial crisis. India's economic program was terminated in

response to the nation's decision to test nuclear devices. Middle East countries continued to receive substantial funding to promote peaceful resolution of regional political crises.

Improving food security and alleviating malnutrition remain extremely important goals in the region, as it is estimated that more than one-half billion of the region's residents are undernourished, with over one-quarter billion in South Asia alone. According to UNICEF, in South Asia, 52 % of the children under five years of age show evidence of long-term undernutrition and 17% exhibit serious signs of short-term hunger.

Nevertheless, in FY 1998, the Agency invested in bilateral agriculture programs in only five ANE countries: Bangladesh, Egypt, Indonesia, Jordan and Nepal. Egypt and Jordan accounted for 90% of this investment. The work in Egypt emphasized agriculture policy reforms and private sector export-oriented growth, while the resources in Jordan were directed to improved water resources management¹. There was significant involvement of U.S. universities in Egypt, where grants to twenty U.S. universities, primarily in collaboration with Egyptian counterpart institutions, increased food production, improved processing techniques and raised the quality of horticultural crops.

Bangladesh's program highlighted food security for the poor, and the program in Indonesia was directed towards sustained liberalization of international trade and domestic competition. The program in Nepal was designed to increase sustainable production and sales of forest and high-value agricultural products.

In India, under the Soil Management CRSP/s NIFTAL project, the University of Hawaii worked with the Maharashtra Hybrid Seed Company (MAHYCO), a major private seed producer and supplier, providing training and technological guidance to test and produce a range of legume inoculants. This process uses bacteria to convert nitrogen from the air into a form useable to leguminous plants as they grow, saving farmers money while protecting and preserving fragile environments.

ANE Agriculture Obligations by Country

	1997	1998
Bangladesh	\$ 1.739	\$ 2.941
Cambodia	\$ 11.570	
Egypt	\$ 33.330	\$ 90.500
India	\$ 1.200	
Indonesia	\$ 1.000	\$ 5.600
Jordan		\$ 31.865
Lebanon	\$ 2.315	
Nepal	\$ 2.998	\$ 1.000
Philippines	\$ 1.000	
Regional Program	\$ 0.474	
Sri Lanka	\$ 0.750	
Strategic & Econ. Analysis	\$ 0.452	
Total	\$ 56.828	\$ 131.906

Europe and the New Independent States (ENI)

USAID's ENI programs emphasize market-oriented policies and institutions and commercial agribusiness development. As this part of the world moves toward greater inter-action with the world economy,

¹ The amount shown for Jordan represents an attribution of benefits stemming from improved wastewater management, rather than agricultural obligations more strictly defined.

academic and research institutions are becoming increasingly interested in establishing long-term relationships with U.S. universities and U.S. private enterprise.

In the *Ukraine*, the agricultural sector was highly resistant to reform, due both to a deficient understanding of a market economy and the inefficiencies inherent in a state-dominated agriculture. Iowa State University (ISU), through the Institute for Policy Reform, is addressing this problem through a combination of analysis, institutional development and on-the-job training.

ENI Agriculture Obligations by Country

	1997	1998
Albania	\$2.903	\$2.847
Armenia	\$3.076	\$6.224
Azerbaijan		\$0.333
Bulgaria	\$1.900	
Georgia		\$0.643
Macedonia	\$1.680	\$3.186
Moldova		\$3.305
Poland	\$0.500	\$0.560
Romania	\$1.100	\$3.865
Slovakia	\$0.250	
Ukraine	\$14.648	\$8.020
Regional	\$5.468	\$5.217
Total	\$31.525	\$34.200

A USAID-funded Pest and Pesticide Management Project (PPMP) in the Ukraine, implemented since 1995 by Virginia Polytechnic Institute and State University and the U.S. Environmental Protection Agency, supported the foundation of the Ukrainian Crop Protection Association which is now lobbying government for market reform in agriculture. Virginia Tech developed a training of trainers program for Ukrainian IPM and Pesticide Safety Training teams. In FY 1998, 31 workshops were conducted training over 1,500 private farmers, local agricultural specialists and officials in target oblasts.

Under PPMP, six IPM collaborative research grants were awarded for wheat, tomatoes, potatoes and apples. A study was conducted on how local plant protection stations can improve their services to private farmers.

The PPMP also helped address the serious problem posed by large stocks of obsolete pesticides. The USAID-supported sustainable Agriculture Working Group developed a proposal, based on international safety procedures, for a large-scale pilot inventory that elicited subsequent Danish government funding.

In 1992, the government of Albania asked USAID to assist in creating a land market to facilitate the emergence of commercial-scale farming. USAID invited the University of Wisconsin's Land Tenure Center (LTC) to help prepare a land market action plan and provide technical assistance.

Among the achievements:

- Legislation legalizing buying, selling, renting, and mortgaging real property has been enacted;
- A registration system, created entirely through the project, is the foundation for establishing and guaranteeing rights in land transactions;
- By the end of 1998, roughly half of the country's 3 million properties had begun the registration process, with roughly ten percent completed.

- The 1995 Immovable Property Registration Baseline Survey is the first land market survey carried out in Albania. A forthcoming book-length analysis of the survey will cover topics from land price determinants to gender issues in the establishment of a property registration system.

The project was able to continue to operate during the prolonged Albanian civil unrest of 1997 and 1998.

Latin America and the Caribbean (LAC)

A key goal of the USAID program in the region is to cut poverty in half by 2015, a goal consistent with the Organization for Economic Cooperation and Development's (OECD) vision for the 21st Century. This will call for reducing hunger and enhancing food security as these are closely related to poverty. USAID programs support "poverty reduction" and "economic integration and free trade" initiatives of the Summit of the Americas. USAID supports the Summit's commitment to increase the economic participation of the poor through programs designed to assure access to credit and financial services, to formal title to property and land and to education and productive resources. USAID supports countries that have renewed their commitment to regional integration as part of a Free Trade Area of the Americas (FTAA). This requires a substantial improvement in the ability of some Latin American countries to implement free trade policies and to enforce sanitary and phytosanitary standards, fair labor practices, and trade-related environmental policies.

LAC Agriculture Obligations by Country

	1997	1998
Bolivia	\$ 6.000	\$ 0.688
Ecuador	\$ 0.105	
El Salvador	\$ 3.049	\$ 3.406
Guatemala	\$ 3.493	\$ 5.412
Haiti	\$ 2.098	\$ 1.400
Honduras	\$ 1.768	\$ 0.559
Jamaica	\$ 0.440	
Nicaragua	\$ 3.299	\$ 5.084
Peru	\$ 7.626	\$ 3.832
LAC Regional	\$ 1.080	\$ 8.396
Total	\$ 28.958	\$ 28.777

USAID continues programs to enhance agricultural productivity and sustainable resource management for the region's poor, small farmers in marginal, rural areas. Models for environmentally-aware development programs include USAID/Honduras' Land Use and Productivity Enhancement Project (LUPE) which has, since 1980, worked with poor hillside farmers to improve soil conservation techniques, crop yields and incomes. Today, over 37,500 farm families use LUPE techniques increasing their income by over 50 percent. LUPE techniques, which bind soil to hillsides, have survived the challenging test of Hurricane Mitch in 1998. Virtually all farms using LUPE techniques survived Mitch with little damage, while nearby farms not participating in the program suffered devastating landslides that washed away topsoil and homes.

In Haiti, the USAID PLUS program reaches 166,000 hillside farmers. CARE and PADF (Pan American Development Foundation) transfer technologies to boost income while conserving soil and water. The Southeast Consortium (of Universities) for International Development (SECID) helps farmers find markets for high-value crops such as cacao, mango, manioc, plantain, yams and coffee. In FY 1998, more than 6.8 million trees were planted or improved through grafting.

In the fall of 1998, hurricanes Mitch and Georges hit the region. In Honduras and Nicaragua, losses were estimated to total up to 70 percent of GDP. In the Dominican Republic, 60 percent of

the bridges, 60 percent of the national forests and 75 percent of the agriculture sector were destroyed. To address the devastation, USAID coordinates the almost \$1 billion U.S. emergency assistance effort. In agriculture, the focus is on repairing critical infrastructure such as farm to market roads, access to credit and technical assistance for small farmers as well as assistance to small farmers to reestablish crop and livestock production. Environmentally sound redevelopment will be encouraged, so in the future the countries are better prepared to deal with natural disasters when they occur.

The Global Bureau

Global scientific research: the CRSPs

Innovative technologies are key to development. When technological advances result from collaborative activities between U.S. and developing-country scientists, institutional growth and improved human resources capacity occur. USAID conducts collaborative research to improve the sustainability of food production systems in developing countries with an emphasis on enhancing the quality of life for small-scale crop, animal and fish farmers. The Agency's Collaborative Research Support Programs (CRSPs) are long-term, multidisciplinary research and training initiatives that capitalize on the vast U.S. Land Grant University and College of Agriculture system that works with developing-country research programs.

There are currently nine CRSPs:

- ◆ *Bean/Cowpea (B/C)*
- ◆ *Broadening Access and Strengthening Input marketing Systems (BASIS)*
- ◆ *Integrated Pest Management (IPM)*
- ◆ *Peanuts*
- ◆ *Pond Dynamics/Aquaculture (PD/A)*
- ◆ *Global Livestock (GL)*
- ◆ *Soils Management (SM)*
- ◆ *Sorghum/Millet (INTSORMIL)*
- ◆ *Sustainable Agriculture and Natural Resource Management (SANREM)*



Sorghum panicles developed by the Sorghum/Millet CRSP demonstrating white food quality types and feed quality types utilized by consumers and farmers worldwide.

The CRSPs involve 50 Land-grant universities in 34 states. CRSPs seek to resolve problems whose solutions will be mutually beneficial to both the U.S. and developing countries in the areas of increased food production, improved distribution, storage, processing, marketing and policy development. They achieve their objectives through research, training (short and long-term), and institutional development. The CRSPs are true partnerships: U.S. universities match at least 25% of the USAID funding they receive; developing country partners contribute scientists, facilities and, when possible, financial resources.

In FY 1998, significant mutual benefits accrued to the U.S. and developing countries from long-term investments in the CRSPs.

Developing Parasite Resistant Sorghum

The parasitic weed *striga* is estimated to infect two thirds of the cultivated lands in sub-Sahara Africa, where it can cause complete yield losses in critical staples such as sorghum, millet, maize, and broadbeans. The FAO estimates that the lives of over 100 million Africans are negatively affected by this single plant pathogen alone. The mechanism for host plant resistance was first identified by the Sorghum/Millet CRSP in 1988. Better understanding of the plant/parasite relationship was used to develop new striga-resistant cultivars. Field trials for evaluation of eight striga resistant sorghum varieties were conducted in partnership with World Vision International in twelve countries: Senegal, Chad, Ghana, Mali, Eritrea, Mozambique, Sudan, Somalia, Rwanda, Ethiopia and Niger in 1997 and 1998. In general, these varieties are widely adapted, are earlier in maturity, have good response to inputs and possess better food quality than most commercial varieties. The Government of Ethiopia has conducted on-farm trials for two of these varieties in northern Ethiopia in 1997-1998. The trials demonstrated the economic benefits of integrating IPM techniques (such as incorporating fertilizer and tied ridges for moisture conservation) with the high yielding, striga-resistant varieties. Seed of these varieties is highly coveted by the farmers and is selling for twice the price of other commercial sorghum seed.

Addressing Micronutrient Deficiency

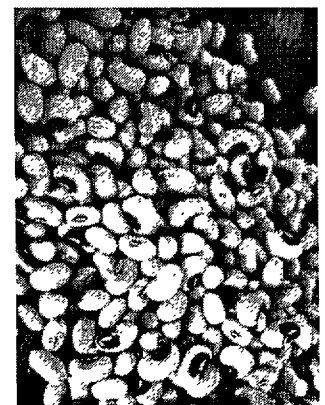
An estimated 2 billion people in the world suffer from lack of micronutrients in their diet with over 250 million children under the age of 5 at high risk of death and illness. During FY 1998, the Global Livestock CRSP (GL CRSP) initiated a child nutrition project involving a controlled intervention study to clarify the role of animal-source foods in the development of East African children. Twelve schools and more than 500 children in the Embu District of Kenya are participating in the school feedings. The project, headed by UCLA, has trained more than 50 members of the community to work as field staff. The GL CRSP project is expected to improve the cognitive function, growth and health of rural East African children through a sustainable, food-based approach to micronutrient deficiencies that not only increases children's potential for survival but also allows them to be more productive and creative contributors to society.

A Livestock Early Warning System

A GL CRSP activity headed by the Texas A&M University System began development of a livestock early warning system designed to allow 6-8 weeks of increased lead-time for drought and famine forecasting. Training was emphasized in FY 1998. In Ethiopia a laboratory was formed to assist in the early warning process and network of policymakers was formed. Future labs are planned in Kenya, Uganda and Tanzania. The improved quality of predictions being developed by this project will have a significant impact on ranchers in the U.S. as well as Africa. Currently, over 1600 U.S. ranchers receive nutritional advisories, with a projected savings to U.S. ranchers of \$187 million per year.

Research Produced High Yielding Cowpeas

Three cowpea varieties developed by Senegalese Bean/Cowpea CRSP scientist, Dr. Ndiaga Cisse, in collaboration with Dr. A. E. Hall, University of California-Riverside, have been awarded the 1999 Presidential Prize for Science and Technology. These cowpea varieties, Mouride and Melakh, increased yields in Senegal by 2.4 times the 20-year baseline average. Farmers pay a premium price for seeds of these varieties. Demand is increasing because



West Africa is a center of diversity for cowpea germplasm.

of their adaptation to drought, their insect/disease resistance, high yield and, especially, their early maturity. They produce large quantities of fresh cowpeas for the hungry period before other crops are ready for market and bring prices double those normally received for other cowpeas. A recent study estimates the present net benefit of these cowpea varieties in Senegal at about U.S. \$19 million. Dr. Cisse received his Ph.D. from Purdue University under the CRSP and is currently the cowpea breeder for the Senegal government's Institute for Scientific Research in Agriculture (ISRA). He accepted the award on behalf of the ISRA/CRSP team on July 15, 1999 in Dakar, Senegal.

A Promising Public-Private Partnership in Africa

Approximately 80% of the farmers in developing countries are small-scale growers who find production hampered by lack of access to high-quality, improved seed. Seed Co., Limited, a private sector seed company in Zimbabwe successfully tested and began multiplying a new cowpea variety bred by the Bean/Cowpea CRSP Purdue/Cameroon team in 1998. Their tests have demonstrated a 200% return on the planting investment (over 1,000 kgs harvested from 5 kgs planted). This variety has seed and pod resistance to both weevils and certain diseases, including a major virus, and also gives leafy, high quality fodder for animals. The grain has excellent cooking time and taste. Farmers and consumers liked the large, white, rough grain that matures one week earlier and weighs more per seed than the most common variety. Seed Co., Limited has a 70% market share in Zimbabwe, with about 80% of that in sales to the small-scale, rural sectors. Their seed production base, conditioning plants, storage facilities and distribution networks are established in Mozambique and Zambia as well as Zimbabwe for their growing export market into the rest of Eastern and Southern Africa (e.g., South Africa, Botswana, Angola, Malawi, Tanzania, Kenya and Uganda). The company was so impressed with this CRSP-developed cowpea they have requested that they be appointed to further multiply and market this variety throughout the Eastern and Southern Africa regions.

Tomato Farmers Benefit from IPM Technologies

In FY 1998, the IPM CRSP in Guatemala developed IPM technologies suitable for small-scale tomato farmers. These were: anti-aphid cloth on seedbeds, seedlings grown in newspaper transplant bags, preplanting sorghum barriers, and oil-covered plastic traps for the integrated management of the whitefly and virus complex. The application of these technologies resulted in reduction in the number of insecticide applications from 24 to 13 per season, decrease in cost of production (\$2,600 to \$1,900/ha), increase in profitability (\$570 to \$2,300/ha), lower levels of whitefly populations, and lowered incidence of viral symptoms in plants. Plans are to extend these promising results to a larger number of tomato farmers in Guatemala and elsewhere in Central America.

Improving Soil Management

Hundreds of millions of people in developing countries seek help in managing and stabilizing their food, economic and personal security against the effects of increasing land degradation and climatic variability. The Soil Management CRSP is using an integrated systems approach to address soil management bottlenecks standing in the way of sustainable development. The CRSP is developing tools to enable policymakers and farmers particularly on cultivated steep lands and in areas of low soil fertility to make better choices about managing their lives and agricultural natural resource base. Using soil and water conservation practices developed by the Soil Management CRSP, people in Honduras have seen their steeply sloping farmlands withstand the devastating rains of Hurricane Mitch, with attendant saving of lives and livelihoods. Sound

watershed management knowledge is now being used in restoration plans throughout Latin America and the Caribbean.

Fortified Peanut Butter Benefits Children in the Philippines

Commercial production of peanut butter fortified with vitamin A has begun in the Philippines. The product, developed through the Peanut CRSP, was first featured in a Food Safety publicity drive inaugurated by the President of the Philippines. This peanut butter carries a double benefit. Not only does the Vitamin A content address child survival directly, but the peanuts used are now selected to ensure that the product is aflatoxin free -- a fact that will also aid child survival since aflatoxin suppresses the immune system and makes children more vulnerable to a wide range of infections. The commercial technology, which is used to control contamination by aflatoxin, was developed by a Filipino food company, Newborn Foods, in collaboration with the Peanut CRSP.

Improving Water Quality Management in Central America

The Pond Dynamics/Aquaculture (PD/A) CRSP has identified the major factors limiting the development of extensive to semi-intensive sustainable aquaculture systems. A long-term cooperative estuarine water quality monitoring study of the Gulf of Fonseca, in Honduras, initiated by the PD/A CRSP in 1993 catalyzed the FY 1998 decision by the Honduran government to suspend shrimp farm development until more data were gathered on the gulf's carrying capacity. CRSP findings will continue to be the basis for water quality management policy decisions throughout the Central American region. Closer to home, the U.S. Environmental Protection Agency adopted the monitoring protocol for use in studying the carrying capacity of the Gulf of Mexico.

Other CRSP and Related Activities

Texas A & M University, a member of the SANREM CRSP network, is completing work on the Impact Methods to Predict and Assess Contributions of Technology (IMPACT) project which demonstrates that modeling the impact of investments in agricultural research is scientifically possible and practical. In FY 98, model calibration was completed for two case studies: sorghum production in Mali and small holder dairy enterprises in Kenya.

The Agricultural Biotechnology Support Program (ABSP), a U.S. university-led program managed in the Global Bureau's Office of Agriculture and Food Security, benefits agribusiness by helping create a favorable policy environment for investment and commercialization of biotechnology. The ABSP helped Costa Rica, Morocco, Indonesia and Kenya develop and implement intellectual property rights legislation in line with the requirements of the GATT treaty. IPR protection is a means to promote trade and technology transfer to developing countries, and also serves to foster local investment in agricultural technology development.

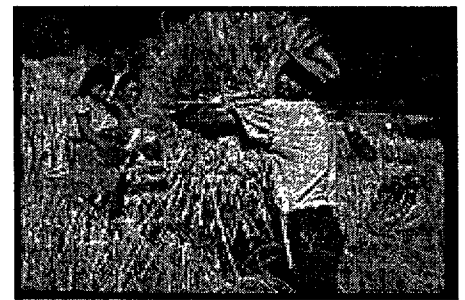
The ABSP translates public research into private technology development. A joint program between Monsanto and the Kenyan Agricultural Research Institute (KARI) will field test disease resistant sweet potatoes next year. Monsanto waived intellectual property rights over the sweet potato technology, allowing KARI the right to commercialize the transgenic variety throughout Africa. In Egypt, ABSP facilitated partnership between the Agricultural Genetic Engineering Research Institute (AGERI), an institute of the Ministry of Agriculture, and private sector growers to conduct field trials of transgenic potatoes and vegetables. AGERI licensed its proprietary organic pesticide to establish a new private company, which will commercialize the

technology. Through the ABSP, more than \$1.5 million of private sector investment was leveraged for research with Egypt, Costa Rica, Indonesia, and Kenya.

Global scientific research: the International Agricultural Research Centers

USAID supports the work of the international agricultural research centers (IARCs) that are members of the Consultative Group on International Agricultural Research (CGIAR) and fosters partnerships between US land grant universities and the IARCs. USAID staff from the Global Bureau's Office of Agriculture and Food Security participate actively in system governance. The programs of the IARCs continue to contribute substantially to new technology development for major food commodities, policy development and conservation of natural resources. Like the CRSPs, the IARC-generated scientific advances have benefited both developing countries and the U.S. Recent studies have quantified these impacts.

The International Maize and Wheat Improvement Center (CIMMYT) recently assessed the influence of its wheat improvement program in developing countries. In terms of varietal releases, over 84% of the spring bread varieties and 96% of the spring durum varieties were significantly based on CIMMYT germplasm. In terms of area, 59% of the bread wheat area and 69% of the spring durum areas were planted to varieties that were significantly based on CIMMYT germplasm. Of all the wheat area in the developing countries, 62% was planted to CIMMYT-related varieties. In the U.S., CIMMYT germplasm provides improved production characteristics such as greater disease resistance, stress tolerance, more efficient use of inputs and higher yields, and is widely used in U.S.-breeding programs.



Harvesting Wheat
Source: CGIAR/CIMMYT

The CIMMYT survey for Latin America indicates that 75% of the varieties released by the private sector were based on CIMMYT germplasm. Maize production in West and Central Africa rose more than three-fold between 1981 and 1996 based on varieties developed by CIMMYT and a sister center in Africa, the International Institute for Tropical Agriculture (IITA) in Nigeria.

Three IARCs work on rice, the daily staple of the majority of the world's population. The largest, the International Rice Research Institute (IRRI), developed irrigated rice technologies which have made possible 2.5 percent per year increases in productivity each year since 1965. This "extra rice" feeds an additional 600 million people -- staying neck and neck with the ever-growing demand. IRRI scientists are now focused on the development of more efficient and productive plant types (aiming for a yield of 12 metric tons per hectare), improved plant and disease resistance, hybrid rice, and more sustainable production technologies. Hybrid varieties developed by IRRI are beginning to come into commercial production: 360,000 acres were planted in India and 1,200 acres in the Philippines in 1998. Water supplies are an increasing constraint to rice production – it takes twice as much water (2,000 metric tons) to produce one metric ton of rice than any other cereal crop – and IRRI is studying five cultural techniques which offer promise of reducing water needs. The West Africa Rice Development Association (WARDA) has made important breakthroughs in developing a new cross between African and Asian rice varieties which has high potential for greater tolerance to environmental, disease and insect constraints. The International Center for Tropical Agriculture (CIAT) has an extended and successful history of supporting rice research and development in Latin America.

Both the CGIAR system and the U.S. university community have many important, highly complementary strengths. USAID continues to encourage increased collaboration between the two to take advantage of their synergies.

Knowledge dissemination and training

Visits to the PD/A CRSP website nearly doubled during FY1998, to over 1,500 hits per month. The CRSP website offers over 180 publications electronically, connects users to programmatic and technical materials, and provides access to information on study sites and software. The CRSP website is linked to the PD/A CRSP Central Database, the world's largest public aquaculture clearinghouse of standardized experiment results. Another CRSP outreach forum, the Educational and Employment Opportunities Newsletter (EdOp Net), launched in FY97, had by FY 1998 experienced a phenomenal growth in electronic circulation. EdOp Net is received by

200 electronic mail subscribers each month, while another 800 visit EdOp Net at the CRSP Internet website. The readership of EdOp Net is evenly split between U.S. and developing countries.



Workers at a cooperatively run fish hatchery harvest *Colossoma macropopum*, a species of fish native to tropical and sub-tropical regions of the Americas.

In FY 1998, over 800 individuals from 16 countries received PD/A CRSP support for undergraduate and advanced degrees or practical training in areas ranging from feed formulation, water quality analysis, and soil management to business plan development and computer applications. In a field still largely made up of men, over 35% of CRSP trainees in FY1998 were women.

With all of the CRSPs, training is an important component. In 1998 graduate degrees under all nine CRSPs were awarded to 52 Ph.D. candidates and 50 Masters degree candidates.

The Association Liaison Office (ALO) for University Cooperation in Development

USAID's Global Bureau, Center for Human Capacity Development worked through the ALO, which serves the nations six major higher education associations to carry out a competitive grants program with educational institutions in developing countries. In FY 1998 the ALO successfully implemented 15 grants valued at nearly \$1.5 million. Those grants of less than \$100,000 each leveraged over \$4.5 million of resources from private firms and the participating institutions in developing countries. The merged resources were applied to help solve mutually agreed upon development problems.

ACTIVITIES AND RECOMMENDATIONS OF THE BIFAD

Title XII legislation mandated the establishment of a Board for International Food and Agricultural Development (BIFAD) to "assist the administration of the programs authorized by this title." The current BIFAD, with six members, was established in 1995, and continues under the Chairmanship of Dr. G. Edward Schuh, University of Minnesota. During FY 1998, the BIFAD emphasized several themes: scientific excellence, agricultural development in Russia, biotechnology, revising institutional relationships, and building linkages. The theme of food security was woven throughout the year.

Scientific Excellence

In FY1998, the BIFAD instituted its annual Chair's Award for Scientific Excellence to recognize an individual researcher or team of researchers for a significant achievement originating from the USAID's Collaborative Research Support Program. The award highlights the success of USAID and university collaboration. It also recognizes work toward sustainable increases in food security and economic growth without environmental degradation.



Dr. Larry Butler (left) posthumous recipient of the BIFAD Chair's Award for scientific excellence and Dr. Gebissa Ejeta (right).

Russia

The BIFAD has urged the USAID to give more attention to collaborating with Russian policy makers to design new institutional arrangements appropriate for a modern market economy. Institutions needing special attention include agricultural research and teaching institutions, financial intermediaries, land tenure arrangements, market information systems, and institutions to make agricultural markets perform more efficiently. The BIFAD emphasized that USAID seek greater involvement of the U.S. university community "and their agricultural science and technology resources" in the design of these new institutions.

Biotechnology

BIFAD discussions on biotechnology, intellectual property and biosafety emphasized education at all levels -- from the national level to institutional levels -- and the need to couple research and education. USAID programs should address both potential benefits and risks in their design, and include scientists, farmers, consumers, agribusinesses, institutions and governments as integral stakeholders in the biotechnologies and biosafety concepts that evolve. Efforts should emphasize how small-scale and resource-poor farmers and the poor in general can benefit from biotechnology and biosafety.

Revising Institutional Arrangements.

The BIFAD reinvigorated important institutional relationships through two key mechanisms. It led a revision of the Collaborative Research Support Program (CRSP) guidelines and it worked on structuring a replacement for the former Joint Committee on Agricultural Research and Development (JCARD) and its predecessor joint committees. The purpose of this replacement structure is to design a way of reviewing program priorities. It will place strong emphasis on the partnership between the university community and the Agency.

Building Linkages.

All of the accomplishments described above are bound by the important role that BIFAD strives to lay in building linkages between the university community and USAID. It builds linkages by explaining the importance of agriculture in general economic development, and by identifying points of strength and capacity in the university community.

FUTURE PROGRAMS AND ACTIVITIES

In 1998, the United States Government joined with representatives of many communities and food and agricultural interest groups to design an appropriate approach to implementing the commitment made by the US delegation to the World Food Summit: to reduce by half by the year 2015 the number of hungry and undernourished people in the world. A Food Security Advisory Committee was constituted as a sub-committee of the BIFAD and co-chaired by the Chairman on the BIFAD and, Dr. Christine Vladimiroff, the head of the well-known civic group Second Harvest.

The Food Security Advisory Committee co-chairs emphasized, on behalf the 28 committee members, that hunger and agriculture should be priority themes for President Clinton's March 1999 sub-Saharan Africa visit. They argued that, in addition to agriculture's importance as a foundation for democratic governments, peace, economic development and regional prosperity, a stronger agriculture will provide the essential foundation for progress in child survival and health, nutrition, and environmental management and conservation. In November of 1998 the *Africa: Seeds of Hope Act* was passed by Congress and signed by the President. The Act recognizes the need for a national commitment to promote agricultural development to improve nutrition and reduce poverty in sub-Saharan Africa.

Throughout the year, discussions addressed the conceptual framework for hunger both in the world and in the US, the relative efficacy of various interventions in removing the causes for hunger as well as alleviating undernutrition in the short term, and the potential for focussing existing resources in new ways. Domestically, the United States has gone beyond the commitments made at the World Food Summit and has dedicated itself to significantly reducing domestic food insecurity. The *U.S. Action Plan on Food Security* was a product of the Interagency Working Group on Food Security, co-chaired by the Department of Agriculture, the Department of State, USAID, in collaboration with the Food Security Advisory Committee.

The Action Plan, released in final on March 26, 1999, identifies seven priority areas for deliberate, concerted action: a positive policy environment; trade and investment liberalization; strengthened research and educational capacity; integration of environmental perspectives to assure sustainability; improving and extending the food and nutrition assistance "safety net;" enhanced food security monitoring and mapping; and ensuring food quality standards. It provides a blueprint for USAID's agriculture and food security involvement into the coming decades in articulating these priorities. Future USAID Title XII programs and activities are discussed relative to these seven action areas.

A Positive Policy Environment

Sound food and agriculture policies are important in famine prevention and freedom from hunger. They must address a range of concerns: poverty reduction, privatization, market access, employment and natural resource management. Good policies originate with sound social, economic, institutional and technical analyses. Appropriate laws, policies, and regulations can then be formulated to create an enabling environment that provides for efficient functioning of private commodity, labor and capital markets. As these markets as well as technology options which affect them are constantly changing, it is important that local capacity for policy analysis, formulation, and implementation is established.

USAID will continue to carry out activities designed to improve developing countries' strategic planning and design, data management, monitoring of performance, and the coordination and

sharing of information. Activities will include policy analysis and reform, marketing and trade policy, institutional capacity building, development of investment plans and management processes, and increased public/private sector partnerships. This common policy approach is to try to quantify and demonstrate costs and benefits of policy alternatives, and develop a constituency for reform both in government leadership circles and in civil society. USAID also promotes a “bottom up” approach which encourages close collaboration between agribusinesses and government to address real world constraints to trade and investment and which will lead to increased food security.

Shifts in global demand and tastes brought about by rising incomes and rapid urbanization require addressing the growing worldwide importance of the production and trade of processed or value-added foods. USAID is preparing to meet this challenge in partnership with US businesses and universities through the design of a demand-driven, but centrally managed activity.

The bulk of the global population increase in the coming decades will occur in developing countries. Urban population in developing countries will increase by 2 billion by 2025. As development occurs, the composition of agribusiness changes, diversifying away from simple agricultural production and consumption to increasingly complex patterns of processing, distribution, and marketing. Also, a higher percentage of agricultural commodities are processed rather than consumed directly as economies modernize. The combination of population growth, rising incomes and urbanization already is altering the characteristic and composition of food demand. Globally, trade in processed (value-added) food is growing at twice the rate of primary agricultural products. Value-added is projected to account for 75 percent of the global food trade by the year 2000 (compared with 50% in 1985). Many USAID assisted countries are poised to make productive use of value-added technologies as their economies modernize. There is demand in such countries for know-how and machinery for processing and packaging meat, poultry, dairy products, spices and fruit pulp. U.S. universities and businesses can jointly seize the opportunities and meet the challenges presented by the prospects for growth in the value-added food sector in developing countries.

During the next five years, the newly designed program for food industry development will be implemented with U.S. universities in the lead. In partnership with U.S. businesses in USAID assisted countries, this activity will seek out the best opportunities for development and adaptation of food processing and packaging technology to create or improve the safety and quality of value-added food products for domestic and international markets. Funds permitting, an additional phase is envisaged that would provide seed funding to be matched by U.S. agribusinesses for addressing specific constraints to U.S. investments in countries from which products of importance to American consumers are sourced.

Trade and Investment Liberalization

Much progress was made, in the final years of the General Agreement on Tariffs and Trade (GATT) and in the establishment of the World Trade Organization (WTO), in increasing openness in world trade. U.S. farmers benefited from expanding agricultural trade, but in 1998, also experienced the pain of a trade contraction as economic crises in Asia reduced exports to that region significantly.

Restrictive policies in developing and transition economies still adversely impact the flow of U.S. technical assistance and trade in bulk commodities, seeds and research derived from genetic engineering. Tariffs on agricultural imports are still high in many developing countries. These tariffs are intended to protect producers from excessive competition but, in fact, may be costing

consumers a substantial amount of food insecurity. Analyses at the country level, combined with proactive agricultural investment programs and the establishment of food safety nets, are one approach that USAID uses -- and will continue to use -- to address these trade-related concerns. Policy issues, primarily related to biosafety and intellectual property rights, also loom as significant choke points in trade. Because of an international treaty network (The Agreement on Trade and Related Aspects of Intellectual Property Rights of the WTO, and the Biosafety Protocol) and the significant role of the private sector in biotechnology, addressing the complex international property issue is essential.

With U.S. University and private sector partners, USAID will focus on capacity building for development and implementation of policy frameworks related to biotechnology. In addition, USAID will broaden and deepen integrated approaches that combine applied research, product development, and policy development through linkages between developing country public and private sectors and the U.S. private sector where much of the technology lies. In addition to these indirect approaches to stimulating increased trade and investment, USAID also supports efforts intended to encourage U.S. investors to take concrete steps toward establishing new agribusinesses in developing and transitional countries.

In Russia, the PRARI (Program to Revitalize Agriculture through Regional Investment) program, operating under the auspices of the US-Russia Bi-national Commission, is working to promote agribusiness investment and policy/regulatory reform at the local level through a public-private partnership. It enjoys the support and cooperation of the Russian Ministry of Agriculture and several regional governments, the latter identified on the basis of agricultural potential, reform orientation of local government, and investment interests on the part of U.S. companies.

Under PRARI, U.S. and Russian consultants assisting regional governments in policy and other reform measures conducive to foreign (mainly U.S.) direct investment. Efforts are also underway to stimulate U.S. investment in these regions. Through 1998, PRARI had been associated with some 30 deals, with a total value -- if consummated and fully implemented -- in the hundreds of million dollars.

Strengthened Research and Educational Capacity

Productivity is critical in addressing the poverty/food insecurity nexus. Productivity increases in agriculture come from improved technologies, more effective policies, improved institutions, education for producers and better infrastructure. Increased productivity leads to higher incomes as agricultural producers gain directly via lower production costs. These increased returns stimulate increased consumption and increased real income for consumers through lower prices, plus increased investment which, in turn, augments incomes of workers in other sectors.

USAID and its partners in the U.S. university community have a tremendous opportunity to increase economic growth, reduce poverty and reduce famine, hunger and malnutrition by mobilizing the research, extension, and training expertise in capacity-building efforts around the world. No other country has the extensive and cutting-edge expertise found in the U.S. As has been shown time and time again, this engagement in global research and development efforts is a "win-win" situation. The U.S. benefits through access to other technologies from around the globe, new management practices, important germplasm, and training for U.S. higher education faculty and students who are preparing for work in the global economy.

On the future agenda for special attention by USAID are issues associated with genetics and biodiversity, biotechnology, and training.

Intensification of production in the future will be increasingly more important because of the reduced availability of land and the need to conserve and enhance natural resources. With intensification, greater control must be obtained of plant and animal diseases and pests. The need for conservation of biodiversity is essential for increased productivity and protection of the environment. Conservation and enhancement of germplasm and breeding will become more important as the search for genetically improved species of plants, fish and animals intensifies. Agricultural biotechnology is a tool that holds considerable promise in the development of new goods and markets and for contributing to food security in developing countries. USAID will support biotechnology activities aimed at safely improving the productivity and efficiency of plant, fish and animal species.

U.S. universities have an impressive track record in their provision of internationally recognized degree programs in agriculture and related scientific fields. An estimated 80 percent of all agriculture scientists worldwide are products of the U.S. university system. USAID's funding for such training has, however, declined significantly in recent years. Without a reverse in the funding trend, USAID will attempt to continue to support targeted training efforts (such as those provided through the CRSPs and the CGIAR) and will explore distance education and communication approaches to increase the linkages between U.S. sources of expertise and the continuing education needs of scientists in developing countries.

Sustainable Food Systems and the Environment

Environmental issues are closely intertwined with agricultural development and span country boundaries. Well-managed natural resources underpin long-term economic growth and food security. If agriculture does not develop in an environmentally appropriate fashion and yields do not increase on high quality land, people will seek additional land – usually on hillsides – to expand agricultural production. The U.S. is affected directly by the quality of air and water in other regions, the loss of biodiversity, and the use of toxic chemicals. Scientists around the world must engage in international scientific collaboration to address problems such as water quality, land degradation and chemical usage. In addition to our support for applications of biotechnology in agriculture, sound natural resource management and the use of rigorous environmental risk assessment methodologies, USAID will also continue to emphasize elements focusing on the environment/agriculture interface: integrated pest management and water conservation and use.

◆ Integrated Pest Management (IPM)

IPM has become increasingly important as world food needs increase and as agriculture production intensifies. Today there are over 200,000 tons of obsolete pesticides in the developing world, much of which resulted from excessive and inappropriate donations from developed countries. USAID should use its influence with other donors and producers of pesticides to secure ways and means to destroy these huge stocks. USAID should greatly increase its research and training activities (using existing expertise at U.S. universities) to develop alternative pest control technologies in the context of its IPM policy.

◆ Water Conservation and Efficiency of Use

Water conservation and more effective utilization in crop and animal production will be critical in the future. Today, irrigation is the largest user of water—70 per cent globally. As the population increases and economic growth accelerates, water use for agricultural purposes will be restricted as pressure mounts to free water for other segments of the economy. Increased yields in the irrigated sector must be combined with more efficient water use. New research is needed on maximization of yield per unit of water, rather than per unit of land.

Similarly, income from irrigated lands must also be increased through production of high value crops to support inevitable increases in the price of water in the agricultural sector. This will allow agriculture to better compete with industrial and domestic needs for scarce water resources.

Unsustainable aquifer withdrawals are also becoming an increasingly important issue in many areas, and will require good science and political will to resolve.

An international consensus is emerging on the utility of taking an integrated water resources management approach as articulated at the 1992 Water and Environment Conference in Dublin and since adopted by a variety of international organizations. This calls for an integrated, rational, transparent and participative process to determine how best to achieve society's long-term needs for freshwater and coastal resources while maintaining essential ecological services.

Food Security Safety Nets and Improved Nutrition

The Asian financial crisis of 1997-98 resulted in many countries falling below the poverty line. At the same time, it caused governments to rethink food subsidy policies -- that they could ill-afford -- and to undertake policy reforms that increased farmers' incentives to produce food even as they caused hardship to many newly-poor families, who found their limited incomes further squeezed by higher prices. USAID/Indonesia has taken a new look at the role of food and agriculture in the Indonesian economy and is planning new programs to enable the sector to adjust to a post-crisis situation more quickly and effectively. More broadly, the Global Bureau will continue to look at the issue of food security for groups and individuals rendered vulnerable to food deficits by crisis of both natural and manmade causes.

Malnutrition emerged as the single most important factor underlying early childhood deaths, as it weakens children's immune systems and leaves them more vulnerable to a range of infections. The World Health Organization estimates that malnutrition is associated with more than one-half of all child deaths in developing countries. Thus it is not surprising that nutrition is a major thrust in USAID's child survival programs. The role of food in achieving nutritional goals has not been emphasized, however, and deserves greater attention based on an impressive and growing body of research results. For example, children from food-secure homes are far less likely to die from diarrhea and other infectious diseases than are children from food-insecure homes. An integrated and sustainable approach to child survival depends on access to adequate levels of nutritious food available at affordable prices. Food-based approaches to nutrition are increasingly important as the world seeks to feed the growing population that will exceed six billion on October 12, 1999.

USAID's agricultural programs make significant contributions to sustainable achievement of nutritional and child survival goals. Mobilizing USAID's agricultural partners in implementation of a food-focussed child survival agenda will result in direct improvements in child nutritional status and an accompanying decline in child morbidity and mortality. It will also provide important synergies with USAID's other child survival interventions. USAID-sponsored research

is producing foods rich in critical nutrients, e.g., iron-rich rice, vitamin A-rich sweet potatoes, protein-rich rice, beans, and corn. Diets including these foods should help mothers give birth to healthy babies and provide children the essential energy, protein and micronutrients so necessary to children's development. These same improved technologies can also provide at-risk families with increased incomes, lifting them out of poverty and providing money for health care and education.

USAID's agricultural staff is working closely with nutritionists, food technologists and biotechnologists to identify new opportunities for food-based approaches to Child Survival. Many of the interventions being analyzed feature women's management of productive resources, leading to major impacts on household food security and children's health. USAID/Addis Ababa recently reported research results that showed that members of households adopting improved dairy technologies consume 17% more calories, 13% more protein and 24% more fat than non-adopters. Women use additional income to purchase 80% of household food, and men spend a third more on food than in non-adopting households. Most strikingly, the incidence of child stunting, a key child survival indicator was reduced by more than half, from 43% to 20%.

USAID's agricultural partners -- U.S. universities, International Agricultural Research Centers, national programs in developing countries, NGOs and the private sector -- have responded enthusiastically to the challenge of increasing the nutritional impacts of USAID's work. In the area of research, biotechnology is pointing to new ways to alleviate micronutrient malnutrition and provide an adequate diet for all children. Information technology is leading to improved surveillance and data gathering tools that can be used to prevent crises before they occur. USAID's agricultural partners are ready to contribute to improving nutrition and reducing child mortality, helping to make child survival goals a sustainable reality.

Information and Mapping

USAID will continue to support information gathering and analysis activities such as the Famine Early Warning System (FEWS) and the Agronomy, Hydrology and Meteorology (AGHRYMET) program in Africa. These programs collect rainfall and weather pattern data, analyze it and share it with affected countries, allowing time for planning to avoid food calamities and starvation. Broader coverage of this type of Geographic Information System program will foster better planning and quicker reactions among those countries at risk of famine and other natural disasters.

Ensuring Food Quality and Safety Standards

FAO valued global trade in agricultural products at \$300 billion in 1998. As a result of the trade agreements concluded during the Uruguay Round of the GATT (now executed under the WTO) and because of the aggressive movement toward regional and global economic integration, a new environment for international trade in food products now exists.

Ensuring the safety and quality of traded food products is of paramount importance to the health of the growing economy in traded food products, both in the U.S. and abroad. These factors are important to the U.S. at this time for the following reasons:

- It is the most effective way to make sustained improvements in the safety of foods imported to the U.S.
- It will enhance the ability of U.S. food businesses to operate within emerging markets and increase consumer demand for safe, high quality food products in those countries.

- It will enhance cooperation and mutual understanding in the development of sound, scientifically based international standards for food safety and quality.

In 1998, food imports to the U.S. totaled \$35 billion, of which \$20 billion (including coffee, cocoa, shrimp and many vegetables and fruits) originated in developing countries. The rapid increase in imports from countries whose regulatory regimes are less rigorous than our own has raised the concern for the safety of foods imported to the U.S. from developing countries. Given the current food inspection capacity of the U.S. regulatory agencies, it is clear that inspection and testing alone will not be enough to ensure the safety of all imported food shipments. The solution lies in improving the production and processing systems in the exporting countries. USAID is poised to develop a strong technical assistance and training program aimed at improving food safety in developing countries that export or plan to export to the U.S. U.S. universities and the U.S. food industry are the logical choice for providing such technical assistance and training.

The growth of the U.S. food industry will depend on development of international business and the ability to operate within the food regulatory framework of other countries. As developing countries work to improve food control legislation and inspection systems, U.S. technical assistance can help ensure congruence with emerging international standards and provide training for best manufacturing practices to ensure safe, high quality products for both export and domestic consumption.

Deploying U.S. foreign assistance funds to improve food safety worldwide is essential in light of the expansion of international trade in food and heightened awareness of microbiological and chemical contamination of food products. To address this food safety challenge, a “farm to table approach” to providing technical assistance and training is necessary.

USAID’s agribusiness activities will emphasize global integration, and the interdependency between U.S. economic interests and the economic growth in developing and transition economy countries. Interventions will focus on food industry development, biotechnology, and input markets.

Food Industry Development: U.S. food companies increasingly are sourcing product and ingredients from developing countries. Meeting internationally set standards for quality and safety, such as the Sanitary and Phytosanitary Standards of the WTO, and Codex Alimentarius, will become paramount for competitiveness in the international food trade. Good Manufacturing Practices, Good Agricultural Practices and process controls such as HACCP will continue to increase in importance.

USAID will partner with U.S. universities and agribusinesses to:

- Put in place systems and science-based standards to serve domestic and global markets
- Adapt and apply food processing technologies and marketing systems to create value-added products and improve the safety and quality of products for those markets
- Facilitate U.S. private agribusiness investment in client countries to increase their efficiency and decrease transaction costs associated with marketing.

In most USAID assisted countries, effective market driven input supply and distribution networks did not emerge with the elimination of state-owned systems that occurred during the 1980’s and early 1990’s. USAID envisions taking earlier privatization efforts a step further. U.S. farm supply companies see tremendous market potential in the developing country small-scale sector,

but distribution networks are inadequate. USAID's objective is to stimulate expansion of supply links for seeds, fertilizer and implements to small farmers by bringing about commercially sustainable networks of input wholesalers and retailers who can expand their markets and sell inputs to smallholder farmers. The overall effect will be an increase in smallholder income. USAID will also support the establishment of inputs-related trade associations in developing countries.

CONCLUSION

Substantial progress was made in 1998 towards famine prevention and freedom from hunger by USAID in collaboration with its university Title XII partners. However, much still needs to be done as the world population is projected to increase at almost a billion individuals per decade for the next two or three decades. This increased population will take prime agricultural lands out of production, as urban and rural areas are developed to meet the needs and demands of the masses. Since no additional prime agricultural lands are available in the world and use of marginal lands in most cases creates environmental problems, the future demands for food will have to come from increased productivity and improved conservation and utilization of the foods produced.

USAID and its partners in the U.S. university community will move forward and utilize Title XII to increase economic growth, reduce famine, hunger and malnutrition and increase human capacity-building efforts around the world. No other country in the world has the extensive and cutting-edge agricultural development and research expertise as in found in the U.S.

ANNEX

CRSP and Direct Linkages between U.S. Institutions and Collaborating Host Countries

State/Institutions/Collaborating CRSPs	Collaborating Host Countries
Alabama Alabama A&M (Peanut) Auburn (PDA)(SANREM)(B/C)(SOILS) Tuskegee (SANREM)	Burkina Faso, Ghana Honduras, Rwanda, Kenya, Egypt, Thailand, Haiti, Philippines, Peru, Ecuador, Cameroon Burkina Faso, Mali, Egypt
Arizona U. of Az. (PDA)(INTSORMIL)(ABSP)	Philippines, Egypt
Arkansas U. of Ark. At Pine Bluff (PDA)	Rwanda, Egypt
California U.C. Berkeley* U.C. (PDA) U.C. Davis (GL)(B/C) UCLA (GL) U.C. Riverside (B/C)	Egypt Honduras, Kenya, Peru, Philippines, Thailand Indonesia, Kenya, Morocco, Kazakhstan, Turkmenistan, Uzbekistan, Peru, Bolivia, Ecuador, Mali, Egypt Kenya, Ethiopia Uganda Senegal, Egypt
Colorado Colorado State (GL) Univ. of Colorado (GL)	Kenya, Egypt Tanzania, Kenya, Uganda
District of Columbia Intern. Center for Res. on Women (BASIS)	Ethiopia
Florida Florida A&M (INTSORMIL) U. of FL (SOILS)	Uganda, Malawi, Zambia, Senegal, Ethiopia, Egypt
Georgia U. GA. (IPM)(SANREM)(B/C)(Peanut)	Burkina Faso, Nigeria, Guatemala, Honduras, Kenya Peru, Philippines, Thailand, Ecuador, Mali, Ghana
Hawaii U. of Hawaii (PDA)(SOILS)	Egypt, Philippines, Kenya
Idaho U. of Idaho (B/C)(CASP)	Tanzania, Honduras
Illinois Southern Illinois U. At Carbondale (PDA) Univ. of Ill. (CASP)	Peru
Indiana Purdue (IPM)(INTSORMIL)(B/C)	Mali, Guatemala, Cameroon, Costa Rica, Niger, Ethiopia, Uganda, Eritrea, Kenya, Sudan
Iowa Iowa St.(SANREM)	Ecuador, Peru
Kansas KSU (INTSORMIL)(CASP)	Mali, Egypt, Kenya, Uganda, Niger, Egypt, Malaysia, South Africa, Swaziland, Uruguay

* Non-CRSP projects.

State/Institutions/Collaborating CRSPs	Collaborating Host Countries
Kentucky U. K. (GL)	Kenya, Ethiopia
Louisiana LSU*	Egypt
Maryland U. of Maryland* Maryland Eastern Shore*	Egypt Egypt
Massachusetts Harvard Inst. for Int. Devel.(BASIS) Williams College (GL)	South Africa Ethiopia, Kenya
Michigan Mich. St. (PDA)(B/C)(ABSP*) U. of Mich. (PDA)	Thailand, Costa Rica, Mexico, Malawi, Egypt, Kenya, Indonesia, Morocco, Jamaica Thailand, Egypt
Minnesota U. Minn. Duluth (GL)(B/C)	Mexico, Ecuador, Bolivia, Egypt
Mississippi Miss. St. U. (INTSORMIL)(CASP)	Honduras, Ethiopia, Nicaragua
Missouri Univ. of Missouri (GL) Lincoln U. (IPM)	Bolivia, Indonesia, Kenya, Jamaica
Montana Montana St. (IPM)(SOILS)	Mali, Ecuador, Peru
Nebraska U. of Neb.(INTSORMIL)(B/C)	Dominican Republic, Mali, Niger, Botswana, Namibia, Zambia, Zimbabwe
New York Cornell (GL)(SOILS) Inst. of Development Anthropology (BASIS)	Peru, Honduras, Ecuador, Bangladeshi, Nepal Ethiopia, Egypt
North Carolina NC State (GL)(Peanut)(SOILS)	Indonesia, Thailand, Costa Rica, Philippines, Mali
Ohio Ohio St. (IPM)(BASIS)	Philippines, Jamaica, Mali, Uganda, Ecuador, El Salvador, Egypt
Oklahoma U. of Ok. (PDA)	Honduras, Kenya, Peru, Philippines, Thailand, Egypt
Oregon Oregon St. (GL) (PDA)	Rwanda, Kenya, Honduras, Egypt
Pennsylvania Penn St. (IPM)	Philippines, Jamaica
Puerto Rico U. of PR (B/C)	Honduras

State/Institutions/Collaborating CRSPs	Collaborating Host Countries
South Carolina <p style="text-align: center;">Clemson (B/C) USDA Vegetable Lab</p>	Ghana, Egypt Jamaica
South Dakota <p style="text-align: center;">South Dakota St. (GL)</p>	Kazakhstan, Turkmenistan, Uzbekistan
Texas <p style="text-align: center;">Texas A&M (GL)(INTSORMIL)(Peanut)(SOILS)</p> <p style="text-align: center;">Texas Tech (GL) (INTSORMIL) U. of Texas (PDA)</p>	Argentina, Bolivia, Botswana, Brazil, Egypt, Namibia, Burkina Faso, El Salvador, Ethiopia, Ghana, Guatemala, Honduras, India, Uganda, Kenya, Mali, Mexico, Nicaragua, Niger, Tanzania, Uganda, Zambia, Zimbabwe Bolivia, Honduras
Utah <p style="text-align: center;">Utah St. (GL)</p>	Kenya, Ethiopia, Peru, Bolivia
Virginia <p style="text-align: center;">VPI&SU (IPM)(SANREM)</p>	Philippines, Jamaica, Mali, Uganda, Guatemala, Ecuador, Peru, Burkina Faso
Washington <p style="text-align: center;">Wash. St. (GL)(SANREM)</p>	Kenya, Burkina Faso, Mali, Tanzania, Egypt
Wisconsin <p style="text-align: center;">U. of Wisc. (GL) (SANREM)(B/C)(BASIS)</p>	Bolivia, Egypt, Kazakhstan, Kirgystan, Uzbekistan, Mexico, Ecuador, Bolivia, Philippines, Thailand, Burkina Faso, Mali, Costa Rica
Totals: 34 States, D.C. and Puerto Rico; 50 Institutions	Total: 50 Host Countries

24

ACRONYMS

ABSP	Agricultural Biotechnology Support Program
AFSI	Africa Food Security Initiative
ATRIP	Africa Trade and Investment Initiative
AGERI	Agricultural Genetic Engineering Research Institute
AGHEYMET	Agronomy, Hydrology and Meteorology
BIFAD	Board for International Food and Agricultural Development
CIAT	International Center for Tropical Agriculture
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CRSP	Collaborative Research Support Programs
FAO	Food and Agriculture Organization of the United Nations
FEWS	Famine Early Warning System
FTAA	Free Trade Area of the Americas
GATT	General Agreement on Tariffs and Trade
HACCP	Hazard Analysis of Critical Control Points
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ILRI	International Livestock Research Institute
IITA	International Institute for Tropical Agriculture
JCARD	Joint Committee on Agricultural Research and Development
KARI	Kenyan Agricultural Research Institute
IARC	International Agricultural Research Center
IMPACT	Impact Methods to Predict and Assess Contribution of Technology
IPR	Intellectual property rights
IPM	Integrated pest management
IRRI	International Rice Research Institute
LTC	Land Tenure Center, University of Wisconsin
LUPE	Land Use and Productivity Enhancement Project
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
PADF	Pan-American Development Foundation
PFID	Partnership for Food Industry Development
PPMP	Pest and Pesticide Management Project
PRARI	Program to Revitalize Agriculture through Regional Investment
SECID	Southeast Consortium for International Development
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WARDA	West African Rice Development Association
WHO	World Health Organization
WTO	World Trade Organization