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OFFICE OF AGRICULTURE (S&T/AGR)

OVERVIEW STATEMENT

The Office of Agriculture (S&T/AGR) manages one of AID's largest and most extensive research and development programs.

S&T/AGR: 1) fosters new scientific and technical breakthroughs relevant to developing countries' needs; 2) provides technical support and information to missions and LDCs.

S&T/AGR helps increase agricultural production, enhance income generation in the impoverished rural sector, eliminate poverty and hunger, and preserve natural resources and the environment. S&T/AGR strives to achieve these results by developing:

- 1 A sound, small-farm agricultural sector that is capital-conserving, energy-efficient and environmentally sound; and,
- 2. Human and institutional capacities within LDCs that will sustain a dynamic agricultural production and marketing system.

To carry out this mandate, S&T/AGR:

- 1. Mobilizes the expertise of U.S. universities and other U.S. Government agencies to conduct research and provide technical assistance;
- 2. Manages AID's technical, scientific and financial relationships with the International Agricultural Research Centers; and
- 3. Supports the strengthening of national research capability in LDCs, and of international research networks linking scientists in developed and developing countries and in international research centers.

In FY 1987 and FY 1988 S&T/AGR will finance research and technical assistance programs in more than 70 countries, involving field studies by some 120 scientists and more than 250 LDC research collaborators.

S&T/AGR works with other offices within the Bureau for Science and Technology, AID regional bureaus, AID field missions, other U.S. government agencies, other donor agencies, international organizations, and LDC institutions to carry out its overall goals.

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ER 2/5/87

SPRING AND WINTER WHEAT

Project No: 931-0621

PACD: 8/31/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$5,200,000	0
Obligation thru FY 86	400,000	0
FY 87 OYB	300,000	0
FY 88 anticipated (available)	300,000	0

B. PURPOSE:

To help developing countries for which winter wheat and winter barley are major food grains, in obtaining and using the latest improved winter wheat and winter barley germplasm as well as the technology to increase yields on small farms and in adverse environmental conditions.

C. COMPONENTS/ACTIVITIES:

Research 60%; Training 40%.

D. BACKGROUND:

1. Implementation began in 1976 with funding to date of \$4.0 million. Geographic concentration has been: Africa, 15%; Latin America/Caribbean, 20%; Asia, 15%; and the Near East, 50%. The ecological zones covered are: Arid/semi-arid, and rainfed.

2. Linkages with research centers in 45 countries have yielded 7,000 germplasms collected and evaluated; from these, 100,900 new spring and winter wheat crosses for genetic diversity were accomplished.

3. 110 students from 22 countries have been trained: 43 MSs, 44 PhDs in LDCs, 27 PhDs in the U.S.

4. Eight new winter wheat varieties and 174 new breeding lines with superior nutritional properties have been tested in 47 countries and are being considered for possible release. Wheat production in Turkey has risen by 10 million MT since the beginning of this program.

E. FUTURE ACTIVITIES/PLANS:

1. Continued collection and testing of germplasm and crosses
2. Several new varieties currently being tested worldwide will be made available for release in the next few years.
3. The project will phase out winter wheat and will concentrate on winter barley.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Collaborative interdisciplinary research and training programs using the enhancement of germplasm of winter and facultative wheat and barley.
2. Reports to plant breeders on more than 2000 germplasms through the computerized data bank.
3. Reports on results of the annual international winter and spring wheat screening nurseries.
4. Improved germplasm of winter and facultative wheat and barley with respect to nutrition, yields and biological stresses.

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CRSP - SORGHUM/MILLET

Project No: 931-1254

FACD: 6/30/90

<u>A. FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$27,500,000	\$45,000
Obligation thru FY 86	24,700,000	0
FY 87 OYB	2,185,000	0
FY 88 anticipated (available)	2,700,000	45,000

B. PURPOSE:

To improve the living conditions of small farm producers in developing countries and to increase the availability of low cost, nutritious sorghum and millet in the market place for the rural and urban poor.

C. COMPONENTS/ACTIVITIES:

Research 60%; Technical Assistance 5%; Training 35%.

D. BACKGROUND:

1. The sorghum/millet program began in 1979 with worldwide emphasis in Africa, 65%; Latin America/Caribbean, 20%; Asia, 10% and the Near East, 5%. The ecological zones included in the research agenda are: Tropical/sub-tropical, Arid/semi-arid, Rainfed and Irrigated.

2. Collaborative research has taken place in Sudan, reflected in sorghum and millet improvement. In Mexico a workshop on sorghum/millet farming systems has been carried out.

3. Research and technical assistance to LDC's has been provided in the form of conducting research and graduate training in the U.S. and the holding of workshops in the LDC's.

E. FUTURE ACTIVITIES/PLANS:

The sorghum/millet CRSP will continue to give technical and research assistance to LDC's on a buy-in basis from missions. Further training and research in sorghum/millet development and production will continue.

F. OUTPUTS IMMEDIATELY AVAILABLE:

- Annual reports
- Trip reports (various countries)
- Workshop proceedings

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p.21, 4263h

CRSP - BEAN/COWPEA

Project No: 931-1310

PACD 9/30/89

<u>A. FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$27,900,000	0
Obligation thru FY 86	19,300,000	0
FY 87 OYB	3,035,000	0
FY 88 anticipated (available)	2,600,000	0

B. PURPOSE:

To improve the living conditions of small farm producers in developing countries and to increase the availability of low cost, nutritious food in the market place for the rural and urban poor.

C. COMPONENTS/ACTIVITIES:

Research 60%; Technical Assistance 5%; Training 35%.

D. BACKGROUND:

1. Project funding began in 1981 with the life of project funding to reach \$27.9 million over the eight year life of the project. Project concentration is equally divided between Africa and Latin America/Caribbean for the following ecological zones: Arid/semi-arid, Humid, Rainfed and Irrigated.

2. Through access to new germplasm, improved cultivars have been developed and released. Senegal released 700 MT of beans seed to 100,000 small farmers whose production has increased from 16,000 MT in 1984 to 80,000 MT in 1985.

3. Improved nutritional value and reduced firewood/fuel requirements have been incorporated into the new releases. More efficient nitrogen-fixing bean cultivars have made it possible to increase their yield and decrease their production costs.

E. FUTURE ACTIVITIES/PLANS:

Further research is being done to find more efficient nitrogen fixing, higher yielding and high nutrition/low fuel requirement cultivars. Continued workshop and degree training in the U.S. and the LDC's will help to defeat the constraints in Bean/Cowpea production, availability and consumption.

F. OUTPUTS IMMEDIATELY AVAILABLE:

- Annual reports
- Research highlights
 - special reports
 - newsletters
- workshop and seminar proceedings
- Various journal articles

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p.23, 4263h

STORAGE AND PROCESSING OF FRUITS AND VEGETABLES

Project No: 931-1323

PADC: 09/30/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	# 5,415,000	4,500,000
Obligation thru FY 86	400,000	
FY 87 OYB	285,000	
FY 88 anticipated (available)	300,000	

B. PURPOSE:

To conduct adaptive research on the postharvest conservation of perishable fruits and vegetables, to provide technical assistance to LDC mission, to train graduate students and to collect and disseminate information on the postharvest conservation of perishables.

C. COMPONENTS/ACTIVITIES:

Research 15%; Technical Assistance 40%; Training 15%; Other 30%.

Technical assistance is available to USAID missions and host country institutions for training in improved storage and handling practices for perishables and design of improved processing systems for perishables. Feasibility studies for efficient domestic marketing systems, loss assessments and documentation services also are provided on request by developing countries.

D. BACKGROUND:

The project was conceived as a long-term effort which began in 1980. The study is now in the middle of its second 5-year cooperative agreement with the University of Idaho.

A number of linkages have been established during the past 7 years. The research and development institutions include the following:

- CIAT
- AVRDC
- CIP
- IFPRI
- Asian Development Bank
- McCormick & Atlanta Co./Grenada Nutmeg Marketing Assoc./marketing of spices in the U.S.
- Visayas State College of Agriculture, Philippines
- University of Virgin Islands
- Appropriate Technology Institute
- Association of SE Asian Nations (ASEAN)-Perishable Loss Methodology Studies
- Weyerhaeuser Corporation - packaging studies for perishable goods transport in the Caribbean

Highlights and Accomplishments to date include:

- Postharvest Insititue for Perishables (PIP) in its first 6 years of operation has sent over 75 short-term technical assistance teams to over 30 countries.
- PIP has accumulated over 9,800 technical post harvest loss control documents intis library.
- PIP has shared 42,000 technical reports with 850 regular clients in 114 countries.

E. FUTURE ACTIVITIES/PLANS:

- Development of a Methodology for rapid appraisal of Postharvest perishable losses.
- Shrink wrap for control of fruit flies and alternative treatment for Ethylens Dibromide Fumigation.
- Inexpensive solar refrigeration for LDC's
- Quality (oil, fat, moisture) factors fo Nutmeg & Marketing
- Postharvest handling and refrigeration of tropical fruits in Thailand
- Rapid market appraisal of fruit and vegetable marketing systems in Jordan
- Thailand fruit & vegetable marketing study - export of perishables to Asia & European markets.
- Dasheen Research and marketing in Jamaica

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. PIP Library has 9,800 technical postharvest loss control documents.
2. PIP presents an annual postharvest course for foreign agriculturalists.
3. Inexpensive solar dryer with auxiliary heat (to use for combustion of agricultural wastes) for drying fruits and vegetables.
4. Methodology manual for postharvest loss assessment for perishables (this is now being tested in 6 LDCs.
5. Technical assistance on postharvest loss control, storage, handling, packaging and marketing of perishables.

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CRSP- SMALL RUMINANT

Project No: 931-1328

PACD: 9/30/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$38,900,000	0
Obligation thru FY 86	29,400,000	0
FY 87 OYB	1,980,000	0
FY 88 anticipated (available)	2,800,000	0

B. PURPOSE:

To increase production of meat, milk and fiber from sheep and goats owned by small holders in LDCs.

C. COMPONENTS/ACTIVITIES:

Research 75%; Training 24%; Other 1%.

The project overseas a multi-disciplinary program to investigate the biological and socio-economic elements of the agricultural production systems in the regions where it is working. Linkages have been established between U.S. and LDC institutions in research programs involving nutrition, range management, animal health, sociology, economics, physiology, and systems analysis.

D. BACKGROUND:

The Small Ruminants CRSP, conceived as an 11-year effort, was initiated in 1978 under a collaborative agreement in which the University of California at Davis was the implementing organization with 8 other universities (U. of Missouri, Utah State Texas Tech., Texas A&M, Colorado State, Montana State, Washington State, and North Carolina State) and Winrock International as subgrantee institutions. The project overseas a multidisciplinary program to investigate the biological and socio-economic elements of the agricultural production in 5 countries: Brazil, Peru, Indonesia, Kenya and Morocco. Linkages have been established with more than one national agency within each country. Linkages have been established between US and LDC institutions in research programs involving nutrition, range management, animal health, sociology, economics, physiology, and systems analysis.

Integration of subject specialists, institutions and individual scientists is progressing rapidly and numerous project reports have been published. Complete production packages are now being formulated from the results of research in different ecological zones and in two systems of small ruminant production.

Highlights and Accomplishments to Date:

- The development of a rapid diagnostic test and new vaccine for contagious caprine pleuropneumonia in Kenya is of economic importance to Africa and Asia.
- The upgrading of Criolla sheep with a locally developed breed in Peru is expected to increase carcass meat production by 8,000 MT and grease wool by 200 million Kg per year.
- The development of a Selenium and Vitamin E treatment for lambs in Morocco has eliminated a severe white muscle disease problem which could save at least 1 million head of lambs per year.
- The development and introduction of dual-purpose goats to 150 farms in Kenya where no livestock were formerly maintained.
- The tripling of fiber yields from alpacas in Peru add \$40-\$50 U.S. annual income per animal.
- The inclusion of green legumes foliage in livestock rations in Indonesia has increased weight gains 120% and feed efficiency by 80% and could be applied to over 1 million sheep and goats there.
- The development of an accurate diagnostic test and control for two sheep diseases - pulmonary adenomatosis (SPA) in Peru and progressive pneumonia, an important respiratory disease of sheep throughout the world.

E. FUTURE ACTIVITIES/PLANS:

Four major activities are to be continued in the future:

1. Planning for national research programs with host country scientists
2. Establishing linkages among host country agencies in order to focus on common objectives
3. Developing laboratory facilities
4. Providing direction for host country research programs

F. OUTPUTS IMMEDIATELY AVAILABLE:

- Annual reports on accomplishments and budgets
- Annual Evaluation Report by the Independent Committee
- Annual Work Plans for 15 Research Subprojects
- 5 Year Summary of Accomplishments
- Listing of Research Publications (1978-83)
- Technical Reports (44 to date)
- Genetics of Reproduction in Sheep, a reference book on prolific sheep with contributions from 50 scientists in 17 countries.
- Quarterly Newsletter
- Program Information Brochure

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PEANUT COLLABORATIVE RESEARCH SUPPORT PROGRAM(CRSP)

Project No: 936-4048

PADC: 06/30/90

<u>A. FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$9,850,000	\$150,000
Obligation thru FY 86	6,800,000	
FY 87 OYB	1,600,000	
FY 88 anticipated (available)	1,700,000	

B. PURPOSE:

To coordinate resources of LDC and U.S. institutions in a long-term research program to relieve constraints on production and utilization of the peanut in the LDCs.

C. COMPONENTS/ACTIVITIES:

Research 60%; Technical Assistance 5%; Training 35%

D. BACKGROUND:

The project was initiated in August 1982, with the University of Georgia as the management entity and the following U.S. subgrantee institutions: 1) Alabama A&M University, 2) North Carolina State University, 3) Texas A&M University and 4) University of Georgia. Linkages with LDCs, International Agricultural Research Centers and other research centers are: the countries of Burkina Faso, Mali, Niger, Nigeria, the Philippines, Senegal, Sudan and Thailand, and the Research Centers of ICRISAT, IRRI, CARDI - including Antigua, Belize, Jamaica, St. Kitts, St. Vincents and Trinidad..

The Board for Food and Agricultural Development (BIFAD) approved the External Evaluation Panel's recommendation for a three-year extension of the Peanut CRSP through year eight to June 1990. Peanut CRSP operations have been adjusted to accommodate the reductions in S&T/AGR program funding.

Research and operating procedures have been developed in all collaborative countries and research results have been found to be of value to the U.S. peanut industry as well as to the developing countries. Trained researchers returning to their countries form critical components of their peanut research efforts.

SEMI-ARID TROPIC (SAT) ENVIRONMENT - New peanut cultivars have been found to meet the tests imposed by diseases, insects, drought and heat. Some of the lines are equal to or better than local cultivars in seed and haulm yields, an indication of drought tolerance. Some of the lines also show an increase in the number of plants that survive until harvest, a major contribution to the yield potential. And, the percentage of good seed at harvest was higher in one of the improved lines. Without a doubt, any improved lines developed to survive the harsh SAT environment will be of interest to the peanut farmer of America's southwest, another peanut growing area under the constant threat of drought.

BIOTECHNOLOGY - Genetic resistance to pests is found in so-called wild *Arachis* species, but interspecific crosses with the cultivated *Arachis hypogaea* produce infertile plants. Genetic manipulation to produce interspecific hybrids and introduce genes for resistance into cultivated species are tedious, and successes rare. The Peanut CRSP breeding project has established an embryo rescue program to increase the frequency of interspecific hybrid production between the wild and cultivated species. Significant progress has been made in the past three years in regenerating plants from the callus of both wild and cultivated species. Plantlets with both roots and shoots have been obtained and the methodology to rescue developing embryos has been established.

PEANUT FOLLOWING RICE - Often the rice paddy lies fallow following rice harvest, necessitating the application of expensive commercial nitrogen to maintain good yields. The peanut, a legume, fixes nitrogen for its own use and for the subsequent rice crop. This approach also provides extra food or available income for the subsistence farmer. After three years of breeding and selecting Thai peanut lines for production following rice, improvements can be seen. Several lines have shown performance superior to the common local cultivar, Tainan 9. Soon a new cultivar with higher and more stable yield patterns will emerge.

CONTROL OF FOLIAR AND SOIL DISEASES - Untold losses to peanut yields are incurred annually because of foliar and soil-borne diseases. Chemical control is expensive, and cultural control is only partially effective. Genetic control is on the horizon. The contributions of the pathology collaborators in to the breeding projects have been invaluable, with disease surveys in Senegal, the Philippines, and Thailand providing a focus for breeding and cultural control efforts. We know that weather-based timing of fungicide applications for leafspot control in U.S.A. decreases chemical costs. Studies on leafspot, rust and other foliar diseases conducted in Thailand and the Philippines help answer this question. Losses from soil-borne diseases are evaluated in Senegal and Texas, with a concurrent exchange of information. Pathologist and breeders cooperate to take and analyze the never-ending ratings for disease resistance in breeding programs. To stabilize or increase yields, diseases must be controlled.

RICE AND PEANUT AND SOIL MICROBIOLOGY - Rice and peanut go together with peanut following rice in a crop rotation. Since rice is flooded with water for long periods of time, the question facing researchers has been, Can sufficient rhizobia from one peanut crop survive the flooding to inoculate the next peanut crop? Peanut CRSP researchers have found that rhizobial numbers decrease steadily during flooding, but sufficient numbers do survive for adequate inoculation of the next peanut crop. Rhizobium strains may exist that will survive in greater numbers during flooding to provide more rapid inoculation to enhance plant growth.

MYCORRHIZAE, A NOVEL APPROACH TO INCREASE YIELDS - Can peanuts be field-inoculated with apparently superior mycorrhizal strains to increase yields? Of ten mycorrhizae species tested in the Philippines, one resulted in better peanut plant growth due to the symbiotic association with similar results in Thailand and Texas. It is expected that this research will provide a way over a seemingly insurmountable roadblock of how to produce and introduce spores into a field to promote inoculation with superior species.

AFLATOXIN MANAGEMENT WITH A MINI-COLUMN - Current techniques to analyze aflatoxins pose a problem in developing countries because the best procedure requires expensive and sophisticated equipment that needs specialized maintenance and the traditional mini-column procedures are only semiquantitative techniques. A new mini-column was developed by the Peanut CRSP toxicology team by adding bentonite clay to the column packing material and resulted in a more concentrated and clearly defined layer of fluorescence. The mini-column has also been used in the development of a simplified procedure for the rapid analysis of aflatoxins in crude peanut oil. It is believed that this new procedure could be contained in a portable unit to provide rapid on-site analysis of the contaminated, crude peanut oil used in Senegalese villages.

AFLATOXIN NUT REMOVAL, OF SORTS - Any aflatoxin-contaminated peanut that reaches the processor must be removed or decontaminated prior to processing. Samples of aflatoxin contaminated peanuts were hot-water blanched in laboratories in the Philippines and Thailand. Without their seedcoats, damaged seeds could be readily observed and removed in visual sorting procedures. This simple sorting technique is effective and can be adapted for use by home- and cottage-level processors.

E. FUTURE ACTIVITIES/PLANS:

The Peanut CRSP will continue to consolidate its operations to deal with funding realities. The new ICRISAT Sub-Sahelian Research Center in Niger has been planned in coordination with the Peanut CRSP and future research, training and outreach activities will continue with the two programs continuing to complement each other. Benefits from the germplasm collected by the Peanut CRSP to the U.S. peanut industry will become apparent as insect, virus, disease and drought resistance is incorporated into U.S. peanut varieties.

F. OUTPUTS IMMEDIATELY AVAILABLE:

Technical Assistance and short-term to degree training. The following services are available on a buy-in basis: a) Short-term technical assistance in the areas of breeding for disease resistance, insect resistance and drought tolerance, integrated pest management including emphasis of insects virus, foliar diseases, rhizobia, mycorrhizae and mycotoxins and post harvest handling. b) Degree training in areas listed in (a) above. c) Short-term training in areas listed (a) above.

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Host Resistance/Integrated Tick Control

Project No: 936-4083

PACD: 8/31/86

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL:	\$1,450,000	0
Obligation thru FY 86:	930,000	0
FY 87 OYB	260,000	0
FY 88 anticipated (available):	260,000	0

B. PURPOSE:

To attack tick-borne diseases such as Heartwater and Babesiosis in livestock. To find & multiply tick resistant strains of livestock & to develop vaccines against ticks.

C. COMPONENTS/ACTIVITIES:

Research 85%; Technical Assistance 5%; Training 10%

Development of:

1. vaccines which protect livestock against ticks
2. improved measures for the control of ticks in the environment
3. lines of livestock breeds having high natural resistance to ticks

D. BACKGROUND:

Initiated in September of 1983 with The International Centre for Insect Physiology and Ecology with LDC linkages with Kenya and other collaborating African states. The following accomplishments have been realized:

1. The investigators conducting this research have identified and isolated the antigens produced by ticks which are effective as a vaccine in producing immunity (resistance) in livestock to ticks. This occurs through the production of antibodies in the animal's blood which attack the tick's digestive system when it attempts to attach to and feed from the animal.
2. Breeds, and lines within breeds, of African cattle have been identified which show a high degree of natural resistance to tick infestation. These animals are being characterized genetically and their numbers increased through selective breeding. Defining the genetic component of this resistance would pave the way for identifying livestock around the world that have this capability.
3. Basic research on tick ecology has provided new bases for controlling ticks in the environment through the use of specific attractants.

E. FUTURE ACTIVITIES/PLANS:

Investigations into the development of resistant cattle and proper treatment of ticks will continue.

F. OUTPUTS IMMEDIATELY AVAILABLE:

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p.41 4263h

SOYBEAN UTILIZATION & RESEARCH

Project No: 936-4132

PACD: 12/31/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$5,950,000	\$560,0000
Obligation thru FY 86		0
FY 87 OYB	550,000	0
FY 88 anticipated (available)	600,000	0

B. PURPOSE:

Assist private businesses and government entities in developing countries develop, test, adapt, and disseminate new soy products and soybena processing techniques with particular concern for products meeting the needs of the malnourished.

C. COMPONENTS/ACTIVITIES:

Research 75%; Technical Assistance 25%; Training 0%.

D. BACKGROUND:

Processing Research: Historically, processing of soybeans has been either through an extrusion process or through an expeller process. The research funded under the Soybeans Utilization and Research Project at the University of Illinois at Urbana-Champaign (UIUC) demonstrated that 75 percent of the edible soy oil can be removed from soybeans with only one pass through a mechanical soy expeller by first conditioning the whole or dehulled beans in the extruder. The process also increases the rated capacity of the expeller by as much as 400 percent. The process produces a high-quality, natural oil and a partially defatted meal suitable for both animal feed and human food products. The process has a low energy requirement, can be conducted with low presision machinery and has wide application for small enterprises in the U.S. and abroad.

New Product Development: Even though the soy foods are high in protein content and contain the favorable, low saturated and no cholesterol oil, product development has taken a great step forward with the UIUC research on blanching dry beans in boiling water cotaining a small amount of sodium bicarbonate. This process inactivates the enzyme that causes the strong beany flavor naormally associated with soy foods, destroys antinutritional agents and tenderizes the beans. Improved snack foods, soups and soy flour for weaning foods, as well as new products such as rice/soy and corn/soy blends have been developed. Several advances have been made in upgrading simple soymilk processing to a medium-scale commercial level using a new steam injection technique.

New Frozen Foods Product: First results of field and laboratory testing on the processing and marketing of frozen green, raw soybeans for the U.S. and other countries with frozen food markets are encouraging. Harvesting problems for this product which has twice the protein of peas or lima beans have been largely overcome. Commercially available green bean picking equipment has proved highly successful during summer field tests. Progress is being made on improving depodding techniques. The product will provide another market for soybeans out of the traditional oil and/or meal markets.

Socio-economic Studies with Soybean Utilization: UIUC initiated studies on the cost analysis of extrusion cooking and mechanical expelling preceded by extrusion using data from India. Studies of the soyfood industry of Sri Lanka were initiated. A survey of "state of the art" whole soy processing and utilization research and development around the world has begun.

Coordination and Cooperation: UIUC cooperated on the establishment of the soybean utilization program at the International Institute for Tropical Agriculture (IITA) with emphasis on home and village processing. UIUC worked with IITA to help obtain a three-year grant of \$300,000 from IDRC to fund a cooperative soybean utilization program with the Nigerian government and IITA. UIUC staff responded to several hundred requests for more information about soyfood processing from more than 30 countries during the last year. More than 100 visitors from 20 different countries visited the facilities. Valuable contacts have been continued among UIUC, U.S. foreign industry foundations, commodity groups and private voluntary organizations.

Training and Communications : A six-week soy utilization short course at UIUC in 1986 was attended by 12 participants from nine countries. Brochures, a newsletter, a special booklet on "The Soybean Solution: Meeting World Food Needs", popular articles and an audio-visual presentation have been developed.

Infrastructure and Support Above and Beyond Expectations: The University and the State of Illinois have committed approximately \$1.4 million to completely remodel the current project laboratories and pilot plant. In addition to equipment purchased with contract funds, the private sector has donated \$420,000 in equipment during CY 1987.

E. FUTURE ACTIVITIES/PLANS:

Further research and development in the area of soybean utilization is planned in order to create more uses for high protein soy foods in LDCs.

F. OUTPUTS IMMEDIATELY AVAILABLE:

The following services are available on a buy-in basis.

1. Training programs in soybean utilization - short-term.
 - six week soybean utilization course at UIUC each summer.
 - degree training in soybean utilization with hands-on experience in public and private sector laboratories.

2. Short-term technical assistance:

- short-term technical assistance is available by UIUC professionals and private sector individuals in the areas of processing, handling, packaging and economic analysis of products as developed.

G. CONTACTS FOR SUPPORT:

Project Manager

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Project Director

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COLLABORATIVE RESEARCH IN SPECIAL CONSTRAINTS AFFECTING
THE PROGRAMS OF THE INTERNATIONAL AGRICULTURAL RESEARCH
CENTERS (IARCS) SPECIAL CONSTRAINT RESEARCH

Project No: 936-4136

PACD: 09/30/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$4,200,000	0
Obligation thru FY 86	700,000	0
FY 87 OYB	550,000	0
FY 88 anticipated (available)	500,000	0

B. PURPOSE:

To provide a system that puts U.S. human and technological resources in the U.S. agricultural science community at the services of the IARC network.

C. COMPONENTS/ACTIVITIES:

Research: 60%; Technical Assist: 30%; Training: 10%.

Linkages of U.S. public and private institutions with the following IARCS:
The activities of the project are targeted to establish,
International Maize and Wheat Improvement Center
International Center for Tropical Agriculture
The Asian Vegetable Research and Development Center
International Institute of Tropical Agriculture
International Rice Research Institute
International Center for Agricultural Research in the Dry Area
International Crops Research Institute for the Semi-Arid Tropics
International Livestock Center for Africa
International Laboratory for Research on Animal Diseases
International Centre of Insect Physiology and Ecology
International Potato Center

D. BACKGROUND:

The implementation process begins in August 1987. Its main accomplishments are as follows:

1. The project awarded nine (9) research projects to nine (9) different universities for collaborative research with seven (7) IARCS totaling \$800,300 in 1986. See attached listing of these projects. Research results will be known in 2 to 3 years. The proposals for FY 87 have been received and are being evaluated.

2. This project is strengthening and increasing the research network between the IARCs and U.S. institutions and familiarizing researchers with LDC research problems.

3. The proposals funded in 1986 were :

- a) Evaluation, Management, and Utilization of Maize Germplasm and Breeding Systems. CIMMYT - University of Nebraska (C. O. Gardner).....\$84,668.
 - b) The Urgent Requirement by IITA for a Taxonomic Resolution of Cylas in Africa. IITA - Rutgers University (G. W. Wolfe).....\$49,852.
 - c) Chemotherapy and Thermotherapy of In Vitro Potato and Sweet Potato Plantlets. CIP -- University of Wisconsin (S. A. Slack).....\$84,000
 - d) Monoclonal Antibodies and Cloned DNA to Index for Sweet Potato and Yam Viruses. USDA/ARS, Beltsville - (R. H. Lawson).....\$143,610.
 - e) Development of a Barley Yield Simulation Model, - ICARDA and IFDC - Michigan State University - (J. T. Ritchie).....\$110,000.
 - f) Differentiating the Corn Stunt and Maize Bush Stunt Diseases in Latin America. - CIMMYT - Ohio State University - (D. T. Gordon).....\$55,432.
 - g) Reproductive Biology of Striga hermonthica. - ICRISAT - Old Dominion University - (L. J. Musselman).....\$112,667.
 - h) Removing Soil Structural Constraints to the Production of Maize and Legumes Following Rice. IIRI - University of Minnesota - (W. E. Larson).....\$110,000.
 - i) Determination of Plants from Wild Glycine Species to be Resistant to Phasokospora pachyrhizi. AVRDC - University of Illinois (T. Hymowitz).\$50,000.
- Total.....\$800,232.

(The International Agriculture Research Centers participating are: CIMMYT (2), IITA (2), CIP, ICARDA, IFDC, ICRISAT, IRRI, AND AVRDC).

E. FUTURE ACTIVITIES/PLANS:

F. OUTPUTS IMMEDIATELY AVAILABLE:

G. CONTACTS FOR SUPPORT:

Project Manager

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Project Director

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IPM and Environment Protection Including Bio-Control

Project No: 936-4142

PACD: 9/30/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$5,800,000	0
Obligation thru FY 86:		0
FY 87 OYB:	475,000	0
FY 88 anticipated (available):	520,000	0

B. PURPOSE:

Provide technical assistance, training, research and networking to LDCs in the areas of pest and pesticide management.

C. COMPONENTS/ACTIVITIES:

Technical Assistance 65%; Training 10%; Networking 10%; Research 15%.

D. BACKGROUND:

E. FUTURE ACTIVITIES/PLANS:

1. Aid to LDC's:

The project will conduct a regional seminar/workshop in pest and pesticide management and conduct training courses in crop loss assessment, weed technology and pesticide residue analysis. In addition, the project will assist in project planning in crop protection as related to AID country projects and will conduct train-the-trainer programs in pesticide safety. Also, the project will assist in planning and will backstop a local currency research project and prepare a number of environmental assessments for clearance of pesticides in country projects. The project also has been very active in the current African grasshopper/locust emergency and has provided substantial technical assistance in pest management related activities.

2. Aid to U.S. Agriculture:

Involvement of U.S. crop protection scientists in the project will allow them to observe, first hand, how crop pests are controlled in both the semi-arid rainfed zone and in the hot humid tropics. Both of these conditions in a sense represent the extreme of U.S. agriculture and therefore provide valuable insights in terms of effectiveness of pest management procedures under extreme conditions of variation. Also, many pests which are indigenous in the LDC's are not present in the U.S. However, if accidentally introduced

they can wreak havoc. Better knowledge of foreign pests materially assist in early recognition of accidentally introduced pests thereby allowing for the development of effective control/eradication techniques before the pest reaches epidemic proportions.

F. OUTPUTS IMMEDIATELY AVAILABLE:

G. CONTACTS FOR SUPPORT:

Project Manager
Mr. Carroll W. Collier
AID/ST/AGR/EP
Room 413 SA-18
Washington, D.C. 20523
Phone: 703-235-8886

Project Director
Dr. Allen Steinhauer
University of Maryland, c/o CICP
4321 Hartwick Rd. Suite 404,
College Park, MD 20740
Phone: 301-454-5147

IMPROVED SEED PRODUCTION AND UTILIZATION

Project No: 936-4143

PACD: 7/15/91

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$3,420,000	\$1,347,000
Obligation thru FY 86:	2,073,000	0
FY 87 OYB:	130,000	0
FY 88 anticipated (available)	255,000	0

B. PURPOSE:

To improve capabilities in LDCs for the efficient production, conditioning, distribution and utilization of seeds of improved food and feed crop varieties.

C. COMPONENTS/ACTIVITIES:

Research: 40% Technical Assistance: (Available through Basic Ordering Agreement) Training: 25% Other: 35%

1. Preparation of project identification documents and project papers.
2. Evaluation of seed programs and recommendations for improvement.
3. Design and specification of facilities and equipment needed for a seed program.
4. Regional, in-country, in-service, and on-the-job training.
5. Degree (B.S., M.S., Ph.D.) and special training programs at MSU with specialization in seed technology.
6. Informational (technical/management) services.
7. Analysis and resolution of technical problems in seed production, conditioning and storage.
8. Review and evaluation of seed projects or the seed components of larger projects.
9. Consulting in privatization and agri-business management.
10. Review and make recommendations on government and private sector policies for the effective operation of seed programs, including items such as: pricing, seed marketing, quality control, certification and seed legislation.

D. BACKGROUND:

The project was initiated in March 1958, under project 931-0203. Last extension in July, 1986 with a new project and cooperative agreement for the period 9/86-7/91. The U.S. subgrantee institution is the Seed and Technology Laboratory (STL) of Mississippi State University (MSU).

The accomplishments are as follows:

1. Training: 253 students from 57 countries have earned degrees in Agronomy-Seed Technology and Management (33, B.S.; 175 M.S.; 45 Ph.D.). 61 participants have received special, non-degree training for 4 to 9 months.

461 participants from 71 countries have completed the annual 9/10 week "Seed Improvement Course" (OICD/TC-130-3) held at MSU. Most of the key positions in the seed program/industry of LDCs are occupied by MSU-trained persons.

2. Technical Assistance: 265 short-term technical assistance consultations have been made to 55 countries. MSU has been substantially involved in seed program/industry development activities in Brazil, Burma, Cameroon, Chile, CIAT (for seed unit), Colombia, Costa Rica, Dominican Republic, Ecuador, Ghana, Guinea Bissau, Guyana, Honduras, India, Indonesia, Morocco, Nepal, Niger, Nigeria, Panama, Paraguay, the Philippines, Taiwan and Thailand.

3. Technology Transfer and Information Services: MSU has been the major medium for technology transfer in seed technology from the developed to the developing countries and the main source of technical information since the mid-1950's. For example, MSU developed a low-cost reusable kit (value U.S. 15¢) for farmers to determine the moisture content of seeds for storage. This kit will be introduced into several LDCs.

4 Allied Activities: MSU has provided the technical assistance and management for three of USAID's most successful seed projects: Brazil (1964-76); India (1968-71); Thailand (1978-87).

E. FUTURE ACTIVITIES/PLANS:

- 1) Various research projects to improve the seed technology and industry under tropical conditions.
- 2) Various long- and short-term training programs.
- 3) Appropriate technology will be transferred to and disseminated in LDCs.
- 4) Handbook on Seed Processing and Handling will be revised.
- 5) Handbook on Seed Drying and Storage will be prepared.
- 6) Handbook on Quality Assurance and Central Methods in Seed Enterprises will be prepared on comprehensive systems for private and public operation.
- 7) Semi-annual research and development reports will be distributed.
- 8) Guidelines for maintenance of seed varieties, field inspections and breeder foundation seed production will be published.

F. OUTPUTS IMMEDIATELY AVAILABLE:

- 1) Applied research program to solve seed supply problems in LDCs.
- 2) T.A. to missions for:
 - a) planning, organization and implementation of seed production and supply projects/programs in LDCs;
 - b) identification, analysis, and recommendations for resolution of technical and operational problems in seed production, conditioning, testing, storage, and marketing;
 - c) layout designs and technical specifications for seed facilities and equipment including assistance with installation, operational checks, and management aspects;

- d) technical and economic studies to develop essential methodology, establish design criteria, and identify/characterize economic-management requisites for efficient and effective seed production and supply operation in the LDCs.

3. Training:

- a) Annual 9-week Seed Improvement Course
- b) Graduate training to B.S., M.S. and Ph.D. degree
- c) Special non-degree training from one to six months
- d) In-country and regional training courses from 2-3 weeks upon request

4. Technology Transfer:

- a) Handbook on Seed Processing and Handling
- b) Workshops and Conferences
- c) Semi-annual research and development reports

5. Services to Missions:

- a) For assignments estimated to less than \$25,000 mission can issue Purchase Orders directly to MSU Office of International Programs, P.O. Box 6342, Mississippi State, MS 39762. Competitive bidding is not required.
- b) For assignments estimated at be more than U.S. \$25,000, missions should make requests to Frank Mertens, S&T/AGR by PIO/T under the Basic Ordering Agreement No. DAN-4143-B-00-7001-00. Expert personnel salary ranges from 200 to 260 US dollars per day plus overhead cost of 17.5% in-country of 43.4% on the MSU campus..

G. CONTACTS FOR SUPPORT:

Project Manager

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Project Director

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Mississippi State, MS 39762
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POSTHARVEST GRAIN SYSTEMS RESEARCH & DEVELOPMENT

Project No: 936-4144

PACD: 2/15/91

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$3,245,000	\$2,400,000
Obligation thru FY 86:	600,000	0
FY 87 OYB:	370,000	0
FY 88 anticipated (available):	425,000	0

B. PURPOSE:

To improve the capability of LDCs to reduce post harvest cereal and legume losses.

C. COMPONENTS/ACTIVITIES:

1. Technology transfers including technical assistance.
2. Training
3. Research
4. Networking Activities
5. Technical Assistance through the Basic Ordering Agreement

D. BACKGROUND:

Since July 1967, the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) has had a continuing agreement with the Bureau of Science and Technology to provide assistance with postharvest grain systems involving grain storage, processing, marketing, and agribusiness development. This assistance has been available to developing countries worldwide.

The main accomplishments of this project are:

1. Technology Transfer

Technology transfer including technical assistance requests, reports and other publications prepared based on these assistance requests and other subjects of interest, and the Postharvest Documentation Services. Staff member consultants have responded to 177 requests for technical assistance, including pre- and post- feasibility studies from 59 countries. Results of FFGI activities are published in the form of technical assistance reports, research reports, and special reports. A total of 104 technical assistance reports, 20 research reports, and 12 special reports on subjects of broad general interest have been prepared to date.

2. Training

The Grain Storage and Marketing Short Course has been held annually on the KSU campus since 1970. This intensive training in grain storage, processing, and marketing has been provided to 411 participants from 73 countries.

Other on-campus training programs are program evaluation, planning, implementation, management, computerized methods of feasibility analysis, systematic procedures for effective project formulation and evaluation, grain handling, conditioning and storage management and a workshop on the larger grain borer has been performed.

Funding for on-campus academic training has been provided in grain storage technology for 38 students from 14 overseas countries (24 M.S., 14 Ph.D), and in grain marketing economics for 10 students from 5 overseas countries (3 M.S., 7 Ph.D.).

In-country training programs are designed so that the subject matter presented in the course meets the individual needs of a given developing country. The objective of these training courses is to solve specific problems in grain storage, handling, and marketing through instruction of operational personnel and through the training of trainers. Training manuals are developed for each course in order to address the specific areas to be covered by the program. In-country training by FFGI staff has been provided to 969 participants in 20 countries.

3. Research

Based on problems encountered during assistance efforts in developing countries, research projects have been developed to provide information not presently available for use in responding to these problems in postharvest grain systems. The overall objectives of the research activities have been to apply solutions to problems existing in developing countries, assist developing country institutions in improving human resources and research technologies, and provide applied training for developing-country researchers. Projects are carried out by staff members and graduate students whose work may or may not be funded by the cooperative agreement.

E. FUTURE ACTIVITIES/PLANS:

Continuation of the activities described in (D) background.

F. OUTPUTS IMMEDIATELY AVAILABLE:

Outputs Immediately available:

1. Technical Assistance: The project provides problem-solving technical assistance in postharvest grain systems to missions. This assistance is directed towards solving problems which have been identified by the developing countries and the USAID missions. These efforts address the areas of feasibility studies, marketing studies, policy actions, equipment requirements and design, grain reserves, improvements of grain storage and handling facilities, and improvement of grain preservation.

2. Training: a) annual 7-week course in the storage and marketing of cereal grains and legumes in LDCs. b) on-campus academic training for degrees in fields related to postharvest storage, handling and marketing practices, c) special on-campus and in-country short courses.

3. Research to address problems in postharvest grain systems and to develop appropriate technologies. .

Services desired may be obtained by:

1. For assignments estimated to be less than U.S. \$25,000 mission may issue Purchase Orders directly to KSU Department of Grain Science and Industry, Shellenberger Hall, Manhattan, KS 66506. Competitive bidding is not required.

2. For assignments of more than U.S. \$25,000 agencies may make request through Frank Mertens S&T/AGR by PIO/T for desired services through the Basic Ordering Agreement DAN-4143-B-00-7001-00. Expert personnel salary ranges from 200-266 US dollars per day plus overhead cost of 38.5%.

G. CONTACTS FOR SUPPORT:

Project Manager
Mr. Frank Mertens
ST/AGR/AP, A.I.D./W
Wash., D.C. 20523
Phone (703) 235-1497

Project Director
Dr. Roe Borsdorf
Shellenberger Hall
Dept. of Grain Science and Industry
Kansas State Univ.
Manhattan, KS 66506
Phone (913)532-6161

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Crop Nematode Research and Control

Project No: 936-4149

PACD: 09/13 87

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$1,000,000	\$30,000
Obligation thru FY 86	666,667	0
FY 87 OYB	333,333	0
FY 88 anticipated (available)	0	0

B. PURPOSE:

Conduct research on nematodes of economic importance on crop plants in developing countries; provide technical assistance, conduct training and serve as a research network coordinator.

C. COMPONENTS/ACTIVITIES:

Research 65%; Technical Assistance 10%; Training 5%; Technical Newsletter 20%.

D. BACKGROUND:

The project was initiated in September 1984 with headquarters at North Carolina State University. The project's main accomplishments to date are:

1. To Screen crop germplasm for resistance to nematodes.
2. To identify nematode problems involving important crops.
3. To evaluate cropping systems involving important crops.
4. To develop a research network of LDC collaborators.

E. FUTURE ACTIVITIES/PLANS:

F. OUTPUTS IMMEDIATELY AVAILABLE:

. Directory of International Network of Scientists engaged in nematology research

G. CONTACTS FOR SUPPORT:

Project Manager

Dr. Harvey Hortik
ST/AGR/AP, A.I.D.
SA-18, Rm 411
Wasn., D.C. 20523
Phone (703) 235-1497

Project Director

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North Carolina State University
Dept Plant Path. Bx 7616
Raleigh, NC 27695-7616
Phone (919) 737-2721

Vertebrate Pest Management

Project No: 936-4173

PADC: 12/31/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$3,910,000	0
Obligation thru FY 86		
FY 87 OYB	\$300,000	
FY 88 anticipated (available)	-0-	

B. PURPOSE:

Reduce preharvest and postharvest losses to food crops caused by vertebrate pests.

C. COMPONENTS/ACTIVITIES:

Technical Assistance 75%; Training 25%

D. BACKGROUND:

This project is a revision of an earlier project (#936-4120) that was initiated in FY 83.

The rescoped project has the objective of developing, further adaption, and improving vertebrate pest management systems.

E. FUTURE ACTIVITIES/PLANS:

F. OUTPUTS IMMEDIATELY AVAILABLE:

G. CONTACTS FOR SUPPORT:

Project Manager

Mr. Carroll Collier
ST/AGR/RNR, A.I.D.
SA-18, Rm 4
Wash., D.C. 20523
Phone (703) 235-

Project Director

Dr. Richard Bruggers
Denver Wildlife Research Center
Blg 16, Denver Fed Ctr Bx 25266
Denver 80225-0266
Phone (303) 236-7878

IMPROVED ANIMAL VACCINES THRU BIOTECHNOLOGY

Project No: 936-4178

PACD: 08/31/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$ 5,870,000	-0-
Obligation thru FY 86	870,000	
FY 87 OYB	350,000	
FY 88 anticipated (available)	480,000	

B. PURPOSE:

To transfer the immunizing antigens of the rinderpest virus (prevalent throughout Asia and Africa) to the vaccinia virus to have a vaccine which, because it requires no refrigeration nor costly equipment for its administration, is better suited to Third World conditions than the existing vaccine which has not been adequate for the eradication of rinderpest.

C. COMPONENTS/ACTIVITIES:

Research 70%; Technical Assistance 10%; Training 18%; Other 2%

D. BACKGROUND:

The project was initiated in September 1986. Under the Management of the University of California/Davis and with Kenyas as the LDC linkages.

No truly adequate vaccines against these rinderpest exist. Recent data shows, that production losses due to the carrier state of this disease (which occurs throughout the world, including anaplasmosis in the United States) costs more that does the acute disease. The latest biotechnological research on this disease indicates that it is feasible to seek improved vaccines, using the stable vaccinia virus as the carrier of the hemoparasite antigens, to eliminate the carrier state or to, perhaps, provide a basis for eradication of these disease. As a second task to support present efforts to develop diagnostic techniques for and a vaccine against (there is no adequate vaccine at present) heartwater disease which has been translocated from its origin in Africa to the Caribbean Islands where it poses a threat to the livestock industry of the American Mainland.

E. FUTURE ACTIVITIES/PLANS:

A Request for Application for this grant will be issued and the project will be funded in FY 87. The development of this project is dependent upon the availability of funds.

F. OUTPUTS IMMEDIATELY AVAILABLE:

None

G. CONTACTS FOR SUPPORT:

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Project Director
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Office of Research, 275 Mark Ave
Davis, CA 95616
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AGRICULTURE SECTOR RESEARCH SERVICES

Project No: 931-0060

PACD: 09/29/88

A. FUNDING:

	S&T	Buy-ins
LOP TOTAL	\$5,460,000	0
Obligation thru FY 86	5,460,000	0
FY 87 OYB	0	0
FY 88 anticipated (available)	0	0

B. PURPOSE:

To provide general support to AID/W and USAID field missions in economic analysis, policy and planning for agricultural development.

C. COMPONENTS/ACTIVITIES:

Research 20%; Tech Assist 60%; Training 10%

D. BACKGROUND:

The project is implemented through a Reciprocal Support Services Agreement (RSSA) with the office of International Cooperation and Development of the USDA and draws largely on expertise of the USDA Economic Research Service in agricultural trade, production and policy issues. The project provides the assistance of agricultural economists for project design, evaluation, special study and sector analysis activities. The project has assisted USAID missions in: Sri Lanka (Sector Planning and Analysis); Honduras (Agriculture Sector Project Design); and the Dominican Republic (Price Policy Study).

E. FUTURE ACTIVITIES/PLANS:

Funding for this project terminated in FY 1986; the remaining pipeline of funds is being used to complete studies on agriculture trade policy.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Agriculture Policy modeling using micro-computers
2. Food policies in developing countries
3. Agriculture production indices

F. CONTACTS FOR SUPPORT:

Project Manager
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AGRICULTURE POLICY ANALYSIS PROJECT (APAP)

Project No: 936-4084

PACD: 9/29/88

A. FUNDING:

	S&T	Buy-ins
LOP Total	\$6,260,000	\$2,796,795
Obligation thru FY 86	4,495,000	1,511,505
FY 87 OYB	840,000	721,281
FY 88 anticipated (available)	925,000	563,973

B. PURPOSE:

To support USAID policy analysis efforts through the synthesis of Agency experiences at policy analysis capacity building within host governments.

C. COMPONENTS/ACTIVITIES:

Research 30%; Technical Assistance 55%; Training 15%

D. BACKGROUND:

Because economic policies affecting agriculture are often made outside the sector, the Agency has sought to build understanding of how such policies impact on the production of and demand for farm products in LDC's. The Agriculture Policy Analysis Project (APAP) was designed in 1983 to: 1) distill lessons we have learned about how to assess the impact of economic policy on agriculture sector performance; 2) assist USAID missions in building capacity in LDC's to conduct their own analysis in support of formulating and monitoring policies affecting the sector. With this added understanding and analytical capacity in A.I.D. and host countries alike, more substantive dialogue on needed policy changes will be possible.

The Agricultural Policy Analysis Project (APAP) started officially on September 30, 1983 when A.I.D. signed a contract with Abt Associates, Inc., to implement the subject project, which is broadly subdivided into worldwide and country activities.

Worldwide activities are those that apply to all USAID Missions, Regional Bureaus and AID/W offices. They consist of five discrete activities: (1) development of roster of policy analysts, (2) formulation of Agricultural Development Officers Guidelines, (3) formulation of Agricultural Policy Analysis Guidelines, (4) evaluation of A.I.D. funded agricultural policy and planning projects, and (5) establishment of agricultural policy decision makers network.

Country activities consist of technical assistance specific to a country or region. These are: (1) conducting country-specific policy analysis; (2) designing and evaluating USAID policy and planning projects; (3) planning for workshops and conferences; and (4) conducting special studies related to on-going projects.

E. FUTURE ACTIVITIES/PLANS:

ST/AGR proposes to implement a second phase five-year competitively bid contract for further APAP activities beginning early in FY 1989. During the second phase the research focus concentrate on economic structural adjustment and trade policy issues as they affect performance of the agricultural sector. Another research area will address AID's experiences in the political economy of policy reform, eg. the dynamics of interest group participation in and influence on the policy making process.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Comparative Analysis of AID Agriculture Policy Projects. An "Executive Summary" and reference volumes that synthesize lessons learned in building LDC government policy analysis capacity.
2. Agriculture Officers Guidelines. A short summary of steps to follow for effective policy analysis project design and implementation.
3. Agriculture Policy Analysis Guidelines. A technical reference for use by practitioners on methods in the analysis of price, subsidy, tariff, quota and related market regulation policies.
4. Agriculture Policy Consultants Roster. A micro-computer based file of nearly one hundred policy consultants coded and categorized by area of specialization, regional and country experience and language ability.
5. Agriculture Workshop Training Modes. A report on the major modes that have been identified for training policy analysts and policy makers.
6. Country Case Studies and Staff Papers. A series of technical reports that examine in greater detail experiences in policy analysis capacity building, policy reform for parastatal divestiture, price policy analysis and the use of food aid as a policy reform tool.

G. CONTACTS FOR SUPPORT:

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Washington, D.C. 20523
Phone (703) 235-8922

Project Director
Dr. Stephanie Wilson
Abt Assoc., Inc.
4250 Connecticut Ave NW
Washington, D.C. 20008
Phone (202) 362-2800

Farming Systems Support Project (FSSP)

Project No: 936-4099

PACD: 12/31/87

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP Total	\$7,887,000	\$2,065,000
Obligation thru FY 86	5,782,000	382,000
FY 87 OYB	300,000	80,000
FY 88 anticipated (available)	0	1,603,000

B. PURPOSE:

To support USAID and LDC's Agricultural Research and Extension Institutions in the design implementation and evaluation of Farming Systems Research and Extension (FSR/E) programs.

C. COMPONENTS/ACTIVITIES:

1. Training
2. Networking
3. Technical Assistance

D. BACKGROUND:

The FSSP, conceived as a ten year effort, was initiated in 1982 under a Cooperative Agreement with the University of Florida. The project has a worldwide scope, with emphasis in West African countries. The main focus of the project was to develop a set of training manuals and to support network efforts in FSR/E. Training has emphasized the identification of constraints limiting the adoption of appropriate technologies, specification of new appropriate technologies and improvement in technology development for limited resource farmers.

Three sets of training manuals have been completed:

- Diagnosis in FSR/E
- Techniques for Design and Analysis of On-Farm Experimentation
- Microcomputer Software for Agricultural Researchers (MSTAT)

FSSP contributed to the development of MSTAT through a bilateral agreement with the University of Michigan. This manual is available in French, Spanish and English, while the two others have been translated into French.

Training has been provided both to LDC researchers and selected staff of 21 U.S. Universities. Over 650 professionals have been trained and at least 17 countries, 20 LDC universities and 21 U.S. universities have received copies of at least one of the completed FSR/E training manuals. During the summer of 1987, 20 Honduran researchers and extension agents have been

trained at the University of Florida through a bilateral arrangement with the USAID Mission in Honduras. This training program is part of the University of Florida's decision to incorporate FSR/E training as part of its regular curriculum in agriculture; American and foreign students are the beneficiaries of this program since fall of 1986.

In networking, FSSP has helped to develop and support two network efforts: the West Africa Farming Systems Research Network (WAFSRN) which involves 18 countries, and the West Africa Integrated Livestock System Network that involves 10 countries.

In supporting and strengthening networks of farming systems professionals world-wide, FSSP has supported the Annual Farming Systems Symposium held at Kansas State University until 1986. (The 1987 Symposium will be held at the University of Arkansas on October 18-21, 1987). Each year 200 to 300 professionals worldwide have participated in a week-long symposium. To complement these network efforts, FSSP reaches more than 500 FSR/E professionals worldwide through trimestral newsletters which are produced in English, French and Spanish.

In technical assistance, FSSP has assisted USAID missions in Kenya, Gambia, Malawi, Senegal, and Togo in the Africa Region; Paraguay, Peru, Bolivia, Ecuador, Belize, Honduras, Guatemala, Dominican Republic, Jamaica, Haiti, and two Regional Offices (ROCAP in Central America and RDO/C in the Caribbean) in the Latin America and Caribbean Region. Assistance involved training in FSR/E methods and helping with project development and evaluation. During Spring 1987, FSSP has finalized the evaluation of the USAID/Cameroon National Cereals Program, which had Farming Systems Research and Extension as one of its main components.

E. FUTURE ACTIVITIES/PLANS:

1. Training -

Three additional sets of training manuals will be finalized by fall 1987:

- Livestock in FSR/E

- Economic Analysis of FSR/E, and

- Management and Administration of FSR/E.

-Through a bilateral agreement between the University of Florida and the CRSP, training in FSR/E methodologies will be provided to key scientists of the Sorghum/Millet and Beans/Cowpeas CRSP.

2. Technical Assistance.- Proposed activities for 1987 includes work in Niger, Mali, Mauritania, Senegal, Zaire, Ecuador, and Honduras.

3. FSSP Second Phase - S&T/AGR in coordination with S&T/RD and S&T/ED will develop, during the summer of 1987, a concept paper which will help in determining the appropriateness of an FSSP Project Paper Amendment for a second phase activity.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Training Manuals: Three sets are available:

- Diagnosis in FSR/E
- Techniques for Design and Analysis of On-Farm Experimentation, and
- Microcomputer Software for Agricultural Researchers (MSTAT).

The first completed set focuses on Diagnosis in FSR/E, including initial diagnosis, links between social and biological science, intra-household considerations and socio-cultural issues. The rapid appraisal approach used for initial diagnosis offers the opportunity of identifying not only biological constraints at the farm level but also policy constraints that are impeding the adoption of appropriate technologies.

The second set of training manuals deals with Techniques for Design and Analysis of On-Farm Experimentation. This set is linked to the longer-term objectives of FSR/E, the identification and development of appropriate technologies to be mixed with traditional technologies.

The third available set, developed by Michigan State University, consists of a microcomputer program (MSTAT) targeted to facilitate effective agricultural research programs. This program enhances the ability of researchers to handle large sets of data, helps them in determining research priorities and problems, and facilitates the generation of new appropriate technologies. The MSTAT training Manual can be obtained directly from Michigan State University by contacting Dr. Russell Freed, MSTAT Director, Department of Crop and Soil Science, Michigan State University, East Lansing, Michigan, 48824-1114.

2. Training Programs:

The following services are available on a buy-in basis:

a) Deliver Shortcourses:

- Regional Shortcourse, English (3 weeks)
- Regional Shortcourse, French (3 weeks)
- Regional Shortcourse, Spanish (3 weeks)
- Individual shortcourses on various aspects of FSR/E

b) Support Training Programs:

- Train Trainers
- Advise National Programs on a training strategy

c) Develop Materials:

- Slide Tape Modules
- Training Units
- Case Studies

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INTERNATIONAL FERTILIZER DEVELOPMENT (IFD)

Project No: 93I-0054

PACD: 06/30/90

A. <u>FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL through FY 86	64,700,000	0
Obligation thru FY 86	50,000,000	0
FY 87 OYB	3,460,000	0
FY 88 anticipated (available)		0

B. PURPOSE:

To assure a dependable supply of better fertilizers at lower cost to farmers in the developing countries.

C. COMPONENTS/ACTIVITIES:

Research 30%; Technical Assistance 30%; Training 30%; Other 10%.

The specific project activities are:

1. Research:
 - a) Research on fertilizer needs and use.
 - b) Process development.
 - c) Estimation and forecasting of LDC country fertilizer needs.
 - d) Evaluation of phosphate needs in LDCs.
2. Technical Assistance:
 - a) Investment feasibility studies.
 - b) Management consultation.
 - c) Project design assistance.
3. Training:
 - a) Field research, production, process control, promotion and extension.
4. Other:
 - a) Collective, collation and distribution of information, related to fertilizer.

D. BACKGROUND:

1. IFD is a project implemented by the International Fertilizer Development Center (IFDC) and was started in 1975. A.I.D. has authorized government funding through 1990. Total funding has exceeded \$50 million through FY 86. Although the annual contribution is programmed at \$4 million, the FY 87 OYB is \$3.46 million. Funds from other sources, mostly in the form of restricted grants and contracts will raise the IFDC budget to approximately \$10 million.

2. IFDC has programs in fifty countries. The S&T grant is used in support of basic research and early technical development work which will be applicable in number a of countries, perhaps universally.

3. IFDC has active collaborative programs with CIAT, ICRISAT, IITA, IRRI and IFPRI. Notable coordination efforts are cooperation with IRRI in FERRAT, the rice fertilizer research network in South Asia, the West African Fertilizer Research Network with 17 countries and East African Fertilizer Research Network. The networks are used to evaluate experimental fertilizers, to test potential ways to use fertilizers more effectively, to define areas where fertilizers do not produce reasonably expected results and pinpoint locations which require additional soil management research.

4. Training is another important activity. Three hundred individuals are trained each year in a wide range specialities such as feasibility of fertilizer production, fertilizer, raw material evaluation, retail sales and promotion of fertilizer use.

E. FUTURE ACTIVITIES/PLANS:

With respect to field studies has shown that generally participating farmers profited more than proportionally their more affected neighbors.

1. In addition to the headquarters laboratory a continue research in fertilizer production, use and marketing.

2. Build a new research and training center in Togo, West Africa.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Feasibility studies, and research evaluation and reports

2. Process recommendation,

3. Training,

4. Technical assistance.

G. CONTACTS FOR SUPPORT:

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BIOTECHNOLOGY-LIMITING FACTORS

Project No: 931-0610

PACD: 05/31/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$7,000,000	0
Obligation thru FY 86		0
FY 87 OYB	250,000	0
FY 88 anticipated (available)	250,000	0

B. PURPOSE:

To develop practical ways to enable crops to capture nitrogen from the air by collaborative (equal-partner) research between LDC and US scientists on factors limiting biological nitrogen fixation in LDC's.

C. COMPONENTS/ACTIVITIES:

Research 30%; Technical Assistance 20%; Training 50%.

D. BACKGROUND:

1. Implemented in 1976, the biotechnology, limiting factor project funding has been \$5.57 million. This funding has gone toward 25 grants for cooperative research involving scientists worldwide.

2. Biological nitrogen fixation (BNF) is being developed to lower the costs of manufacturing and applying nitrogen. Research into high temperature improved strains of rhizobia may enable BNF to replace expensive man-made nitrogen fertilizers.

3. Forty-one (41) graduate students have been supported involving 35 developing countries and 21 U.S. states; 8 in Africa 10 in AWE, 15 in LAC. A total of 72 journal articles have been published. 30 persons have earned MS/PhD degree through this project.

E. FUTURE ACTIVITIES/PLANS:

1. Further research will be conducted to develop rhizobia and inoculants that will make available inexpensive nitrogen to LDC farmers.

2. Technical workshops and assistance by U.S. scientists in LDC cooperating countries.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Biological fixation for tropical Agriculture.
2. Proceedings: Coordinating Workshop BNF Limiting Factors Program.
3. Technical Publications form scientific Journals
4. Annual Reports.

G. CONTACTS FOR SUPPORT:

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SOIL MANAGEMENT SUPPORT SERVICES (SMSS)

Project No: 931-1229

PACD: 9/29/87

A. <u>FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$8,832,000	\$500,000
Obligation thru FY 86	6,967,000	200,000
FY 87 OYB	615,000	0
FY 88 anticipated (available)	660,000	300,000

B. PURPOSE:

To develop the prerequisites for soil resource inventories and assessments, land use evaluation, soil conservation/management for environmental integrity and improved agricultural sustainability, and improved soil-based agrotechnology transfer.

C. COMPONENTS/ACTIVITIES:

Research 20%; Technical Assistance 30%; Training 30%.

D. BACKGROUND:

SMSS was initiated in 1979 to assist developing countries to build their capacity for addressing soil resource problems. The Soil Conservation Service (SCS) of the USDA implements the project.

The main accomplishments of the project to date are:

1. Research: Eight international committees, with more than 500 soil scientists from over 45 countries collaborating, have improved the usefulness of soil taxonomy as an international system for soil-based agrotechnology transfer. Technical workshops have been conducted in seven countries to involve scientists from different countries in assisting their committees.
2. Technical Assistance: Assistance has been provided to more than 50 countries with more than 3000 person-days in over 200 TDYs. Assistance has been in areas of land evaluation, soil surveys, institutional evaluations, laboratory capability, and database management.
3. Training: More than 900 developing country scientists from 80 countries have been trained at courses conducted in 17 countries. Training has been primarily in soil survey, soil classification, laboratory methodology, and soil management.

E. FUTURE ACTIVITIES/PLANS:

Future activities will build on the base developed in the past, but giving more emphasis on utilization. This will include soil surveys, mapping, and interpretation for management, land evaluation, geographic information systems, and training in soil conservation/management.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Technical publications; over 65.
2. Newsletter "Agrotechnology Transfer."
3. Computer software and databases.
4. Audio-visual training materials.

Key Publications:

- Keys to Soil Taxonomy
- Soil moisture regimes - Africa and South America
- Bibliography of Soils of the Tropics (vols. 1-5)
- Soil Taxonomy and Technology Transfer
- Soil Taxonomy News
- Progress reports

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CRSP- SOIL MANAGEMENT

Project No: 931-1311

PACD: 9/25/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$27,500,000	\$45,000
Obligation thru FY 86	24,700,000	45,000
FY 87 OYB	2,185,000	0
FY 88 anticipated (available)	2,700,000	0

B. PURPOSE:

Research toward increasing farm productivity through better soil management to conserve and protect the soil.

C. COMPONENTS/ACTIVITIES:

Research 100%; Technical Assistance 0%; Training 0%.

Activities incidental to research include: TDY assistance to missions, LDC based training workshops and degree training in-country and also in the U.S.

D. BACKGROUND:

1. Funding began in 1981 with project emphasis on the tropical soils of Africa, Latin America/Caribbean, and Asia.

2. Work from earlier projects has shown yields can be sustained for 25 crops over a ten year cycle. Aluminum toxicity is being reduced by incorporating liming, phosphate conditioning and organic residues into soil management.

3. "Africano Desconido," the "Unknown African" rice variety was found to thrive in the acidic soil conditins of the Amazon region. This variety has increased yields by three times and has made it possible in rotation with cowpeas to develop a cropping system utilizing minimum inputs while maintaining high yields.

4. Legume based pastures offer an attractive alterna tive to cultivated crops and a way to increase farm productivity without a large increase in labor requirements.

5. Several agro-forestry systems are demonstrated alternatives or complements to field crop production.

6. Except in instances of severe erosion, techniques have been recognized or devised to rehabilitate land damaged by improper clearing.

E. FUTURE ACTIVITIES/PLANS:

Additional crops and varieties are being screened for acid, aluminum and/or manganese tolerance to minimize the need for soil amendments. Systems to adjust practice to soil microvariability are being sought. A greater range of alternative crop combinations will be tried to provide systems appropriate for many more social and economic environments. Careful soil-status and nutrient removal logging will be continued to document both depletion and accumulation of plant nutrients. The latter being especially important with phosphorus and micronutrients.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. "Sustainable High Level Management Systems for Ultisols and Alfisols in the Humid Tropics."
2. "Legume Based Pasture Systems for the Humid Tropics."
3. Catalogue: "Legumes for the Wet and Dry Tropics."
4. Computerized land capability system for rapid land practice estimation.
5. Various research and training papers.

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TECHNOLOGY FOR SOIL MOISTURE MANAGEMENT (TSMM)

Project No: 936-4021

PACD: 9/29/88

<u>A. FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$2,900,000	\$100,000
Obligation thru FY 86	2,485,000	0
FY 87 OYB	400,000	0
FY 88 anticipated (available)	510,000	0

B. PURPOSE:

To assist developing countries in the assessment of their soil, water, and crop management systems under dryland or rainfed conditions and in the formulation of national strategies for increasing their agricultural productivity through research and technology transfer.

C. COMPONENTS/ACTIVITIES:

Research: 25% Technical Assistance: 25%
 Training: 25% Technology Transfer: 25%

D. BACKGROUND

The Technology for Soil Moisture Management Project (TSMM) was initiated in 1983 under a Participating Agency Service Agreement (PASA) with USDA. The Agricultural Research Service (ARS) and the Economic Research Service (ERS) are direct implementers. Through TSMM, the skills of scientists and researchers in ARS, ERS, International Agricultural Research Centers (IARCs), US land-grant universities and other research centers are being applied to arid and semi-arid regions.

Countries

Asia: Thailand, Sri Lanka, India
 Africa: Niger, Mali, Sudan, Burkina Faso, Mauritania
 Near East: Jordan, Morocco, Egypt, Turkey

Research Organizations: ICRISAT, ICARDA, IITA, ORSTOM, IRAT

TSMM's basic approach involves three steps: (1) compilation of databases or synthesis of relevant in-country research; (2) conducting of workshops to assess findings and establish priorities; (3) planning and implementing of regional research and economic case studies on priority problems.

TSMM is unique because it integrates agronomic research and economic assessment within one project. These intergrations facilitate the achievement of the overall objective because planners must understand both agronomic and economic issues in order to assess options realistically.

Highlights and Accomplishments to date include:

In-Country Research Databases: Creation of Northeast Thailand and Jordan research databases on soil moisture conservation, conservation tillage, wind and water erosion control practices, farming systems/crop rotations, soil fertility, agroclimatology, socioeconomic impacts and cost/benefit effects of improved management practices, crop residue management, water harvesting and systems modeling. Efforts are now ongoing in Sri Lanka, Mali, Niger and Mauritania, Thailand, and Jordan.

Regional Workshops: Held to date in Thailand, Jordan and Niger and have brought together governmental, university and international experts to assess existing research, to establish priorities for future research, and to identify resources to address problems.

Regional Research: Five Near East countries are using a common experimental design to study the agronomic and economic values of crop residues from rainfed wheat and barley, for soil and water conservation and for livestock utilization. Four West African countries are studying the use of crop residues for improved soil moisture management, wind/water erosion control, and livestock feed.

Economic Studies: A Mali case study has found that increasing the infiltration of rainfall from 40% to 60% can increase disposable income by 2 to 4 times. Income can be increased by another 50 percent if the infiltration is raised to 80%. Food availability also is increased to a similar extent.

E. FUTURE ACTIVITIES/PLANS:

TSMC will continue to synthesize past in-country research experience in soil and water management/conservation for dryland production in order to improve the basis for further research activity. Collaborative research and economic analysis for appropriate soil and water management technologies will be initiated.

F. OUTPUTS IMMEDIATELY AVAILABLE:

Key Publications: Soil and Moisture Management in Mali: A Case Study
Analysis for West Africa

- World Water for Agriculture: Precipitation Management
- Dryland Soil Resources
- Dependable Precipitation and Potential Yields for Senegal: A Practical Guide for Rainfed Agriculture
- Rainfed Agriculture in Haiti.
- A Crop Water Evaluation Manual for India

Traveling Seminars: Organized study tours of current dryland research in the U.S. Great Plains and Pacific Northwest. Tour designed for scientists and administrators from developing countries in semi-arid areas, and personnel from USDA, land-grant universities and international development agencies. Display of lessons learned from the recovery from the 1930's Great Plains disaster applied to current problems in other dryland areas in the developing world.

Agroclimatology Advisory Services: A small team of agroclimatologists provide guidance in the following areas: improved collection, stratification, and synthesis of agroclimatic data for agricultural use in collaboration with WMO, FAO, IARCs and U.S scientists.

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INT'L BENCHMARK SITES NETWORK FOR AGROTECHNOLOGY
TRANSFER (IBSNAT)

Project No: 936-4054

PACD: 8/31/92

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL:	\$9,930,000	\$3,000,000
Obligation thru FY 86	4,130,000	0
FY 87 OYB	890,000	0
FY 88 anticipated (available)	1,080,000	0

B. PURPOSE:

To develop a prototype Decision Support System for Agrotechnology Transfer and to demonstrate its application for making responsible choices which result in desired outcomes in developing countries.

C. COMPONENTS/ACTIVITIES:

Research 42%; Technical Assistance 13%; Training 24%; Networking 21%

The central concept of systems-based research is that the whole system must be understood in order to evaluate changes in any single component. In this innovative approach, the project brings together existing knowledge of the farming system, identifies major components and processes and their interactions, and seeks to identify the bottlenecks to improve performance. IBSNAT is intended to provide the structure and mechanism to link soil, water, weather, crop and management research projects into a coherent, problem-solving instrument, called the Decision Support System for Agrotechnology Transfer.

1. Validate simulation models for ten crops
2. Develop operational agronomic data base management system
3. Establish capability in LDCs to use models for predicting crop performance
4. Establish fully functional prototype network

D. BACKGROUND:

The project was carefully designed to attack the more critical factors impeding agricultural development in the tropical and semi-tropical areas of the developing world. Previous A.I.D. supported research has demonstrated that agrotechnology could be successfully transferred on the basis of a comprehensive soil classification system, i.e., "transfer by analogy". For the first time, the components for a successful transfer of agrotechnology existed.

It was recognized, however, that maximum crop yields do not result from the cumulative effect of individual site characteristics and management practices but from the "interaction" between these components. For

maximum economic crop production, optimum conditions must exist with respect to at least five variables (1) balances supply of plant nutrients, (2) solar energy, (3) rooting zone with adequate amounts of water and oxygen, (4) crop varieties with the genetic potential to make effective use of environmental and management inputs, and (5) crop protection from insects, diseases, weeds and other hazards. The purpose of this attempt was then conceived as an attempt to bring these components together for a successful transfer of agrotechnology from research centers to farmers fields in a timely and acceptable manner using a systems approach of "transfer by simulation".

Originally conceived to require project activities covering a nine-year span, the project was approved and a contract was executed with the college of Tropical Agriculture and Human Resources of the University of Hawaii in August 1982 for a five year period. Starting September 1987 the project will be in cooperative agreement format for another five years.

The project has developed a unique collaborative world-wide network of both developed and the developing countries to tap, mold and disseminate the rapidly changing technology of systems approach for the purpose of agrotechnology transfer.

E. FUTURE ACTIVITIES/PLANS:

1. An optional data base management system and data base enlarged to cover prototype DSSAT.
2. Decision-aids (simulation and expert system models) for LDC scientists, extension workers, and farmers developed and validated for agricultural development (strategic) and production (tactical) levels.
3. Computer software for LDC scientists, extension workers and farmers; developed, tested and applied to enable users to interact with DSSAT, i.e., a dialogue generator.
4. The DSSAT expanded to solve additional problems commonly encountered at the farm level as well as application to other commodities and products.
5. a. Functioning and viable network of international, regional, and national research centers and development agencies for continuing DSSAT development and application by targeted beneficiaries.
b. Conferences and international study groups held on DSSAT.
c. Publications and scientific journal articles produced selectively collected and disseminated to LDCs and international organizations.
6. a. Application of DSSAT to location-specific agricultural problems to end-users.
b. Acceptance by LDC scientists, extension workers, and farmers.
c. Documentation of the intercrop model will be published and distributed.
7. a. Training and acceptance of DSSAT by a representative number of collaborators and end-users.
b. Training natural resource inventory specialists.
c. Develop manual dealing with experimentation, data sheets instructions for collecting a minimum data set (MDS) for genetic coefficient determination.
d. Develop and distribute to collaborators data sheets and instruction for collecting a MDS for genetic coefficient determination.

OUTPUTS IMMEDIATELY AVAILABLE:

1. Services Available:

- Technical assistance to USAIDs and LDCs
- Technical information sharing
- Regional training workshops
- Back-stopping for LDC collaborators

2. Publications available from PPC/E/DIU:

- IBSNAT Brochure, IBSNAT Leaflet
- IBSNAT Project Design Elements, Linkages and Schedules
- Agrotechnology Transfer (Newsletter)
- Minimum Data Set of Agrotechnology Transfer - Guide
- Guidelines - Experimental Design and Minimum Data Set
- Networking Knowledge - The Future is Now
Dr. N.C. Brady's Keynote Speech August '84
- Progress Report 1982-85
- Mid-term Evaluation, 1985
- Project Paper, 1987
- Technical Report - DSSAT
- Software for data entry of minimum data set (4 diskettes)

G. CONTACTS FOR SUPPORT:

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4A

Biotechnology - Plant Tissue Culture

Project No: 936-4137

PACD: 8/31/89

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$5,000,000	\$500,000
Obligation thru FY 86	?	0
FY 87 OYB	460,000	0
FY 88 anticipated (available)	750,000	0

B. PURPOSE:

Expand and accelerate tissue culture research on LDC crop production by strengthening LDC capacity; linking and coordinating world wide research. Expand field testing of stress tolerant plants in collaboration with IARCs and LDC research institutions. Train LDC researchers to use plant biotechnology/tissue culture for crop production problems. Stimulate a network of research institutions to share technology, information and materials. Apply tissue culture techniques to additional important LDC crops.

C. COMPONENTS/ACTIVITIES:

Research: 65% Technical Assistance: 10% Training: 15%

Produce and characterize such LDC crops as wheat, rice and pearl millet tolerant of salt, drought, aluminum and heat stresses. Develop techniques for regenerating plants from protoplasts or cell cultures of soybeans, green beans, cowpea, corn and sorghum. Develop techniques to accelerate translocation of genes from wild species into domesticated crops during wide crosses. Test derived crop lines at field locations including IARC's testing networks. Develop and apply techniques such as anther culture, embryo culture and protoplast fusion to improve LDC crops.

D. Background:

This project is supporting a worldwide effort targeted to establish a collaborative research screening network to field test regenerated cereal plants. Initial members: IRRI, CIMMYT, ICRISAT, ICARDA, LSU and several LDC's. Computer access file of plant tissue culture literature for access by LDC cooperators.

E. FUTURE ACTIVITIES/PLANS:

- Subgrants for research where LDC and U.S. institution scientists cooperate
- Train LDC personnel in tissue culture to obtain stress tolerant crops
- Annual network conference to enhance research cooperation and information exchange
- With AID mission funding establish U.S.-LDC technical support linkages and upgrade LDC laboratories and staff to participate in the International Tissue Culture Network for cooperation with CSU staff on specific problems including linkage for diagnostic analysis, information/technology transfer and training.

- CSU will supply bibliographies and journal article reprints to LDC members
- A network newsletter published twice yearly

F. OUTPUTS IMMEDIATELY AVAILABLE:

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IMPROVED BNF THRU BIOTECHNOLOGY

Project No: 936-4177

PACD: 09/30/95

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	9,690,000	10,300,000
Obligation thru FY 86	0	0
FY 87 OYB	750,000	0
FY 88 anticipated (available)	780,000	10,300,000

B. PURPOSE:

The purposes of the project are: (1) To increase the efficiency of nitrogen fixing microorganisms adapted to LDC conditions through methods of biotechnology; (2) To promote the use of BNF in LDCs by assisting them to adapt, use and disseminate information about BNF; and (3) To increase their capacity to produce and distribute BNF inocula.

C. COMPONENTS/ACTIVITIES:

Research 45%; Technical Assistance 19%; Training 25%; Other 11%.

1. The overall objective of the research component is to improve the BNF technology so LDC farmers can use it to produce crops more efficiently. The specific research objectives are:

(a) Genetic improvement of rhizobia for tropical legumes, (b) improvement of host performance in BNF symbiosis, (c) maintain, characterize and evaluate germplasm resources for BNF systems, (d) developing methodologies for monitoring microorganisms (rhizobia) introduced into the environment. (e) collection of environmental (field) data for practices to maximize BNF. Techniques used will include recombinant DNA, antigen-antibody reactions, cell selection, breeding and statistical modeling.

2. In addition to training and technical assistance to LDC's, the project will provide;

(a) leadership in global, regional and in-country networks of LDC scientists and DC scientists; (b) germplasm resources and antisera for rhizobia.

D. BACKGROUND:

The BNF project was initiated in FY 86 as a follow-on project to Fixation, Symbolic (931-0673). The project strategy is to develop better BNF systems so farmers can increase their income through increased efficiency in crop production by optimizing the use of home-grown nitrogen among its activities the Haiti - NIFTAL staff member participated in assessing inoculant production situation for tree project using legume and other nitrogen fixing trees.

E. FUTURE ACTIVITIES/PLANS:

World-wide - Build a model to describe crop response to rhizobia inoculation so farmers can use inoculant effectively (or choose other legumes), involving LDC's cooperating scientists in several countries.

F. OUTPUTS IMMEDIATELY AVAILABLE:

With Mission support, backstop regional center for training activities, germplasm distribution, technical assistance and research on local problems.

Subgrants for research in which LDC scientists cooperate.

Train LDC personnel in rhizobium technology, BNF legume production, genetic technologies, fate of introduced microbes, commercial BNF inoculant production and distribution.

Periodic network conferences to enhance cooperation and technology transfer.

Technical assistance in project identification, project development, evaluation and assessment of national BNF programs.

G. CONTACTS FOR SUPPORT:

Project Manager

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Project Director

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Paia, HI 96779
Phone (808) 579-9568

Aquaculture Technical Assistance

Project No: 931-0242

PACD: 02/29/88

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$2,470,000	0
Obligation thru FY 86		0
FY 87 OYB		0
FY 88 anticipated (available)		0

B. PURPOSE:

To provide technical assistance toward improving protein availability and rural employment in LDCs through developing and increasing the productions of fish by small scale fisheries and planning

C. COMPONENTS/ACTIVITIES:

D. BACKGROUND:

E. FUTURE ACTIVITIES/PLANS:

F. OUTPUTS IMMEDIATELY AVAILABLE:

G. CONTACTS FOR SUPPORT:

Project Manager

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Washington, D.C. 20523
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Project Director

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AQUACULTURE TECHNOLOGY DEVELOPMENT

Project No: 931-1314

PACD: 12/31/87

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$3,759,000	\$300,000
Obligation thru FY 86	?	300,000
FY 87 OYB	260,000	?
FY 88 anticipated (available)	255,000	?

B. PURPOSE:

To contribute to the development of aquaculture projects in LDCs.

COMPONENTS/ACTIVITIES:

Research 40% ; Technical assistance 30%; Training 30%

1. Provide advisory services in aquaculture to AID Missions and host country governments.
2. To conduct short course training program overseas and at Auburn University.
3. To conduct feasibility studies leading to the development of aquaculture projects.
4. To carry out impact studies and evaluations on the design and implementation of mission-funded aquaculture operations.

D. BACKGROUND:

1. Funding for the Aquaculture Technology Development began in 1982 with a project funding of \$2.25 million. This program has a worldwide focus on aquaculture development in the LDC's.
2. Past activities by Auburn University include: the study of potential for the increase of fish production in the Niger river - Niger and sector impact analysis of aquaculture development and evaluation of the Freshwater Aquaculture Development project in the Philippines.
3. Services provided by Auburn University to LDC's are:
 - project related technical assistance
 - evaluation, special studies
 - training programs - long and short term

E. FUTURE ACTIVITIES/PLANS:

Continued research to refine polyculture and to develop improved hybrids or genetics of appropriate species. Also the creation and development of fish/small animal associations in LDC's.

F. OUTPUTS IMMEDIATELY AVAILABLE:

- Surveys of USAID needs for project development assistance
- Project development reports
- Evaluations of aquaculture projects
- Fish farming research
- Various technical and special reports

G. CONTACTS FOR SUPPORT:

Project Manager
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Project Director
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CRSP-AQUACULTURE POND DYNAMICS

Project No: 931-4023

PACD: 8/31/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$4,750,000	\$100,000
Obligation thru FY 86	4,290,000	0
FY 87 OYB	973,000	0
FY 88 anticipated (available)	920,000	0

B. PURPOSE:

(1) To quantitatively determine how physical, chemical, and biological pond variables regulate pond productivity; (2) To develop quantitative models describing these processes; (3) To transform these models into pond management models and production functions; (4) To improve the efficiency of pond culture systems.

C. COMPONENTS/ACTIVITIES:

Research 100%

1. To quantitatively determine how physical, chemical, and biological pond variables regulate pond activity.
2. To develop quantitative models describing these processes.
3. To transform these models into pond management models and production functions.
4. To improve the efficiency of pond culture systems.

D. BACKGROUND:

The Pond Dynamics CRSP, conceived as an 8-year effort, was initiated in 1982 as a CRSP with Oregon State University as the implementing organization and four U.S. subgrantee institutions including Auburn, Michigan State, University of Hawaii, and the University of Michigan. Under this project, physical, chemical and biological mechanisms regulating the productivity of pond culture systems are being studied in a continuing series of field experiments conducted in six participating host countries in Africa, Asia and Latin America. The countries include: Thailand, Indonesia, the Philippines, Panama, Honduras, and Rwanda.

E. FUTURE ACTIVITIES/PLANS:

- Develop production models for fish pond production under tropical conditions.
- Examples of continuing research activities:
 - Thailand project on low and high intensity
 - Indonesia, Honduras and Rwanda projects on the use of cooler water
 - The Philippines and Panama projects on low use intensity, brackish water and hypersaline conditions.

A

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Reports entitled Principles and Practices of Pond Aquaculture: A State of the Art Review
2. Annual Administrative Reports
3. Annual Work Plans
4. "Aqua News" Quarterly Newsletter

F. CONTACTS FOR SUPPORT:

Project Manager

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Project Director

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FISHERIES DEVELOPMENT SUPPORT SERVICES

Project No: 936-4024

PACD: 6/30/87

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$4,000,000	\$200,000
Obligation thru FY 86	?	200,000
FY 87 OYB	245,000	0
FY 88 anticipated (available)	255,000	0

B. PURPOSE:

To provide technical assistance, training and information to USAID regarding fisheries development. Established priority areas include: sociocultural factors, fisheries management and resource utilization, use of mariculture, and post-harvest fishery losses.

C. COMPONENTS/ACTIVITIES:

Research 40%; Technical Assistance 30%; Training 30%

The approach is to provide assistance on an as requested basis, and training in an organized form appropriate for individuals with language and discipline skills that are less than satisfactory to entering the training.

D. BACKGROUND:

The Fisheries Development Support Service (FDSS), conceived as a 9-year effort, was initiated in 1982 under a cooperative agreement with the University of Rhode Island. Under FDSS, a number of technical assistance service are provided to USAID missions and LDCs in marine fisheries, as appropriate and requested, and training is provided to personnel from developing countries. The International Center for Marine Resource Development has dealt with LDC issues since its formation.

Highlights and accomplishments to date include:

1. Research on fisheries in Latin America and Africa.
2. Training of fisheries researchers and administrators from Asia, Africa, Latin America, and the Near East.
3. Assistance to USAID/Djibouti in project paper development for a Fisheries Development project.
4. Development of an information search capability for fisheries-related publications.
5. Studies and project assistance focussing on small-scale fishery needs and on opprtunities to increase incomes and improve nutrition through fisheries management.

E. FUTURE ACTIVITIES/PLANS:

1. Preliminary Investigation of the Portunidae Crab Resources in the Coastal and Estuarine Waters of Ecuador.
2. Research on the brine shrimp (Artemia) currently a constraint on fish and shrimp production Artemia growth as a feed supply limits commercialfish/shrimp industry development.

F. OUTPUTS IMMEDIATELY AVAILABLE:

1. Report evaluating Sri Lanka shrimp farming problems and potential including salt water (penaeid) and fresh water (Macrobrachium) shrimp.
2. Status statement on fisheries development in West Africa.
3. Technical publications, manuals, newsletters, bibliographies and literature searches on fisheries related publications using URI's library.
4. Short-term advisory and consulting services up to 30 work-days per mission to assist in all aspects of design, implementation and evaluation of stock assessment, product quality, economics and information handling.
5. Long and short-term training programs at URI. Fields include marine fisheries, including biology, sociology, economics and information handling.
6. Short courses, seminars and workshops to be conducted in LDCs.

F. CONTACTS FOR SUPPORT:

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WATER MANAGEMENT SYNTHESIS - II

Project No: 936-4127

PACD: 09/29/87

A. FUNDING:

	S&T	Buy-ins
LOP TOTAL	\$20,000,000	\$6,000,000
Obligation thru FY 86	18,412,892	0
FY 87 OYB	785,000	0
FY 88 anticipated (available)	0	0

B. PURPOSE:

To increase host country capabilities to plan and implement irrigation water management programs and to change attitudes and behaviors at all levels toward irrigation water management improvement. Major emphasis is irrigation systems; rehabilitation strategies; and new irrigation technologies.

C. COMPONENTS/ACTIVITIES:

Research 20%; Technical Assistance 40%; Training 20%; Technology transfer 20%.

D. BACKGROUND:

WMS II is a five-year, \$20.0 million project that is jointly funded by the Asia/Near East and Africa Bureaus as well as by two S&T Offices -- AGR and RD. It is being implemented by the Consortium for International Development (CID), with the main implementing entities being Utah State University, Colorado State University and Cornell University. However, resources are also secured from other CID and non-CID universities as well as from consulting firms and other private sources. The project became operational in September 1982 and is due to terminate March 29, 1988.

Besides responding to over 100 mission requests for technical assistance and training during its first three years (FY 1982-85), the Water Management Synthesis II Project has also carried out nearly fifty special studies (action research) and Technology Transfer activities. These have project evaluations, seven diagnostic analysis workshops and numerous trouble-shooting efforts ranging from operation and maintenance to curriculum development. Special studies have focused on several broad socio-technical areas including rehabilitation and existing system improvement, farmer participation and user organizations, small-scale and locally-managed systems development, main system management, on-farm and command area development, and water pricing and policy. Over fifty publications have been produced, as well as three major videotape sets (training), including one with forty separate modules in both Spanish and English.

While the initial focus has been on Asia, increased attention is now being given to the other regions. Africa has been receiving increased emphasis during the project's last two years, with three "Joint Field Studies" underway (Niger, Rwanda, Zimbabwe) and a major international conference on irrigation improvement in Africa being planned (Nairobi, January, 1988). Mission buy-in support, greater than anticipated, is expected to remain high; central support will remain about the same as in previous years--about three million per year, with funding coming from two regional bureaus (ASIA and AFRICA) as well as the Bureau for Science and Technology.

E. FUTURE ACTIVITIES/PLANS:

While the WMS II Project is winding down, a planned follow-on project (Water Management Research and Support--WMRS: 936-4179) will replace it which will give particular attention to Africa. The scope of the follow-on project will be broader in order to deal more effectively with the development and improvement of irrigated agriculture, as proposed to "irrigation," as well as to deal more substantially with the more non-traditional aspects of water management, e.g., flood recession farming, swamp cultivation, wetlands agriculture, water harvesting/spreading, etc.

F. OUTPUTS IMMEDIATELY AVAILABLE:

Services provided under the project/contract include:

Technical Assistance to AID Missions and host governments, including project design, monitoring and evaluation, sector surveys, studies and analysis and trouble-shooting on specific irrigation/water management problems.

Training Activities, including both in-country and U.S. short courses related to both on-farm and main-systems operations and management, diagnostic analysis workshops, policy and strategy training courses.

Technology Transfer and information exchange efforts, including workshops and conferences as well as reports, manuals, handbooks and other publications pertaining to the development/improvement of LDC irrigation.

Special Studies into selected problem areas, including both long-term and short-term research efforts; located both in the LDCs as well as on-campus; and either at the request of AID (including Missions and regional bureaus) or those initiated by the universities but approved by AID.

G. CONTACTS FOR SUPPORT:

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COLLABORATIVE RESEARCH SUPPORT PROGRAM
FISHERIES STOCK ASSESSMENT CRSP

Project No: 936-4146

PACD: 06/30/90

A. FUNDING:

	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$5,000,000	\$100,000
Obligation thru FY 86	\$1,300,000	100,000
FY 87 OYB	\$895,000	0
FY 88 anticipated (available)	\$700,000	0

B. PURPOSE:

The purpose of this CRSP is to improve analytical and sampling methodology for assessment of the size and sustainable yields of tropical fisheries populations.

C. COMPONENTS/ACTIVITIES:

Research 100%; Technical Assistance 0%; Training 0%

Project activities include development of models to test statistical gathering theories, management theories, multispecies interactions and age/size relationships. Field testing of special sampling methods including sonar are being evaluated for use in LDCs. Techniques for aging tropical fish are being studied and economic implications of new management methods are being analyzed.

D. BACKGROUND:

The project was initiated in December, 1984. The Management Entity is the University of Maryland with two U.S. Subgrantee Institutions, the University of Washington and the University of Rhode Island and LDC Linkages in 2 countries, Costa Rica and the Philippines. Research was initiated in July 1985 at the participating institutions. LDC work was begun in 1986.

The projects main accomplishments are:

1. The University of Rhode Island has developed the first stage of a useful multi-species model for tropical fisheries.
2. The University of Washington has initiated hydroacoustic (sonar) surveys of fishes in Costa Rica as input to assessment models for inshore pelagic fishes.

3. The University of Maryland has progressed further toward recruitment models, including economic aspects relating desirable levels of fishing to recruitment patterns.

E. FUTURE ACTIVITIES/PLANS:

A stock assessment manual for use by developing country fishery resource managers and researchers will be prepared utilizing results of the study. The new methods developed, tested and described will provide fishery resource managers with improved scientific tools for regulating the harvesting rates of fish stocks to obtain maximum sustainable yields from the resources. Benefits in terms of incomes, employment and high protein food will be substantial if improved management techniques are applied.

F. OUTPUTS IMMEDIATELY AVAILABLE:

None

G. CONTACTS FOR SUPPORT:

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REPRODUCTIVE STUDIES ON MILKFISH

Project No: 936-4161

PACD: 07/14/91

<u>A. FUNDING:</u>	<u>S&T</u>	<u>Buy-ins</u>
LOP TOTAL	\$4,850,000	0
Obligation thru FY 86	?	0
FY 87 OYB	1,200,000	0
FY 88 anticipated (available)	1,200,000	0

B. PURPOSE:

To carry out research on milkfish in southeast Asia and the Pacific

C. COMPONENTS/ACTIVITIES:

Research 70%; Technical Assistance 20%; Training 10%.

The research activities of the project are the following:

1. Determine techniques to improve maturation and spawning of captive milkfish.
2. Determine techniques to improve larval survival of cultured milkfish.
3. Determine stocks/subpopulations of milkfish through electrophoresis.
4. Determine nutritional requirement of cultured milkfish, at all stages.
5. Determine environmental parameters necessary for proper culture of milkfish.

D. BACKGROUND:

Milkfish are a highly important food fish in southeast Asia. Two major problems exist in making the species more available and efficient to rear: 1) maturing adult fish to the spawning conditions in captivity and 2) reducing the mortality of larva during culture, which is presently at 90%. This Cooperative Agreement directly addresses these problems through research. It allows considerable interaction between the Oceanic Institute and Project Manager(s) of A.I.D. It also provides a mechanism for collaboration with research institution in LDCs which work on milkfish. Principle involvement is in Taiwan, the Philippines, and Indonesia. Scientist exchange, training and technology transfer is included.

E. FUTURE ACTIVITIES/PLANS:

Research to be coordinated with TungKang Marine Reserach Institute in Taiwan, Southeast Asia Fisheries Development Commission in the Philippines, and the government of Indonesia.

F. OUTPUTS IMMEDIATELY AVAILABLE:

Training of LDC research personnel in techniques of culturing milkfish.
Transfer of technology of milkfish culture to LDCs.

G CONTACTS FOR SUPPORT:

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AID
S&T/AGR PROGRAM
DESCRIPTION

2/18/87

DRAFT

OFFICE OF AGRICULTURE (S&T/AGR)

OVERVIEW STATEMENT

The Office of Agriculture (S&T/AGR) manages one of AID's largest and most extensive research and development programs and is unique among the donor community.

S&T/AGR: 1) fosters new scientific and technical breakthroughs relevant to developing countries' needs; 2) provides technical support and information to missions and LDCs.

In addressing the critical development problems of poverty and hunger, S&T/AGR helps increase agricultural production, enhance income generation in the impoverished rural sector, and preserve natural resources and the environment. S&T/AGR strives to achieve these results by developing:

1. A sound, small-farm agricultural sector that is capital-conserving, energy-efficient and environmentally sound; and,
2. Human and institutional capacities within LDCs that will sustain a dynamic agricultural production and marketing system.

To carry out this mandate, S&T/AGR:

1. Mobilizes the expertise of U.S. universities and other U.S. Government agencies to conduct research and provide technical assistance;
2. Manages AID's technical, scientific and financial relationships with the International Agricultural Research Centers; and
3. Supports the strengthening of national research capability in LDCs, and of international research networks linking scientists in developed and developing countries and in international research centers.

In FY 1987 and FY 1988 S&T/AGR will finance research and technical assistance programs in more than 70 countries, involving field studies by some 120 scientists and more than 250 LDC research collaborators.

S&T/AGR works with other offices within the Bureau for Science and Technology, AID regional bureaus, AID field missions, other U.S. government agencies, other donor agencies, international organizations, and LDC institutions to carry out its overall goals.

PROGRAM EMPHASIS AREAS

S&T/AGR has a twofold mandate (1) to lead the Agency in anticipating and applying to LDC needs the new technologies that can increase agricultural productivity over a medium to long-term frame; (2) to respond to requests from missions and LDCs for technical/assistance to solve immediate or short-term problems.

The office's areas of emphasis reflect this mix of long-term research and capacity building and short-term technical assistance.

Research Priorities are:

- Biotechnology (including tissue culture and biological nitrogen fixation) to improve crops and livestock to develop resistance to pests and diseases, and tolerance to or pathways for overcoming environmental stresses including adverse climatic and soil conditions.
- Conservation and improvement of natural resources for income generation and alleviation of hunger. Resource inventory and management of soils for crop production are being studied.
- Research to enhance production at reduced cost to LDC farmers - examples include wide crosses, studies of biological nitrogen fixation and the development of true seed for tuber crops such as potatoes.
- Research carried out by the International Agricultural Research Centers, including the Internatl. Fertilizer Development Center, Asian Vegetable Research and Development Center, Internatl. Irrigation Management Institute, Internatl. Board for Soils Research and Management, Internatl. Center for Living Aquatic Resources Management, and the CGIAR supported centers on major food crops and their associated input technologies.
- Livestock health and production systems and biological control of insect vectors which transmit diseases.
- Small-scale fisheries and aquaculture, taking advantage of emerging new technologies and management techniques.
- Promoting efficient use of scarce water in both irrigated and rainfed agriculture.
- Methodology and networking for transfer of agro-technology from one tropical region to another to expedite agricultural development using computer simulation/predictive technology.

Technical Assistance priorities are:

- Reducing LDC crop losses from insects, diseases and weeds by using economically and environmentally acceptable integrated crop-protection methods.
- Reducing post-harvest food losses through provision of technical assistance and training.
- Improving economic environment through agricultural policy dialogue and assistance with modification of restrictive policies.

MECHANISMS FOR RESEARCH IMPLEMENTATION

The International Agricultural Research Centers (principally those under the Consultative Group on International Agricultural Research, CGIAR) will require \$41.53 million in FY 1988 to support the budgets of the CGIAR centers plus some additional amounts for several centers and activities outside the CGIAR (i.e.: AVRDC; IIMI; IBSRAM; ICLARM; and AID's Scientific Liaison Officer Activity) For FY 87, PPC has budgeted \$40 million under 936-4111 for core support of the CGIAR Centers. S&T/AGR is providing \$1.75 million of FY 87 funds also under 936-4111 for support of the centers outside the CGIAR and for related activities such as the Scientific Liaison Officer activity.

The Collaborative Research Support Programs (CRSPs) are carried out through U.S. land grant colleges and universities and other U.S. agricultural research institutions and the USDA, in cooperation with foreign institutions. These are funded at \$12.7 million in FY 1987 and \$13.5 million in FY 1988, excluding the Functional Implications of Malnutrition CRSP managed by S&T/N with final funding at \$273,000 in FY 1987.

Programs of small research grants include project 936-4136, Special Constraints--IARCs and projects in biotechnology (931-0610). The Special Constraints project mobilizes the scientific expertise and facilities of U.S. institutions to overcome bottlenecks identified by the IARCs as hindering progress in their research agendas. S&T/AGR provided \$726,000 to this project in FY 86, and has budgeted \$550,000 in FY 87 and \$500,000 in FY 88. The Biotechnology--Limiting Factors project, 931-0610, awards grants to projects where US and LDC researchers collaborate in applying molecular biology to increase crop yields. Work to date has emphasized biological nitrogen fixation. This project is budgeted at \$250,000 in FY 1987 and FY 88.

Direct contracts and grants to U.S. universities and agreements with U.S. Government agencies are the fourth mechanism for implementing research. Funding levels are projected at \$6.9 million in FY 1987 and \$7.4 million in FY 1988.

OFFICE OF AGRICULTURE ACTIVITY AREAS AND PERSONNEL

<u>Area</u>	<u>Personnel</u>
<u>Director</u>	David Bathrick
Program.....	Elizabeth Roche; Betty Beckett Mildred Blakeney Daniel Piper, RSSA-USDA Dana Dalrymple, RSSA-USDA Robert Bertram
Research and International Centers.	
<u>Agricultural Production</u>	
Chief.....	Harvey Hortik
Cereal Grains.....	Frank Mertens
Soybeans & Grain Legumes.....	Loren Schulze
Crop Protection/Pesticides.....	Carroll Collier Benjamin Waite, RSSA-USDA Andrea Blumberg, AAAS Fellow Charles Haines, RSSA-USDA Charles Mullenax, RSSA-USDA
Livestock Production & Health.....	Harvey Hortik Frank Mertens
Horticulture/Extension Agronomy.....	
Postharvest Food Loss.....	
<u>Renewable Natural Resources Management</u>	
Chief.....	Tejpal Gill
Soil Management.....	Tejpal Gill; John Malcolm
Water Management.....	Worth Fitzgerald
Fertilizer Technical Assistance.....	John Malcolm
Aquaculture and Fisheries.....	Richard Neal Lamarr Trott, RSSA-NOAA Kenneth Osborne, RSSA-NOAA
Biotechnology, Biological Nitrogen Fixation and Tissue Culture.....	Lloyd Frederick; Joel Cohen, AAAS Fellow
<u>Economic Policy and Planning</u>	
Chief.....	Phillip Church, (Acting)
Agric. Data Systems.....	Phillip Church
Food Policy.....	Phillip Church
Farming Systems Research.....	Roberto Castro

S&T/AGR PROJECTS RECEIVING FUNDS FOR FY 1986 thru 1988

Project Title	Project Number	Institution or Organization Name	Location	Type of Agrmt	Fiscal Year Funding (\$000)		
					86 Actual	87 OYB	88 C.P.
Total Office					37,025	29,951	31,000
A. AGRICULTURAL PRODUCTION:							
Crop Production Technologies							
Spring x Winter Wheat.....	931-0621	Oregon State Univ.	Oregon	Contract	(9,685)	(9,544)	(9,585)
Sorghum/Millet CRSP ¹ /.....	931-1254	Univ. of Nebraska	Nebraska	Grant	400	300	300
Beans/Cowpeas CRSP.....	931-1310	Michigan State Univ.	Michigan	Grant	2,220	2,185	2,700
Peanut CRSP.....	936-4048	Univ. of Georgia	Georgia	Grant	2,600	3,035	2,600
Agricultural Technology R&D.....	936-4109	USDA	Wash. DC	RSSA	2,400	1,600	1,700
Soybean Utilization & Res.....	936-4132	University of Illinois	Illinois	CA	1,010	1,744	1,430
R&D of Improved Seed Production.	936-4143	Mississippi State Univ.	Miss.	CA	695	550	600
					360	130	255
Livestock Production							
Small Ruminants CRSP.....	931-1328	Univ. of California	Davis CA	Grant	(3,750)	(2,590)	(3,540)
Host Resistance/Integrated Tick Control.....	936-4083	Int'l. Ctr. for Insect Physiology and Ecology	Kenya	Grant	2,580	1,980	2,800
Imp. ² / Animal Vac thru Bio-tech	936-4178	Univ. of California	Davis CA	CA	300	260	260
					870	350	480
Pest & Pesticide Management							
IPM ³ / & Envir. Prot.-Bio-Control	936-4142	Consort. Int'l. Crop Prot.	Berkley CA	--	(340)	(475)	(520)
Vertebrate Pest Mgt. Syst. R&D	936-4173	Denver Wildlife Res. Ctr.	Colorado	PASA	-0-	475	520
					340	-0-	-0-
Postharvest. Food Loss Reduction							
Storg & Procsng Fruits & Vegtbls.	931-1323	Univ. of Idaho	Idaho	CA	(400)	(655)	(725)
Postharvest Grain Systems R&D....	936-4144	Kansas State Univ.	Kansas	CA	400	285	300
					-0-	370	425
Intl Agr. Research Centers(total)							
NON-CGIAR ⁴ /.....	936-4111	AVRDC, IBSRAM, IMMI, ICLARM & MISC.	Various	Grant	(3,948)	(2,300)	(2,030)
					3,223	1,750	1,530
Special Constraint Research....	936-4136	USDA/CSRS	Wash. DC	PASA	725	550	500
B. RENEWABLE NATURAL RESOURCES:							
Water & Tropical Soils Mgt							
Soil Management Support Service.	931-1229	USDA	Wash. DC	PASA	(6,725)	(4,438)	(4,950)
Soil Management CRSP.....	931-1311	N.C. State Univ.	NC	Grant	1,000	615	660
Intl Benchmark Sites Network....	936-4054	Univ. of Hawaii	Hawaii	Contract	2,600	2,013	2,100
Water Management Synthesis-II...	936-4127	Consort. for Int'l. Dev.	Utah	Contract	400	890	1,080
Technology of Soil Moisture Mgt.	936-4021	USDA	Wash. DC	PASA	2,025	660	-0-
Irrigation Mgt Supp & Research..	936-4179	TBD			700	260	510
					-0-	-0-	600

S&T/AGR PROJECTS RECEIVING FUNDS FOR FY 1986 thru 1988

Project Title	Project Number	Institution or Organization Name	Location	Type of Agrmt	Fiscal Year Funding (\$000)			
					86 Actual	87 OYB	88 C.P.	
<u>Fertilizer Development</u>								
Int. Fertilizer Development Center	931-0054	IFDC ^{5/}	Alabama	Grant	4,000	3,460	3,460	
<u>Biotechnology (total)</u>								
Nitro Fix. Symbiotic(NiFPAL) ^{6/}	931-0613	Univ. of Hawaii	Hawaii	Contract	650	-0-	-0-	
Biotechnology - Limiting Factors	931-0610	USDA	Wash. DC	PASA	320	250	250	
Biotechnology for Tissue Culture Imp. ^{7/} BNF thru Bio-Technology	936-4137	Colorado State Univ.	Colorado	CA	500	535	750	
	936-4177	Univ. of Hawaii	Hawaii		200	750	780	
<u>Fisheries and Aquaculture</u>								
Fishrs & Aquaculture Tech. Asst.	931-0242	Dept. of Commerce, NOAA	Wash. DC	RSSA	190	240	240	
Aquaculture Technology Developmt	931-1314	Auburn University	Alabama	CA	310	260	255	
Pond Dynamics CRSP.....	936-4023	Oregon State Univ.	Oregon	Grant	1,040	974	920	
Fisheries Dev. Support Services.	936-4024	Univ. of Rhode Island	Rhode Id.	CA	300	245	255	
CRSP Stock Assessment Fisheries.	936-4146	Univ. of Maryland	Maryland	Grant	800	895	700	
Reproductive Studies on Milkfish.	936-4161	Oceanic Institute	Hawaii	CA	1,200	1,200	1,200	
<u>C. ECONOMIC POLICY & PLANNING</u>								
Agric. Sector Research Services.	931-0060	USDA	Wash. DC	RSSA	449	-0-	-0-	
Agriculture Policy Analysis....	936-4084	ABT Associates	Mass.	Contract	1,498	840	840	
Farming Systems Support.....	931-4099	Univ. of Florida	Florida	Contract	720	300	-0-	

Drafted: S&T/AGR: JARoyer:map: 235-8954:ls1:13. II.86:MB/BB:mdp: 2-18-86:Revised: 2-2-87:mdp
WU098b

- 1/ CRSP - Collaborative Research Support Program
- 2/ IMP - Improved
- 3/ IPM - Integrated Pest Management
- 4/ CGIAR - Consultative Group for International Agricultural Research
- 5/ IFDC - International Fertilizer Development Center
- 6/ NiFPAL - Nitrogen Fixation by Tropical Agriculture Legumes
- 7/ IMP BNF - Improved Biotech Nitrogen Fixation

9/29/86

NO	NUM	TITLE	NAMED	NAMEA	PHONE	PROJ#
1	931-0054	INTERNATIONAL FERTILIZER DEVELOPMENT	DR. DONALD L. MCCUNE	INTERNATIONAL FERTILIZER DEVELOPMENT CTR.	205-391-6600	J. MALCOLM
2	931-0060	AGRICULTURE SECTOR RESEARCH SERVICES	MR. GREG GARBINSKY	USDA/DICB	202-475-4346	P. CHURCH
3	931-0242	AQUACULTURE TECHNOLOGY DEVELOPMENT	MS. PRUDENCE FOX	NOAA (DEPT. OF COMMERCE)	202-673-5302	R. NEAL
4	931-0610	BIOTECHNOLOGY-LIMITING FACTORS	DR. CHARLES SMITH	USDA-CSRS	202-447-2039	L. FREDERICK
5	931-0613	N-FIXATION SYMBIOTIC	MS. JOANNY ROSKOSKE	UNIVERSITY OF HAWAII	868-579-9568	L. FREDERICK
6	931-0621	SPRING AND WINTER WHEAT	DR. WARREN KROWSTAD	OREGON STATE UNIVERSITY	503-754-3728	H. HORTIK
7	931-1229	SOIL MANAGEMENT SUPPORT SERVICE	MR. RICHARD ARNOLD	USDA	202-382-1819	R. MEYER
8	931-1254	CRSP - SORGHUM/MILLET	DR. GLEN VOLLMAR	UNIVERSITY OF NEBRASKA	402-472-6032	H. HORTIK
9	931-1310	CRSP - BEAN/CDRPEA	DR. PAT BARNES-MCCONNELL	MICHIGAN STATE UNIVERSITY	517-355-4693	H. HORTIK
10	931-1311	CRSP - SOIL MANAGEMENT	DR. CHARLES B. MCCANTS	M. C. STATE U. CORNELL U. U HAWAII TR U.	919-737-3922	J. MALCOLM
11	931-1314	AQUACULTURE TECHNOLOGY DEVELOPMENT	DR. DONOVAN MOSS	AUBURN UNIVERSITY	205-826-4786	R. NEAL
12	931-1323	STORAGE/PROCESSING OF FRUITS/VEGETABLES	DR. HARVEY NEESE	UNIVERSITY OF IDAHO	208-885-6791	H. HORTIK
13	931-1528	CRSP - SMALL RUMINANTS	DR. DAVID ROBERTSHAW	UNIVERSITY OF CALIF/DAVIS	916-752-1721	H. HORTIK
14	936-4021	TECHNOLOGY OF SOIL MOISTURE MANAGEMENT	DR. JIM PARR	USDA	202-344-4281	R. MEYER
15	936-4023	CRSP - AQUACULTURE POND DYNAMICS	DR. JAMES LAMMAN	OREGON STATE UNIVERSITY	503-867-3011	R. NEAL
16	936-4024	FISHERIES DEVELOPMENT SUPPORT SERVICES	DR. DON MCCREIGHT	UNIV. OF RHODE ISLAND	401-792-2479	R. NEAL
17	936-4048	CRSP - PEANUTS	DR. TOMMY MAKAYAMA	UNIVERSITY OF GEORGIA	404-229-7312	L. SCHULZE
18	936-4054	INT'L BENCHMARK SITES NETWORK	DR. GORO UEHARA	UNIVERSITY OF HAWAII	808-948-6593	T. GILL
19	936-4083	HOST RESISTANCE/INTEGRATED TICK CONTROL	DR. THOMAS R. ODHAMBO	INTERNATIONAL CENTER OF INSECT PHY ECOL.	430-494-3081	H. HORTIK
20	936-4094	AGR. POLICY ANALYSIS PROJECT	DR. CHARLES HAMRAHAM	ABI ASSOCIATES	202-362-2800	P. CHURCH
21	936-4099	FARMING SYSTEMS SUPPORT	DR. CHRIS ANDREW	UNIVERSITY OF FLORIDA	904-392-1965	R. CASTRO
22	936-4109	AGRICULTURAL TECHNOLOGY RES./DEVELOP.	MR. GREG GARBINSKY	USDA/DICB	202-475-4346	H. HORTIK
23	936-4111	INTL AG RESEARCH CENTERS		IARCS		R. BERTRAM
24	936-4127	WATER MANAGEMENT SYNTHESIS - II	DR. RICHARD MCCONNEN	CONSORTIUM FOR INTERNATIONAL DEVELOPMENT	602-745-0455	W. FITZGERALD
25	936-4132	SOYBEAN UTILIZATION & RESEARCH	DR. HAROLD KAUFFMAN	UNIV OF ILLINOIS AT CHAMPAIGN/URBANA	217-333-6422	L. SCHULZE
26	936-4136	COLLABORATIVE RESEARCH IARCS	DR. SAM WIGGINS	USDA/CSRS	202-447-4202	F. MERTENS
27	936-4137	BIOTECHNOLOGY-TISSUE CULTURE	DR. MURRAY MABORS	COLORADO STATE UNIVERSITY	303-491-1092	T. GILL
28	936-4142	IPM AND ENVIRON PROT INCL BIO-CONTROL	MS. ELEANOR DAMES	CONSORTIUM FOR INTL CROP PROTECTION	301-454-5147	C. COLLIER
29	936-4143	R&D OF IMP SEED PROD/UTILIZ. IN LCES	DR. CURT DELOUCHE	MISSISSIPPI STATE UNIV.	601-325-2391	R. NEAL *
30	936-4144	POSTHARVEST GRAIN SYS/AGRI-BUSINESS R&D	DR. ROE BORSDDRF	KANSAS STATE UNIV.	913-532-6161	R. NEAL *
31	936-4146	CRSP: STOCK ASSESSMENT FISHERIES	DR. JOHN ROWNTREE	UNIV. OF MARYLAND	301-454-8993	R. NEAL
32	936-4149	CRSP NEMATODE RESEARCH AND CONTROL	DR. J. W. SASSEV	NORTH CAROLINA STATE UNIVERSITY	919-737-2721	R. NEAL *
33	936-4161	REPRODUCTIVE STUDIES ON MILKFISH	DR. C.S. LEE	OCEANIC INSTITUTE, HAWAII	808-259-7951	R. NEAL
34	936-4173	VERTEBRATE PEST MANAGEMENT	MR. JOHN W. DEGRAZIO	DENVER WILDLIFE RESEARCH CENTER	303-236-7850	R. NEAL *
35	936-4177	IMPROVED DMF THRU BIOTECHNOLOGY	DR. BEN BOHLOOL	UNIV. OF HAWAII	808-579-9568	L. FREDERICK
36	936-4178	IMPROVED ANIMAL VACCINES THRU BIOTECH	DR. T. YILMA	UNIVERSITY OF CALIFORNIA/DAVIS	916-752-1400	H. HORTIK

*F Merten

AID's INVOLVEMENT WITH THE CONSULTATIVE GROUP
ON INTERNATIONAL AGRICULTURAL RESEARCH

In 1971, AID helped establish the Consultative Group on International Agricultural Research (CGIAR) and was a charter member. The CGIAR is an association of donors that coordinates funding and provides program guidance for 13 International Agricultural Research Centers (IARCs).

The CGIAR is chaired by Dr. S. Shahid Husain, Vice President, Operations Policy, of the World Bank. Technical support is furnished by a Secretariat (provided by the Bank) and a Technical Advisory Committee (TAC) of renowned scientists that has a small secretariat in Rome.

AID Involvement at the Center Level

Each of the 13 IARCs has an international Board of Trustees that has final responsibility for program, management, and funding for that center. The Board's program committee reviews the proposed program with center staff and makes recommendations on content, budget, etc. The program is then presented to the full Board. Issues that remain undecided in committee are presented for Board resolution. An AID representative is frequently involved in committee deliberations when there are major program issues, and the Agency generally has an observer at principal Board meetings.

AID Involvement at the CGIAR/TAC Level

The program and core budget, as approved by the IARC's Board, are then presented to the CGIAR for funding. The CGIAR Secretariat analyzes the program and sends the program, budget, and analysis to each donor and to the TAC. AID is represented at the June/July TAC meeting where the proposed programs and budgets are presented and reviewed. The AID representatives examine each center's budget and activities, and then join the TAC in its discussions of each program. Increasingly, AID is also contributing to external reviews of each center conducted by the TAC every 5 to 6 years. AID has suggested review improvements, provided some review questions, and participated in the open discussion of review reports at the TAC meetings. AID also suggests U.S. candidates for review teams.

U.S. Liaison Scientists

AID has identified 11 U.S. scientists from universities, the USDA Agricultural Research Service and private concerns who will provide technical liaison with eleven international centers. They follow center scientific and technical developments and spend a week or so per year at the center. Their functions include reporting to the Agency on technical/scientific and related management aspects of the program, and consulting with center scientists and management, as requested. They also work actively to further research linkages and interaction between center scientists and the U.S. agricultural research community.

Other AID Involvement at the Center Level

AID is involved in suggesting U.S. candidates for center Board membership. In the few cases where centers have an annual presentation week program, AID tries to send a representative. We also try to have representatives at major conferences/conclaves at the centers. Occasionally, AID's regional bureaus hold their annual meetings at international centers. There is significant and growing interaction between AID missions and the centers.

Funding

AID has provided some funding to the centers that existed before the formation of the CGIAR. After the formation of the CGIAR in 1971, AID began a commitment to provide 25% of the total funding of the system. (In recent years, due to major budget reductions, AID's contribution has been slightly less than this.) The amount and percentage of center funding varies according to a number of factors, including, quality, impact, need and relevance to AID priorities. The amount for individual centers is conditioned in part by our substantial program interaction and from the review process. Support for the system comes from many countries (U.K., Japan, W. Germany, Canada, India, etc.), international organizations (e.g., UNDP, FAO, OPEC), foundations, regional banks, and the Social Progress Funds -- U.S.-owned Latin American currencies administered by the Inter-American Development Bank.

TECHNICAL ASSISTANCE SPONSORSHIP

S&T/AGR sponsors a number of technology development and field service projects which are designed specifically to respond to needs of the LDCs, regional bureaus and country missions. The funding for these projects will total \$7.8 million in FY 1987 and FY 1988. These projects are implemented by:

- Direct contracts;
- Cooperative agreements;
- Grants and agreements with other U.S. government participating agencies.

This total represents only those projects whose entire funding can be classified as technical assistance. In addition, however, virtually every other project in the portfolio has the capacity to provide expert assistance upon request. Taking into account the technical services, information and training components of all projects would raise the percentage of the Office's budget devoted to technical assistance and field services to 35-40 percent.

Private business is strongly involved in providing specialized technical assistance worldwide through the agricultural Indefinite Quantity Contracts (IQCs) which the Office manages. These can amount to \$4.5 million yearly. Nearly all of these funds are from USAID Mission budgets.

DESCRIPTION OF
S&T OFFICE
OF AGRICULTURE
PROJECTS

INTERNATIONAL FERTILIZER DEVELOPMENT CENTER - IFDC - (931-0054)

PURPOSE: To assure a dependable supply of better fertilizers at lower cost to farmers in the developing countries.

CURRENT STATUS: Continues support of IFDC through a grant toward core program expense has been authorized to June 30, 1990. Although the annual contribution is programmed at \$4 million per year, the OYB obligation is \$3.6 million for FY 1987. Funds from other sources, mostly in the form of restricted grants and contracts will raise the IFDC budget to approximately \$10 million.

IFDC has programs in fifty countries. However, none of the S&T grant is used to support assistance to any one country. The grant is used in support of basic research and early technical development work which will be applicable in a number of countries, perhaps universally.

IFDC has active collaborative programs with CIAT, ICRISAT, IITA, IRRI and IFPRI. Notable coordination efforts are cooperation with IRRI in FERRAT, the rice fertilizer research network in South Asia, the West African Fertilizer Research Network with 17 countries and the East African Fertilizer Research Network. The networks are used to evaluate experimental fertilizers, to test potential ways to use fertilizers more effectively, to define areas where fertilizers do not produce reasonably expected results and pinpoint locations which require additional soil management research.

Nitrogen efficiency research and devising ways to use the phosphate rock found in the developing countries to meet their national needs have been and remain the major elements in IFDC's research program. Other fertilizer elements are receiving attention also. Potash balance is important. A systematic survey has shown that sulfur must be included in many fertilizer programs. Other minor and micro nutrient deficiency have also been identified but are not so widespread.

Management assistance in production and marketing is an important service offered by IFDC. Reducing manufacturing and delivery costs are major ways to reduce the delivered cost of fertilizer. This may be of most interest to Asian clients.

Training is nother important activity. Three hundred individuals are trained each year in specialities ranging from feasibility of fertilizer production, raw material evaluation, fertilizer, retail sales and promotion to fertilizer use.

FUTURE PLANS: IFDC will continue research in fertilizer production, use and marketing. In addition to the headquarters laboratory and new research and training center is being build in Togo, West Africa.

PROJECT REPORT

PROJECT: Biotechnology, Limiting Factors (931-0610). Initial FY 76. Continuing. Authorized to 9-30-89. Funding through FY 87 \$5,570,000.

PURPOSE/APPROACH/DESCRIPTION: To help developing countries to improve the capability for doing appropriate BNF research by conducting cooperative research with outstanding U.S. scientists. The information obtained is shared through workshops and publications so other scientists can use the knowledge in their own countries. Graduate training is often provided also, and essential equipment and supplies often are furnished by the U.S. collaborator.

RESEARCH OBJECTIVES:

- To improve the host legume plant capacity for BNF.
- To select and improve strains of rhizobia that maximize BNF for the host.
- To overcome soil and environmental constraints by selecting tolerant systems and by appropriate additions of chemical, cropping sequences, etc.
- To develop methods of rhizobia inoculant use that are appropriate to LDC situations.
- To develop rhizobia inoculants that are capable of surviving high temperatures and adverse conditions during establishment of the crop.
- To find ways that will enable the inoculated strain of rhizobia will outcompete the soil strains (usually less effective) for occupancy of the nodule.

SERVICES AVAILABLE:

- Technical workshops
- Technical assistance by U.S. scientist - cooperator in the cooperating country.

KEY PUBLICATIONS AVAILABLE:

- Biological Nitrogen Fixation for Tropical Agriculture.
- Proceedings: Coordinating Workshop BNF Limiting Factors Program.
- Technical Publications from Scientific Journals (many).

EXAMPLES OF ACTIVITY:

41 graduate students supported; 72 journal articles published.

Institutions and scientists in 35 developing countries and 21 U.S. states have been involved; 8 in AFR, 10 in ANE, 15 in LAC.

GEOGRAPHIC SCOPE: Worldwide

S&T PROJECT OFFICER: Lloyd R. Frederick, S&T/AGR/RNR, AID/W, 703-235-1275.

IMPLEMENTING ORGANIZATION: Cooperative States Research Service, USDA.

SPRING x WINTER WHEAT (931-0621)

PURPOSE: Interdisciplinary research and training program to enhance germplasm of selected grains (wheat and barley) for less favorable environments in LDCs.

CURRENT STATUS:

Initiated: September 1976; New cooperative agreement in effect from Jan, 1986 through Aug, 1989.

Contractor: Oregon State University

Linkages with Research Centers in 45 countries for the purpose of exchange of germplasm. OSU works with CIMMYT and ICARDA and with institutions in Morocco, Tunisia, Turkey, Thailand, Pakistan, India, Nepal, Peru and Colombia.

FUNDING: FY 76 through FY 86 Actual \$4.0 million
 FY 87 OYB 300,000
 FY 88 Proposed 300,000

HIGHLIGHTS AND ACCOMPLISHMENTS

A) For LDCs:

- 1) Developed a germplasm and computer information bank (collected and evaluated 7,000 germplasms)
- 2) 100,900 new spring and winter wheat crosses for genetic diversity were accomplished.
- 3) Eight new varieties of improved winter wheat have been released and approximately 174 new breeding lines with superior nutritional properties are in the final yield testing stage in 47 countries and 120 locations and being considered for possible release. Turkey's annual wheat production has increased from 6.7 million metric tons to 17 to 18 million metric tons since OSU has been involved in this wheat improvement program in Turkey.
- 4) 83 students from 21 countries have received degrees (43 M.S. and 44 Ph.D.) under this program and many have cooperated actively with OSU after returning to their home.

B) For USA:

- 1) The receipt of 7,000 germplasms under this project from numerous countries including those in Eastern Europe, Middle East and China which normally do not share their experimental material, is of tremendous importance to wheat improvement in the U.S.A. Germplasms provided sources of resistance to cereal diseases and have been incorporated into recently released U.S. wheat varieties.
- 2) Several varieties will be ready for release in the U.S. in the next few years.
- 3) 27 American students have performed research toward their thesis through involvement in this project.

PROJECT: Soil Management Support Services, #931-1229. Initial obligation FY 79, estimated completion FY 88. Life of project funding \$5.2 million.

PURPOSE/APPROACH/DESCRIPTION: The purpose is to help developing nations improve their capability for managing and conserving vital soil resources for agricultural production and to improve their capacity to use soil classification and soil surveys as means of improving the applicability and transfer of agricultural information. Coordinated technical input is provided to A.I.D. missions and national institutions/programs. Regional technical workshops and training fora are conducted.

RESEARCH OBJECTIVES:

- Improve soil taxonomy for tropical soils.
- Improve systems for sustained production in less favorable areas.
- Improve systems for high production in less favorable areas.
- Improve minimum purchased input systems.
- Improve institutional capability to generate or adapt technologies and get them applied.
- Improve erosion and resource conservation understanding in the tropical region.

SERVICES AVAILABLE:

- Technical assistance to missions
- Technical information dissemination
- Regional training workshops

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

- Keys to Soil Taxonomy
- Soil Moisture Regimes of Africa
- Soil Moisture Regimes of South America
- Bibliography of Soils of the Tropics (Vols. 1-5)
- Soil Taxonomy and Technology Transfer
- Soil Taxonomy News
- Progress Report, SMSS

EXAMPLES OF ACTIVITY:

Sudan, Chile/Ecuador, Philippines--International Soil Classification Workshops

Costa Rica, Jordan, Burundi--International Forums on Technology Workshops

Djibouti, Jamaica--Soil laboratory assistance

Ecuador, Peru, Thailand, Senegal--Policies and programs in soil conservation

GEOGRAPHIC SCOPE: Worldwide

S&T PROJECT OFFICER: Raymond E. Meyer, S&T/AGR/RNR, AID/W (703) 235-8993

CONTRACTOR/IMPLEMENTING ORGANIZATIONS: Soil Conservation Service/USDA

COLLABORATIVE RESEARCH SUPPORT PROGRAM
GRAIN SORGHUM/PEARL MILLET (931-1254)

PURPOSE:

To improve production, marketing and utilization of grain sorghum and pearl millet in LDCs. To strengthen the capabilities of LDC institutions to generate, adapt and apply improved knowledge to local conditions.

CURRENT STATUS:

Initiated: In mid-1979

5 U.S. SUBGRANTEE INSTITUTIONS:

Texas A&M University
Kansas State University
Purdue University
Mississippi State University
University of Kentucky - Project terminated in FY 86

LDC and Research Center Linkages:

Countries

1. Botswana
2. Brazil
3. Chad
4. Colombia
5. Dominican Republic
6. Honduras
7. Kenya
8. Mali
9. Mexico
10. Niger
11. Paraguay
12. Philippines
13. Senegal
14. Sudan

Research Centers

1. CIAT
2. ICRISAT
3. IRRI
4. ICA

FUNDING:

Total thru FY 86: \$24.7 million
FY 87 OYB: \$2.2 million
FY 88 proposed: \$2.7 million

HIGHLIGHTS AND ACCOMPLISHMENTS OF SORGHUM AND MILLET CRSP

Accomplishments of the Sorghum and Millet CRSP are:

I. U.S. Agriculture

- A. Hybrids with improved feed and food nutritive quality, and greater ecological adaptation. Approximately 75-80% of current U.S. commercial sorghum hybrids contain some germplasm from Africa and India as a consequence of INTSORMIL or INTSORMIL procedures or programs.
- B. Essentially all currently used resistant genes to the major diseases-downy mildew, head smut, anthracnose, charcoal rot and grain rot-were derived from breeding material introduced by INTSORMIL.
- C. New sources of germplasm from high altitude tropical sorghums are providing cold tolerance at the germination/seedling and grain-filling stages for use in improving and extending adaptation to U.S. temperate summer seasons and to no-till farming conditions.
- D. Sorghum genetic material with tolerance to high levels of soluble aluminum has been identified. U.S. seed companies have requested seed of the aluminum-tolerant high yielding lines. Four photo-period insensitive aluminum-tolerant seeds will be released to U.S. and LDC breeders.
- E. Experimental hybrids developed by INTSORMIL and tested for four years in Kansas, have shown that pearl millet has the potential to become an additional combine dryland summer cereal crop with excellent feed grain qualities. Pearl millet is excellent as cereal base in a feed grain ration, high in energy and slightly better than maize in protein content.
- F. Aluminum tolerant millets have been identified. This germplasm has potential in arid soil regions of the world.

II. LDCs

- A. INTSORMIL developed and released in conjunction with ICRISAT and the Sudanese Agricultural Research Corporation the hybrid Hageen Dura -1, a high yielding sorghum for Sudan. In Honduras, INTSORMIL released the high yielding sorghum variety Sureno. It is a dual purpose variety for both grain and forage. It has resistance to foliar diseases and grain storage insects. The seed has been increased for distribution to farmers.
- B. INTSORMIL developed drought tolerant germplasm - one line P898012, possesses excellent drought tolerance in multi-location testing in Sudan.

- C. INTSORMIL developed striga tolerant germplasm - a sorghum variety, P-967083 has excellent tolerance to striga, a parasitic weed. The weed is a major constraint to improved sorghum production in semi-arid regions of Africa.
- D. INTSORMIL has developed a reliable aluminum tolerance field screening technique for sorghum genetic material. This should allow for the development of hybrids which can be produced on two billion hectares of highly acid soils throughout the tropics.

COLLABORATIVE RESEARCH SUPPORT PROGRAM
BEANS/COWPEAS (931-1310)

PURPOSE:

To improve production, distribution, storage, and marketing of beans and cowpeas, and to overcome constraints on the use of these important sources of dietary protein.

CURRENT STATUS:

Initiated: September 1980

Management Entity: Michigan State University

U.S. SUBGRANTEE INSTITUTIONS:

- | | |
|------------------------------|--------------------------------|
| 1. Colorado State University | 5. University of Nebraska |
| 2. Cornell University | 6. University of Puerto Rico |
| 3. University of California | 7. University of Wisconsin |
| 4. University of Georgia | 8. Washington State University |

LDC and Research Center Linkages:

<u>Countries</u>		<u>Research Centers</u>	
Dominican Republic	Senegal	IITA	CNPAF
Honduras	Cameroon	CIAT	INIAP
Guatemala	Nigeria	INCAP SAFGRAD	
Brazil	Kenya	Boyce Thompson Institute	
Ecuador	Tanzania	ICRISAT	
Mexico	Malawi	WSARP	
	Botswana		

FUNDING:

Total thru FY 86: \$19.3 million
FY 87 OYB: \$3.0 million
FY 88 proposed: \$2.6 million

In FY 1986 a new 3 year grant was awarded to Michigan State University. The new grant runs through May 6, 1989.

HIGHLIGHTS AND ACCOMPLISHMENTS OF BEANS AND COWPEAS CRSP

I. For U.S. Agriculture

- A. Improved bean cultivars through access to new germplasm with disease and insect resistance, increased yield potential and improved nutritional quality.
- B. Reduced nitrogen fertilizer requirement as a result of new varieties capable of producing 60 pounds nitrogen per acre plus improved nitrogen fixing bacteria, rhizobia.
- C. Commercial bean seed free of common bean mosaic virus as a result of the virus antisera and sero-detection protocols developed by this project. This protocol is being used by U.S. industry, USDA and the International Agricultural Research Center personnel.
- D. Over 200 strains of insect pathogenic fungi have been accumulated for biological control of cowpea and bean pests with insect pathogens.
- E. Improved varieties of cowpeas are being developed through use of heat-tolerant germplasm identified by CRSP research.

II. For LIC Recipients

- A. In conjunction with USAID mission and European Economic Community, CRSP researchers introduced a new cowpea variety from California. Seven hundred tons of seed were distributed to 100,000 small farmers in Senegal. As a consequence cowpea production in Senegal increased from 16,000 tons in 1984 to 80,000 tons in 1985. Over one million were fed with this new variety.
- B. Improved cultivars for LDCs have been released and additional ones are being developed with insect and disease resistance and heat tolerance. These will result in increased field yields and yield stability. In the Cameroons because of improved cultivars and pest management, farmers can expect 600-1200 kilograms per hectare of cowpeas compared to 300 kilograms before the CRSP project.
- C. Field yields will increase and production costs will decrease as a result of nitrogen fixing bean cultivars and improved nitrogen fixing bacteria.
- D. Improved nutritive value and reduced firewood/fuel requirements. CRSP researchers have demonstrated that two processing treatments can minimize or control hard to cook beans. In addition, genetic and environmental factors have been identified which cause the hard to cook problem. By incorporating germplasm and processing treatments which require less cooking time, firewood/fuel requirements in many areas can be reduced and nutritive value can be improved.

COLLABORATIVE RESEARCH SUPPORT PROGRAM
SOIL MANAGEMENT (931-1311)

PURPOSE:

To find ways to provide sustained crop yields and better income for farmers while protecting the soil from erosion, plant nutrient depletion and physical deterioration.

CURRENT STATUS:

Initiated: September, 1981

Management Entity: North Carolina State University

U.S. Subgrantee Institutions:

Cornell University
Texas A&M University
University of Hawaii

LDC Linkages in 5 Countries:

- 1) Humid tropics: Indonesia, Peru;
- 2) Acid Savannas: Brazil;
- 3) Semiarid Tropics: Niger, Mali.

FUNDING:

Total thru FY 86: \$13.1 million
FY 87 OYB: \$2.0 million
FY 88 proposed: \$2.1 million

Agreements for assignment of field personnel have been reached with all host countries. Low-cost, local sources of essential plant foods are being sought. Full advantage will be taken of legumes to fix nitrogen in the fields or in nearby fallows. As nearby as possible, continuous cover will be maintained to prevent erosion and minimize leaching losses. Mulches are being tried to increase water infiltration rates and protect the soil from the direct impact of intense rains. Aluminum toxicity and soil acidity have been identified as major factors limiting utilization of rainfall in Niger. Acute phosphorus deficiency is the companion fertility problem.

HIGHLIGHTS AND ACCOMPLISHMENTS OF SOIL MANAGEMENT CRSP

- Texas A&M University in collaboration with the University of Niamey and an AID mission program, developed a technique to use mulches of waste products from wood cutting to improve soil conditions, reduce erosion and increase water available to plants. The technique was tested in the Sahel region of Niger. It has great promise for aiding in reforestation of limited rainfall areas which have been rendered barren by over cutting and grazing.
- Texas A&M University in collaboration with the Agricultural Research Agency in Niger (INRANN) and the International Center for Research in the Semi-Arid Tropics has identified soil chemical problems as the over-riding factors limiting the effective use of limited soil moisture. Soil acidity and resulting high concentrations of active aluminum with low reserves of bases prevent adequate root development on sorghum, millet and other annual crops. These plants simply cannot reach the water in the soil at times of their most critical need. The problem is complicated by extreme variability over very short distances and the lack of any pattern clearly related to landscape features. Current research is aimed at correcting or by-passing the problem with liming, phosphate application or use of organic residues. One of the major benefits of sand trapping is likely to be building a less acidic layer over the inhospitable, aluminum saturated soil.
- While working on North Carolina State University research projects in Yurimaguas, Peru, a researcher found and named the rice plant Africano Desconocido, the Unknown African. The plant thrives in paddies and the high ground of the Amazon Basin. Even under acid conditions, the Unknown African can yield three tons per hectare; the native variety averages one ton. Its other attributes: it grows chest high -- farmers don't have to stoop to cut the heads; it doesn't blow over as easily as other tall varieties; it resists disease; it grows in soils high in aluminum without demanding lime. Farmers and scientists are using the Unknown African successfully all over the Amazon Basin.
- The Government of Peru has also selected the Yurimaguas experiment station as the site for the administration of its entire development program for the tropical forest area on the eastern slope of the Andes, a recognition of the value of results obtained there so far.
- North Carolina State University in collaboration with the Peruvian Agricultural Research Organization (INIPA) developed a cropping system which uses a minimum of purchased inputs to increase production. Extensive field testing of rice and cowpeas in Peru has shown that the system, combining selection of crop varieties tolerant to soil constraints, crop rotation, and plant residue management, can substantially increase yields.
- Collaborative research carried out by Cornell University and the Brazilian Agricultural Research Organization (IMBRAPA) has shown that green manure crops can be an alternative to expensive commercial fertilizers to improve soil productivity. These crops can provide a low cost natural source of nitrogen. In addition, use of "green manure" crops can reduce erosion and increase soils' ability to capture water. The technique has been tested in Brazil but should have wide applicability in other acid savanna areas, particularly in Africa.

PROJECT: Aquaculture Technology Development #931-1314 Initial obligation FY 82, estimated completion FY 87. Life of Project funding \$2.25 million.

PURPOSE/APPROACH/DESCRIPTION: The purpose is to (1) enable the International Center for Aquaculture (ICA) at Auburn University to continue to utilize its faculty for steering educational programs in fish culture for students from LDCs, (2) effectively utilize the capabilities available at Auburn/ICA in programs that backstop aquaculture development in 2 DCs, and (3) research, develop and extend appropriate new technologies in fish culture to A.I.D. missions and LDC host country governments.

RESEARCH OBJECTIVES:

- Improve genetics of appropriate species
- Develop improved hybrids
- Refine polyculture
- Develop fish/small animal associations
- Develop low cost feeds
- Improve post harvest fish processing methods

SERVICES AVAILABLE:

- Project related technical assistance
- Evaluation, Special Studies
- Training Program Long and Short term
- Information dissemination

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

- Surveys of USAID needs for project development assistance
- Project Development Reports
- Evaluations of Aquaculture Projects
- Fish Farming Research
- Various Technical and Special Reports

EXAMPLES OF ACTIVITY:

Niger--Study of Potential for increased Fish Production in the Niger River.

Philippines--Sector Impact Analysis of Aquaculture Development and Evaluation of Freshwater Aquaculture Development project.

GEOGRAPHIC SCOPE: Worldwide

S&T PROJECT OFFICER: Tejpal S. Gill, S&T/AGR/RNR, AID/W, (703) 235-1275

CONTRACTOR/IMPLEMENTING ORGANIZATION: Auburn University

STORAGE & PROCESSING OF FRUITS AND VEGETABLES
(Project Number 931-1323)

PURPOSE:

To conduct adaptive research on the postharvest conservation of perishable fruits and vegetables, to provide technical assistance to LDC missions, to train graduate students and to collect and disseminate information on the postharvest conservation of perishables.

CURRENT STATUS:

Initiated: 1980. A second five year cooperative agreement was implemented for the period October 1985 through September 1990.

Management Entity: University of Idaho

Linkages with Research and Development Institutions:

- CIAT
- AVRDC
- CIP
- Asian Development Bank
- McCormick & Atlantic Co./Grenada Nutmeg Marketing Assoc./-marketing of spices in the U.S.)
- International Food Policy Research Institute (IFPRI)
- Visayas State College of Agriculture, Philippines
- University of Virgin Islands
- Appropriate Technology Institute (ATI)
- Perishable Loss Methodology Studies with the Association of Southeast Asian Nations (ASEAN)
- Packaging studies for transport of perishable goods in the Caribbean with the Weyerhaeuser Corporation.

FUNDING:

Total thru FY 86: \$400,000
FY 87 OYB: \$285,000
FY 88 proposed: \$300,000

ACCOMPLISHMENTS:

The Postharvest Institute for Perishables (PIP) in its first six years of operation has sent over 75 short-term technical assistance teams to over 30 countries, accumulated over 9,800 technical postharvest loss control documents in its library, shared 42,000 technical reports with 850 regular clients in 114 countries, presented an annual postharvest course for foreign agriculturists with USDA's Office of International Cooperation and Development and developed an inexpensive solar drier with auxiliary heat (combustion of agricultural wastes) for drying fruits and vegetables. Recently the postharvest loss assessment methodology manual for perishables has been developed and will be tested in 6 LDCs in the next year.

COLLABORATIVE RESEARCH SUPPORT PROGRAM
SMALL RUMINANT - CRSP (931-1328)

PURPOSE: To increase production of meat, milk and fiber from sheep and goats owned by small holders.

CURRENT STATUS:

Initiated: October, 1978.

Management Entity: University of California/Davis

U.S. SUBGRANTEE INSTITUTIONS:

- | | |
|------------------------------|------------------------------------|
| 1. University of Missouri | 6. Montana State University |
| 2. Utah State University | 7. Washington State University |
| 3. Texas Tech University | 8. North Carolina State University |
| 4. Texas A&M University | 9. Winrock International |
| 5. Colorado State University | |

LDC Linkages in 5 Countries:

Brazil
Indonesia
Kenya
Morocco
Peru

Linkages are generally with more than one national agency within each country. Integration of subject specialists, institutions and individual scientists is progressing rapidly and numerous project reports have been published. Complete production packages are now being formulated from the results of research in different ecological zones and in two systems of small ruminant production.

FUNDING:

Total thru FY 86: \$29.4 million

LDC host country & other donor total: \$3.5 million/annually

U.S. institutions: Matching funds in excess of 25% of USAID funding

FY 87 OYB: \$1.98 million

FY 88 proposed: \$2.8 million

U.S. institutions, host countries and other sources are expected to expand the amount of support for the program. Other LDCs have also shown an interest in having SR-CRSP activities in their countries but funding has been a problem.

HIGHLIGHTS AND ACCOMPLISHMENTS OF SMALL RUMINANTS-CRSP (931-1328)

A. In Host Countries

1. The development of a rapid diagnostic test and new vaccine for contagious caprine pleuropneumonia in Kenya is of economic importance to countries extending from West Africa into Asia, affecting at least 48 million goats.
2. The upgrading of Criolla sheep with a locally developed breed (Junin) in PERU is expected to increase the production of carcass meat by 8,000 metric tons and grease wool by 20 million kg per year.
3. The treatment of lambs with Selenium and Vitamin E in Morocco has eliminated a severe white muscle disease problem which when applied on a country basis could save at least 1 million head of lambs per year.
4. Dual-purpose goats have been developed and introduced to 50 farms in KENYA where no livestock was formerly maintained. One hundred additional farms received these dual-purpose goats in 1986.
5. Fiber yields from alpacas in PERU have been increased from a low of 6 pounds up to 17 pounds per animal for added incomes of approximately \$40-50 U.S. per animal.
6. In INDONESIA, the inclusion of green legume foliage in livestock rations increases weight gains by 120% and feed efficiency by more than 80%. This practice could improve the growth rates of over 1 million young sheep and goats in Indonesia.
7. The development of an accurate diagnostic test and control for sheep pulmonary adenomatosis (SPA) in PERU and also progressive pneumonia, another important respiratory disease of sheep throughout the world has been accomplished. Recently, two cases of SPA were identified in the USA by a Peruvian coinvestigator.
8. Research results were transferred to farmers in INDONESIA through 30 participants in sheep and goat training courses, half of which are active in PVO projects and the other half government extension agents.
9. A Synergistic Hemolysis Inhibition Test developed in California was implemented in BRAZIL to detect goats infected with Caseous lymphadenitis.

B. In the USA

1. Six alpacas were acquired by TEXAS TECH UNIVERSITY, Lubbock to take part in educational and research programs on the campus. This occurred only because this institution was involved with the SR-CRSP.
2. US institutions with the SR-CRSP have located potentially valuable gene pools in host countries for improving livestock populations in the USA. The industry has also been reversed; US institutions marketing US maintained genetic materials in LDCs.

3. New courses in international agriculture have been added to the curriculum of several of the SR-CRSP institutions. The courses are often multidisciplinary which has promoted the integration of staff members within institutions.
4. Knowledge is being compiled on animal diseases in LDCs which are not yet important to USA producers but may be of concern in future situations when disease importations occur.

C. In a Worldwide Context

1. The SR-CRSP was responsible for the publication of a new comprehensive reference book on prolific sheep titled Genetics of Reproduction in Sheep. Contributions were from 50 scientists representing 17 countries.
2. In KENYA, SR-CRSP scientists identified Caprine Anthraxis Encephalitis (CAE) and developed a technique for its eradication. The use of these methods could be worth up to \$20 million to goat producers worldwide.
3. The value of including sociology in agricultural development programs in LDCs has been so well demonstrated in host countries that new socio-economic divisions have been formed within collaborating agencies of BRAZIL, KENYA and PERU.
4. SR-CRSP scientists have been asked to participate in regional networks on small ruminants for different regions of the world due to successful records with in host countries.

TECHNOLOGY FOR SOIL MOISTURE MANAGEMENT PROJECT (TSMM, 936-4021)

PURPOSE: To assist developing countries in the assessment of their soil, water, and crop management systems under dryland or rainfed conditions and in the formulation of national strategies for increasing their agricultural productivity through research and technology transfer.

CURRENT STATUS: The TSMM project is implemented under a Participating Agency Service Agreement (PASA) with USDA. The Agricultural Research Service (ARS) and the Economic Research Service (ERS) are direct implementers. ARS has addressed problems of dryland agriculture in the U.S. Great Plains and Pacific Northwest for more than 50 years. Through TSMM, the skills of scientists and researchers in ARS, ERS, and in land-grant universities are being applied to arid and semiarid regions of developing countries.

Linkages have been established with a number of countries, International Agricultural Research Centers (IARCs), and other research centers:

<u>Countries</u>		<u>Research Organizations</u>
Thailand	Jordan	ICRISAT
Sri Lanka	Morocco	ICARDA
India	Egypt	IITA
Niger	Turkey	ORSTOM
Mali		IRAT
Sudan	Mauritania	
Burkina Faso		

TSMM's basic approach involves three steps: 1) compiling data bases or syntheses of relevant in-country research, 2) conducting workshops to assess findings and establish priorities, and 3) planning and implementing regional research and economic case studies on priority problems. In the long run, TSMM hopes to contribute to the development of regional research networks in dryland soil and water management.

TSMM is unique because it integrates agronomic research and economic assessment within one project. This integration facilitates the achievement of the overall objective because planners must understand both agronomic and economic issues in order to assess options realistically.

TSMM received \$700,000 in FY 1986. Planned obligations are \$260,000 in FY 1987 and \$510,000 in FY 1988.

FUTURE PLANS: TSMM will continue to synthesize past in-country research experience in soil and water management/conservation for dryland production in order to improve the basis for further research activity. Collaborative research and economic analyses for appropriate soil and water management technologies will be initiated.

TECHNOLOGY FOR SOIL MOISTURE MANAGEMENT (TSM, 936-4021)

ACCOMPLISHMENTS AND HIGHLIGHTS

IN-COUNTRY RESEARCH DATABASES:

Research databases on soil moisture conservation, conservation tillage, wind and water erosion control practices, farming systems/crop rotations, soil fertility, agroclimatology, socioeconomic impacts and cost/benefit effects of improved management practices, crop residue management, water harvesting, and systems modeling have been compiled by Thai scientists for Northeast Thailand and Jordanian scientists for Jordan. Collaborative efforts are currently underway to do similar syntheses in Sri Lanka, Mali, Niger, and Mauritania. These databases serve as planning documents for research and investment decisions.

WORKSHOPS:

Regional workshops bringing together governmental, university and international experts to assess existing research, establish priorities for future research, and identify resources to address problems have been conducted in Northeast Thailand, Jordan, and Niger. These workshops have fostered a cooperative spirit among participants, provided a forum for identification of critical research needs and of scientists to participate in regional research trials, scientist-to-scientist linkages, and regional networks for research and transfer of soil and water management/conservation technologies.

REGIONAL RESEARCH:

Regional research on priority problems is being undertaken jointly by several countries within a framework that promotes sharing of the results. In 1987, five countries in the Near East plan to use a common experimental design to study the agronomic and economic values of crop residues from rainfed wheat and barley, for soil and water conservation and for utilization by livestock. A similar project on the use of crop residues for improved soil moisture management, wind/water erosion control, and/or livestock feed is being initiated by 4 countries in West Africa. This regional research (ribbon) establishes the foundation for regional networking for research, technology transfer, and information exchange in dryland soil and water management/conservation.

ECONOMIC STUDIES:

Economic case studies involve the review of soil and water management/conservation issues and related economic and policy concerns in typical dryland areas, the design and development of representative farm models with special features to evaluate the economics of soil and water management technology, the identification of data needed for economic analysis at the farm, community and regional levels, farm surveys, and the analysis itself. An

example of preliminary estimates of the ability of low resource farmers in Mali to pay for increased soil moisture conservation technology has shown that increasing infiltration of rainfall from 40% to 60% can increase disposable income by two to four times depending on the rainfall. Income can be increased by another 50 percent if the infiltration is raised to 80 percent. The specific technology to increase infiltration whether tillage, furrow-diking, or residue management depends on the specific farm situation.

TRAVELING SEMINARS:

To provide opportunities for scientists to review current research on soil, water, and crop management systems and to encourage network development; TSMM has organized study tours of dryland research facilities in the U.S. Great Plains and Pacific Northwest. These "traveling seminars" are for scientists and administrators from developing countries in semiarid areas, and personnel from USDA, land-grant universities and international development agencies, including the World Bank, FAO, USAID and the CGIAR centers. These seminars have had an impact on the perspective of several international research organizations and donors. They have provided an important linkage among development practitioners in dryland areas. An important further contribution has been the realization that there are lessons to be learned from the processes involved in the recovery from the environmental and economic disaster in the Great Plains of the "30s" that are very applicable to current problems in the SAHEL and other dryland areas in the developing world.

AGROCLIMATOLOGY:

TSMM has provided the impetus for a small group of agroclimatologists to coordinate their efforts and provide guidance to donors. TSMM is collaborating on improved collection, stratification, and synthesis of agroclimatic data for agricultural use with WMO, FAO, International Research Centers, and U.S. scientists.

TECHNICAL ASSISTANCE:

TSMM has provided technical assistance to several other countries and donors. Assistance has included providing scientific expertise for resolving problems of soil moisture management, participating in reviews of ongoing and proposed research projects, developing problem-solving strategies, facilitating information dissemination, and promoting regional collaboration through workshops, seminars and training programs.

TITLE XII UNIVERSITY COLLABORATION:

TSMM has developed close linkages with a number of Title XII universities including Washington State University, Texas A&M University, Texas Tech University, Kansas State University, University of Missouri, and Utah State University. These universities provide support closely complementary to that of ARS and ERS.

COLLABORATIVE RESEARCH SUPPORT PROGRAM
POND DYNAMICS CRSP (936-4023)

PURPOSE: To define the principles underlying sound aquaculture management and improve practices so as to provide increased employment and a dependable, inexpensive source of animal protein.

CURRENT STATUS

Initiated: September, 1982

Management Entity: Oregon State University

U.S. Subgrantee Institutions:

Auburn University
Michigan State University
University of Hawaii
University of Michigan
Oregon State University

LDC Linkages in 6 countries: Honduras, Indonesia, Panama, Philippines, Thailand, and Rwanda.

FUNDING:

Total thru FY 86: \$4.29 million
FY 86 Actual \$1.04 million
FY 87 OYB: \$.973 million
FY 88 proposed: \$.920 million

Highlights and Accomplishments of the Pond Dynamics CRSP

"Principles and Practices of Pond Aquaculture: A State of the Art Review" has been prepared under the CRSP. It contains a succinct statement on the status and conditions necessary for pond aquaculture, and a review of pond dynamics research as well as an extensive bibliography in each section. It is, therefore, a major basic reference for those interested in initiating a project in pond aquaculture. The core research is a single worldwide experiment with replicates in 6 different tropical environments. From this research a unique data base has been created, based on three years of basic data collected on environmental factors and fish production under varied production regimes at seven sites located in a range of physioenvironmental conditions around the world in the tropics. Analysis of the data has been initiated and is expected to lead to the development of production models for fish pond production under a variety of conditions.

PROJECT: Fisheries Development Support Service (Cooperative Agreement), #936-4024. Initiated July 1, 1983. 1984 funds \$324,969 Continuing.

PURPOSE/APPROACH/DESCRIPTION: To provide technical assistance to Missions and LDCs in marine fisheries, as appropriate and requested; and, to provide training to personnel from developing countries. The International Center for Marine Resource Development has dealt with LDC issues since its formation, with A.I.D. funds and other sources. It is located in Kingston, Rhode Island, with a separate campus and facilities on Naragansett Bay. Approach is to provide assistance on an as requested basis, and training in an organized form appropriate for individuals with language and discipline skills less than satisfactory.

RESEARCH OBJECTIVES: Not applicable.

SERVICES AVAILABLE:

- Technical assistance in marine fisheries, including stock assessment, product quality, economics, and information handling.
- Training in marine fisheries, including, biology, sociology, economics, and information handling.
- Information search capability for fisheries related publications.

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

EXAMPLES OF ACTIVITY:

Sri Lanka--Report evaluating shrimp farming problems and potential. This includes salt water (penaeid) and fresh water (Macrobrachium) shrimp.

West Africa--Assisted the Africa Bureau by developing a status statement on fisheries development in West Africa. This was required for development of a PID for the West Africa initiative, which will begin in FY 1985.

GEOGRAPHIC SCOPE: Worldwide, with emphasis on the marine environment.

S&T PROJECT OFFICER: Tejpal S. Gill, S&T/AGR/RNR, AID/W, (703) 235-1275

CONTRACTOR/IMPLEMENTING ORGANIZATIONS: University of Rhode Island

COLLABORATIVE RESEARCH SUPPORT PROGRAM
PEANUT (936-4048)

PURPOSE: To coordinate resources of LDC and U.S. institutions in a long-term research program to relieve constraints on production and utilization of the peanut in the LDCs.

CURRENT STATUS:

Initiated: August 1982.

MANAGEMENT ENTITY: University of Georgia

U.S. SUBGRANTEE INSTITUTIONS:

1. Alabama A&M University
2. North Carolina State University
3. Texas A&M University
4. University of Georgia

Linkages with LDCs, International Agricultural Research Centers and other research centers:

<u>Countries</u>		<u>Research Centers</u>	
Burkina Faso	Senegal	ICRISAT	CARDI - Including
Mali	Sudan	IRRI	-Antigua
Niger	Thailand		-Belize
Nigeria			-Jamaica
Philippines			-St. Kitts
			-St. Vincents
			-Trinidad

FUNDING:

TOTAL THRU FY 86: \$6.8 million
FY 87 OYB: \$1.6 million
FY 88 proposed: \$1.7 million

The Board for Food and Agricultural Development (BIFAD) approved the External Evaluation Panel's recommendation for a three-year extension of the Peanut CRSP through year eight to June 1990. Peanut CRSP operations have been adjusted to accommodate the reductions in S&T/AGR program funding.

Research and operating procedures have been developed in all collaborative countries and research results have been found to be of value to the U.S. peanut industry as well as to the developing countries. Trained researchers returning to their countries form critical components of their peanut research efforts.

FUTURE PLANS: The Peanut CRSP will continue to consolidate its operations to deal with funding realities. The new ICRISAT Sub-Saharan Research Center in Niger has been planned in coordination with the Peanut CRSP and future research, training and outreach activities will continue with the two programs continuing to complement each other. Benefits from the germplasm collected by the Peanut CRSP to the U.S. peanut industry will become apparent as insect, virus, disease and drought resistance is incorporated into U.S. peanut varieties.

HIGHLIGHTS AND ACCOMPLISHMENTS OF THE PEANUT CRSP

SEMI-ARID TROPIC (SAT) ENVIRONMENT - New peanut cultivars have been found to meet the tests imposed by diseases, insects, drought and heat. Some of the lines are equal to or better than local cultivars in seed and haulm yields, an indication of drought tolerance. Some of the lines also show an increase in the number of plants that survive until harvest, a major contribution to the yield potential. And, the percentage of good seed at harvest was higher in one of the improved lines. Without a doubt, any improved lines developed to survive the harsh SAT environment will be of interest to the peanut farmer of America's southwest, another peanut growing area under the constant threat of drought.

BIOTECHNOLOGY - Genetic resistance to pests is found in so-called wild *Arachis* species, but interspecific crosses with the cultivated *Arachis hypogaea* produce infertile plants. Genetic manipulation to produce interspecific hybrids and introduce genes for resistance into cultivated species are tedious, and successes rare. The Peanut CRSP breeding project has established an embryo rescue program to increase the frequency of interspecific hybrid production between the wild and cultivated species. Significant progress has been made in the past three years in regenerating plants from the callus of both wild and cultivated species. Plantlets with both roots and shoots have been obtained and the methodology to rescue developing embryos has been established.

PEANUT FOLLOWING RICE - Often the rice paddy lies fallow following rice harvest, necessitating the application of expensive commercial nitrogen to maintain good yields. The peanut, a legume, fixes nitrogen for its own use and for the subsequent rice crop. This approach also provides extra food or available income for the subsistence farmer. After three years of breeding and selecting Thai peanut lines for production following rice, improvements can be seen. Several lines have shown performance superior to the common local cultivar, Tainan 9. Soon a new cultivar with higher and more stable yield patterns will emerge.

CONTROL OF FOLIAR AND SOIL DISEASES - Untold losses to peanut yields are incurred annually because of foliar and soil-borne diseases. Chemical control is expensive, and cultural control is only partially effective. Genetic control is on the horizon. The contributions of the pathology collaborators in to the breeding projects have been invaluable, with disease surveys in Senegal, the Philippines, and Thailand providing a focus for breeding and cultural control efforts. We know that weather-based timing of fungicide applications for leafspot control in U.S.A. decreases chemical costs. Studies on leafspot, rust and other foliar diseases conducted in Thailand and the Philippines help answer this question. Losses from soil-borne diseases are evaluated in Senegal and Texas, with a concurrent exchange of information. Pathologist and breeders cooperate to take and analyze the never-ending ratings for disease resistance in breeding programs. To stabilize or increase yields, diseases must be controlled.

RICE AND PEANUT AND SOIL MICROBIOLOGY - Rice and peanut go together with peanut following rice in a crop rotation. Since rice is flooded with water for long periods of time, the question facing researchers has been, Can sufficient rhizobia from one peanut crop survive the flooding to inoculate the next peanut crop? Peanut CRSP researchers have found that rhizobial numbers decrease steadily during flooding, but sufficient numbers do survive for adequate inoculation of the next peanut crop. Rhizobium strains may exist that will survive in greater numbers during flooding to provide more rapid inoculation to enhance plant growth.

MYCORRHIZAE, A NOVEL APPROACH TO INCREASE YIELDS - Can peanuts be field-inoculated with apparently superior mycorrhizal strains to increase yields? Of ten mycorrhizae species tested in the Philippines, one resulted in better peanut plant growth due to the symbiotic association with similar results in Thailand and Texas. It is expected that this research will provide a way over a seemingly insurmountable roadblock of how to produce and introduce spores into a field to promote inoculation with superior species.

AFLATOXIN MANAGEMENT WITH A MINI-COLUMN - Current techniques to analyze aflatoxins pose a problem in developing countries because the best procedure requires expensive and sophisticated equipment that needs specialized maintenance and the traditional mini-column procedures are only semiquantitative techniques. A new mini-column was developed by the Peanut CRSP toxicology team by adding bentonite clay to the column packing material and resulted in a more concentrated and clearly defined layer of fluorescence. The mini-column has also been used in the development of a simplified procedure for the rapid analysis of aflatoxins in crude peanut oil. It is believed that this new procedure could be contained in a portable unit to provide rapid on-site analysis of the contaminated, crude peanut oil used in Senegalese villages.

AFLATOXIN NUT REMOVAL, OF SORTS - Any aflatoxin-contaminated peanut that reaches the processor must be removed or decontaminated prior to processing. Samples of aflatoxin contaminated peanuts were hot-water blanched in laboratories in the Philippines and Thailand. Without their seedcoats, damaged seeds could be readily observed and removed in visual sorting procedures. This simple sorting technique is effective and can be adapted for use by home- and cottage-level processors.

PROJECT: International Benchmark Sites Network (IBSNAT), #936-4054.
Initial Obligation FY 82, estimated completion FY 90. Life of
project funding: \$9.9 million.

PURPOSE/APPROACH/DESCRIPTION: The purpose of the project is to demonstrate, through a network approach, the use of systems analysis and soil-weather-crop simulation models for predicting problems and potentials of crop performance and management requirements for decision-making at regional, national, intermediate and on-farm levels. It will be a prototype network of collaborating national, regional and international research centers whose stations represent major agroecological zones and crops of the tropics and subtropics. They will serve as both sources and recipients of agrotechnology.

RESEARCH OBJECTIVES:

- Validate simulation models for ten crops.
- Develop operational agronomic data base management system.
- Establish capability in LDCs to use models for predicting crop performance.
- Establish fully functional prototype network.

SERVICES AVAILABLE:

- Technical assistance to USAIDs and LDCs.
- Technical information sharing
- Regional training workshops
- Back-stopping for LDC collaborators.

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

- IBSNAT Leaflet; IBSNAT Brochure
- IBSNAT Project Design Elements, Linkages and Schedules.
- IBSNAT Sites News
- Proceedings - Minimum Data Set of Agrotechnology Transfer
- Guidelines - Experimental Design and Minimum Data Set.
- Networking Knowledge - The Future is Now
Dr. N.C. Brady's Keynote Speech August 84.

EXAMPLES OF ACTIVITY: (Research Collaboration)

International Centers--ICRISAT, CIP, IFDC
Regional Centers --CATIE, ACSAD
National Centers --CSIRO, EMBRAPA, INRA
Philippines, Indonesia, Panamá, Burundi

GEOGRAPHIC SCOPE: Worldwide

S&T/PROJECT OFFICER: Tejpal S. Gill, S&T/AGR/RNR, AID/W (703) 235-1275

CONTRACTOR/IMPLEMENTING ORGANIZATION: University of Hawaii

HOST ANIMAL RESISTANCE/INTEGRATED TICK CONTROL PROJECT
(Project Number 936-4083)

Purpose: To attack tick-borne diseases such as Heartwater and Babesiosis in livestock through the development of: (1) vaccines which protect livestock against ticks; (2) improved measures for the control of ticks in the environment; and (3) lines of livestock breeds having high natural resistance to ticks.

Current Status:

Initiated: September, 1983
Management Entity: The International Centre for Insect
Physiology and Ecology
LDC Linkages: Kenya and other collaborating African states.

Funding:

Total through FY 88	\$1,410,000
FY 87 OYB	\$ 260,000
FY 88 Proposed	\$ 260,000

Accomplishments of the Tick Control Project:

1. The investigators conducting this research have identified and isolated the antigens produced by ticks which are most effective as a vaccine in producing immunity (resistance) in livestock to ticks. This occurs through the production of antibodies in the animal's blood which attack the tick's digestive system when it attempts to attach to and feed from the animal.
2. Breeds, and lines within breeds, of African cattle have been identified which show a high degree of natural resistance to tick infestation. These animals are being characterized genetically and their numbers increased through selective breeding. Defining the genetic component of this resistance would pave the way for identifying livestock around the world that have this capability.
3. Basic research on tick ecology has provided new bases for controlling ticks in the environment through the use of specific attractants.

AGRICULTURAL POLICY ANALYSIS PROJECT (APAP) #936-4084

Introduction and Summary

Project Goal and Purpose. "Policy dialogue" is one of the four pillars in AID's Blueprint for Development. The limited development assistance resources of AID and other donors can have a much greater impact if they are used to foster the types of economic and non-economic incentive policies needed to assure efficient use of LDC's own natural, human and technological resources. The type of economic policy environment which AID rosters will also influence the effectiveness of our new Agency focus in agriculture on income generation, hunger avoidance and maintenance of the natural resource base.

Because policies affecting agriculture are often made outside the sector, the Agency has sought to build understanding of how such policies impact on the production of and demand for farm products in LDC's. The Agriculture Policy Analysis Project (APAP) was designed in 1983 with two purposes: 1) distill lessons we have learned about how to assess the impact of economic policy on agriculture sector performance; 2) assist USAID missions in building capacity in LDC's to conduct their own analysis in support of formulating and monitoring policies affecting the sector. With this added understanding and analytical capacity in AID and host countries alike, more substantive dialogue on needed policy changes will be possible.

Project Activities. The Agricultural Policy Analysis Project (APAP) started officially on September 30, 1983 when AID signed a contract with Abt Associates, Inc. to implement the subject project, which is broadly subdivided into worldwide and country activities. APAP is now into its fourth year of activities.

Worldwide activities are those that apply to all USAID Missions, Regional Bureaus and AID/W offices. They consist of five discrete activities: (1) development of roster of policy analysts, (2) formulation of Agricultural Development Officers Guidelines, (3) formulation of Agricultural Policy Analysis Guidelines, (4) evaluation of AID funded agricultural policy and planning projects, and (5) establishment of agricultural policy decision makers network.

Country activities consist of technical assistance specific to a country or region. These are: (1) conducting country-specific policy analysis; (2) designing and evaluating USAID policy and planning projects; (3) planning for workshops and conferences; and (4) conducting special studies related to on-going projects. Until this last year country activities were funded at the outset if necessary by ST/AGR and to the extent feasible through mission buy-ins. With funding cutbacks we no longer have the scope to launch new efforts; we must depend entirely on mission funded country work. Accomplishments to date in meeting the targets established in the implementation schedule include:

- most of the worldwide activities are on schedule;
- a staff papers series has been started to report lessons learned and applied research results;

- more than \$1.5 million in mission buy-ins has been obtained from 17 missions;
- twenty-seven countries have received technical assistance involving 45 project staff and outside consultants;
- long-term relationships with seven USAID Missions have been established for conducting applied research and testing techniques for building policy analysis capacity.

On the other hand, the uncertainty of SI/AGR core funding availabilities have placed strains on the contractor and sub-contractors alike. The following sections summarize the principal accomplishments of the project by activities and analyzes the level of expenditures and level of effort for the remaining project life.

Worldwide Activities

1. Analysis of AID Agricultural Policy Projects. This evaluation was conducted to identify the factors that contribute policy project success or failure, to assess the socio-economic impacts of policy projects and evaluate the administrative efficiency of policy projects. A draft of the report based on literature review of USAID documents has been completed. Distribution and discussions of the draft report have been completed with the Asia and Near East, Africa, Latin America Bureaus and the Policy and Program Coordination Bureau.

2. Agriculture Officers' Guidelines. A draft of Agricultural Officers' Guidelines has been completed and reviewed by selected AID/W offices and some USAID missions. The draft also has been used, along with other teaching materials, in the Agricultural Policy Workshop. A final draft was delivered on September 30, 1986 at the end of the third project year.

3. Agricultural Policy Analysis Guidelines. The guidelines differ from the above in content and target audience. They are designed to develop the analytical skills of host country analysts and technical assistance teams. A draft of the guidelines has been completed and circulated internally in AID for review and comments by the regional bureau representatives in the Economic Policy Sub-committee of the Agriculture Sector Council.

4. Policy Networks. APAP network support provides a common forum for agricultural decision makers and administrators to share experiences and discuss common policy problems and issues through regional workshops, conferences and invitational travel. APAP has helped foster intra-regional linkages among countries in Africa and Latin America and The Caribbean. In Latin America and the Caribbean, the terms of reference have been prepared for a conference among Ministers of Agriculture in the region. In Africa, plans are underway for workshop on agricultural policy to be sponsored jointly by FAO and the Agricultural Policy Analysis Project.

5. Roster of Agricultural Policy Analysts. A roster of agricultural policy analysts and development specialists has been developed in hard copy and computerized files. The roster contains the individual's name, language proficiency, subject matter and area expertise, work experience, education and professional affiliation. It is now operational -- copies of the handbook, C.V.s and computer diskette have been distributed to each of the regional bureaus and to PPC -- and has already been used to identify candidates for overseas assignments.

Country Activities

1. Technical Assistance for Policy Analysis. The purpose of this activity is to assist USAID Missions in identifying policies that constrain national agricultural development. Technical assistance under this activity has resulted in identification of strategies and their anticipated impact on production, employment, government revenues and expenditures. Assistance has been given to USAID Missions in Malawi, Mauritania, Senegal, Zaire, Costa Rica, Dominican Republic, El Salvador and Near East Regional.

2. Design and Evaluation of Agricultural Policy Analysis Project. This activity is designed to assist USAID Missions in developing new policy projects and projects with policy analysis components, and in evaluating on-going and terminating projects. Assistance was given to Zaire, Madagascar, Egypt, Thailand, Dominican Republic, Panama, Togo and LAC Regional.

3. Workshops. Two workshops planned for this project: the Agricultural Policy Analysis Workshop and the Decision Makers Workshops. Workshops have been conducted to date in Liberia, Dominican Republic, Peru and Madagascar. Policy workshops are in preparation for Anglophone and Francophone Africa and for the Dominican Republic in 1987. The final draft of the Agricultural Policy Analysis Guidelines and Agricultural Development Officers' Guidelines will be used as teaching materials for future workshops.

4. Technical Assistance to On-going Projects. Technical assistance to on-going projects assists USAID Missions in finding solutions to policy problems through special studies and to help host country governments institutionalize policy analysis. Assistance was given to Liberia, Niger, Pakistan, Sri Lanka, Bolivia, Dominican Republic and Panama.

5. Mission Buy-ins for Agriculture Policy Analysis. Buy-ins have come from over 17 missions--Africa (7), ANE (4) and Latin America (6)--and have ranged over the entire scope of APAP services; project design, policy analysis, workshops and technical assistance to on-going projects. Annex A lists the country buy-ins during the first three years of the project.

S&T/AGR AGRICULTURE POLICY ANALYSIS PROJECT (APAP) -- #936-4084

FY 1984 to FY 1986

Mission*	Activity	Amount	Cumulative for FY	Cumulative FY 84 - FY 86
(Mission Buy-ins for FY 84)				
Senegal (1)	Policy Analysis	\$252,959	\$252,959	
El Salvador (2)	Policy Analysis	\$138,150	\$391,109	
El Salvador (3)	Policy Analysis	\$61,935	\$453,044	
Senegal (5)	Policy Analysis	\$60,586	\$513,630	
Panama (5)	Project Design	\$48,095	\$561,725	
Sri Lanka (5)	Project Design	\$93,065	\$654,790	
Dominican Republic (5)	Project Design	\$24,734	\$679,524	\$679,524
(Mission Buy-ins for FY 85)				
Ecuador (6)	Project Design	\$30,860	\$30,860	
Liberia (12)	Workshops	\$48,812	\$79,672	
Dominican Republic (12)	Workshops	\$10,010	\$89,682	
Africa Regional (12)	Policy Analysis	\$14,303	\$103,985	
Honduras (12)	Policy Analysis	\$4,957	\$108,942	
Niger (12)	Tech. Assistance	\$41,001	\$149,943	
Sri Lanka (12)	Tech. Assistance	\$24,424	\$174,367	
Mauritania (12)	Project Design	\$60,418	\$234,785	
Bangladesh (12)	Policy Analysis	\$41,956	\$276,741	\$956,265
(Mission Buy-ins for FY 86)				
Mauritania (13)	Tech. Assistance	\$26,874	\$26,874	
Madagascar (14)	Policy Analysis	\$88,750	\$115,624	
Egypt (1)	Project Design	\$18,342	\$133,966	
Togo (15)	Policy Analysis	\$74,990	\$208,956	
Dominican Republic (15)	Workshops	\$48,252	\$257,208	
Mali (16)	Project Design	\$28,042	\$285,250	
Sri Lanka (16)	Project Design	\$51,048	\$336,298	
Guatemala (17)	Policy Analysis	\$65,106	\$401,404	
RDO/C (18)	Project Design	\$53,889	\$455,293	
Egypt II (19)	Tech. Assistance	\$98,947	\$554,240	\$1,510,505

*Numbers in parenthesis refer to the contract modification number. PEC. 1 October 1986.

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

February 9, 1987

TO: Participants to the 1987 ARDO Conference in Bangkok

FROM: Roberto J. Castro, S&T/AGR/EPP 12 Gits

SUBJECT: Update on the S&T/AGR Farming Systems Support Project

Dear College:

Farming Systems as a concept is directed to improving farm productivity and income by understanding the conditions of the farmers for whom technology is being developed in order for it to be efficiently and rapidly adopted as well accepted (See Fig. 1). For operational purposes a distinction is made between Farming Systems Research (FSR) and Farming Systems Research and Extension (FSR/E).

FSR is an appropriate strategy for the International Agricultural Research Centers (IARC's) to use as a means of exposing their genetic materials and management practices to a wider range of conditions than would be possible in working only on their own experiment stations and on those of host countries. IARC scientists using FSR not only are able to test their technology on farms but are able to receive the feedback from the farmers on whose land the testing takes place. On the other hand, FSR/E is more applicable to national institutions that have the direct responsibility for not only developing technology appropriate to the conditions in their countries, but also to promote the diffusion of that technology to their farmers. In this context, research and extension blend into a common effort regardless of the institutional home of the program. Researchers carry out extension functions and extensionists conduct research.

The S&T Farming Systems Support Project (FSSP), conceived as a ten-year effort and initiated in 1982, has the purpose of supporting USAID and LDC's Agricultural Research and Extension Institutions in the design, implementation and evaluation of FSR/E programs. The main components of the project are training, networking, and technical assistance.

Training has emphasized the identification of constraints bounding the adoption of appropriate technologies, specification of new appropriate technologies and improvement in technology development for limited resource farmers. Three sets of training manuals have been completed and three others are in the process of being finalized. One set is available in French, Spanish and English and two have been translated to French.

The first completed set focuses on Diagnosis in FSR/E, including initial diagnosis, links between social and biological science, intra-household considerations and socio-cultural issues. The rapid appraisal approach used for initial diagnosis offers the opportunity of identifying not only biological constraints at the farm level but also policy constraints that are impeding the adoption of appropriate technologies. By addressing those policy

constraints, the potential for short-term impact is significant.

The second set of training manuals deals with Techniques for Design and Analysis of On-Farm Experimentation. This set is linked to the longer-term objectives of FSR/E, the identification and development of appropriate technologies to be mixed with traditional technologies.

The third available set, developed by Michigan State University with the support of FSSP, consists of a microcomputer program (MSTAT) developed to facilitate effective agricultural research programs. This program enhances the ability of reserchers to handle large sets of data, helps them in determining research priorities and problems, and facilitates the generation of new appropriate technologies.

The sets being developed which will enhance the scope of the completed manuals are: Livestock in FSR/E, Economic Analysis of FSR/E and Management and Administration of FSR/E.

Training has been provided not only to LDC's researchers but to the staff of 21 U.S. Universities. Over 650 professionals have been trained and at least 17 countries, 20 LDC's universities and 21 U.S. universities have received copies of the completed training manuals.

In supporting and strenghtening networks of farming systems professionals world-wide, FSSP has been supporting the Annual Farming Systems Symposium held at Kansas State University until 1986. (The 1987 Symposium will be held at the University of Arkansas). Each year 200 to 300 professionals worldwide have participated in a week-long symposium. To complement these efforts, FSSP reaches more than 500 FSR/E professionals worldwide through trimestral newsletters which are produced in English, French and Spanish.

In support of Farming Systems Networking in West Africa, FSSP has supported the West Africa Farming Systems Research Network (WAFSR) which involves 18 countries and the West Africa Integrated Livestock System Network that involves 10 countries.

FSSP has also contributed to the Kansas State University Bibliography in FRS/E, which contains approximately 1250 entries and 300 yearly supplemental entries. This bibliography is available to national institutions and the public on microfiches. French and Spanish translations of most of the bibliography is available.

In addition to these efforts , FSSP has provided technical assistance to USAID missions in Kenya, Gambia, Malawi, Senegal, and Togo in the Africa Bureau; Paraguay, Peru, Bolivia, Ecuador, Belize, Honduras, Guatemala, Dominican Republic, Jamaica, Haiti, and the two Regional Offices of ROCAP in Central America and RDO/C in the Caribbean Region. Assistance involved training in FSR/E methods and helping in project development and evaluation. Proposed activities for 1987 includes work in Cameroon, Niger, Mali, Mauritania, Senegal, Zaire, Ecuador, Peru, and Honduras.

Attachments

SOYBEAN UTILIZATION AND RESEARCH PROJECT (936-4132)

PURPOSE: To develop and disseminate new soy products and processes from raw whole soybeans; to conduct collaborative research and testing of new products and processes and promote the commercial application of these products in the LDCs as well as in the USA; and to conduct training on soybean utilization

CURRENT STATUS: The International Soybean Program (INTSOY) of the University of Illinois at Urbana-Champaign (UIUC) received the award to implement the Soybean Utilization and Research Project in April 1985.

Linkages have been established with the following countries, International Agricultural Research Centers and other research centers:

<u>Countries</u>		<u>Research Centers</u>
Kenya	India	IITA
Swaziland	Pakistan	IRRI
Uganda	Sri Lanka	
Zambia	Jamaica	
Zimbabwe		

UIUC has completed the building of a new food processing structure in which the Soybean Utilization and Research Project will conduct on-campus research. Private sector manufacturers of food processing equipment have donated extruders to INTSOY for development of new products and processes.

The major efforts of the INTSOY researchers have been to establish working relationships with Host Country and other LDC institutions; to initiate on-campus research in the development of new products and processes; and to develop linkages with other organizations with interest in improving the lot of the hungry and malnourished of the world.

The Soybean Utilization and Research Project received \$695,000 in FY 1986. Planned obligations are \$550,000 in FY 1987 and \$600,000 in FY 1988.

FUTURE PLANS: INTSOY will solidify the loose regional soybean research organizations in Asia and Africa in which IRRI and IITA play a major role. Collaborative research and testing of new products and processes will begin in the cooperating countries. A major training initiative will begin, including short-term training abroad and extended training at UIUC.

SOYBEAN UTILIZATION AND RESEARCH PROJECT (936-4132)
ACCOMPLISHMENTS AND HIGHLIGHTS

PROCESSING RESEARCH - Historically, processing of soybeans has been either through an extrusion process or through an expeller process. The research funded under the Soybean Utilization and Research Project at the University of Illinois at Urbana-Champaign (UIUC) demonstrated that 75 percent of the edible soy oil can be removed from soybeans with only one pass through a mechanical expeller by first conditioning the whole or dehulled beans in the extruder. The process also increases the rated capacity of the expeller by as much as 400 percent. The process produces a high-quality, natural oil and a partially defatted meal suitable for both animal feed and human food products. The process has a low energy requirement, can be conducted with low precision machinery and has wide application for small enterprises in the U.S. and abroad.

NEW PRODUCT DEVELOPMENT - Even though the soy foods are high in protein content and contain the favorable, low saturated and no cholesterol oil, product development has taken a great step forward with the UIUC research on blanching dry beans in boiling water containing a small amount of sodium bicarbonate. This process inactivates the enzyme that causes the strong beany flavor normally associated with soy foods, destroys antinutritional agents and tenderizes the beans. Improved snack foods, soups and soy flour for weaning foods, as well as new products such as rice/soy and corn/potato/soy blends have been developed. Several advances have been made in upgrading simple soymilk processing to a medium-scale commercial level using a new steam injection technique.

NEW FROZEN FOODS PRODUCT - First results of field and laboratory testing on the processing and marketing of frozen green, raw soybeans for the U.S. and other countries with frozen food markets are encouraging. Harvesting problems for this product which has twice the protein of peas or lima beans have been largely overcome. Commercially available green bean picking equipment has proved highly successful during summer field tests. Progress is being made on improving depodding techniques. The product will provide another market for soybeans out of the traditional oil and/or meal markets.

SOCIO-ECONOMIC STUDIES WITH SOYBEAN UTILIZATION - UIUC initiated studies on the cost analysis of extrusion cooking and mechanical expelling preceded by extrusion using data from India. Studies of the soyfood industry of Sri Lanka were initiated. A survey of "state of the art" whole soy processing and utilization research and development around the world has begun.

COORDINATION AND COOPERATION - UIUC cooperated on the establishment of the soybean utilization program at the International Institute for Tropical Agricultural (IITA) with emphasis on home and village processing. UIUC worked with IITA to help obtain a three-year grant of \$300,000 from IDRC to fund a cooperative soybean utilization program with the Nigerian government and IITA. UIUC staff responded to several hundred requests for more information about soyfood processing from more than 30 countries during the last year. More than 100 visitors from 20 different countries visited the UIUC facilities. Valuable contacts have been continued among UIUC, U.S. and foreign industry foundations, commodity groups and private voluntary organizations.

TRAINING AND COMMUNICATIONS - A six-week soy utilization short course at UIUC in 1986 was attended by 12 participants from nine countries. Brochures, a newsletter, a special booklet on "The Soybean Solution: Meeting World Food Needs", popular articles and an audio-visual presentation have been developed.

INFRASTRUCTURE AND SUPPORT ABOVE AND BEYOND EXPECTATIONS - The University and the State of Illinois have committed approximately \$1 million to completely remodel the current project laboratories and pilot plant. In addition to equipment purchased with contract funds, the private sector has donated \$315,000 in equipment during CY 1986.

COLLABORATIVE RESEARCH ON SPECIAL CONSTRAINTS AFFECTING
THE PROGRAMS OF THE INTERNATIONAL AGRICULTURAL RESEARCH
CENTERS (IARCS)
Project Number (936-4136)

PURPOSE: To provide a system that puts U.S. human and technological resources in the U.S. agricultural science community at the services of the IARC network.

CURRENT STATUS:

Initiated: August 1985

Management Entity: USDA/Cooperative State Research Service (CSRS) implements the project through a PASA agreement from 8/1/85 through 9/30/90.

Linkages of U.S. public and private institutions with the following IARCs:

International Maize and Wheat Improvement Center
International Center for Tropical Agriculture
The Asian Vegetable Research and Development Center
International Institute of Tropical Agriculture
International Rice Research Institute
International Center for Agricultural Research in the Dry Areas
International Crops Research Institute for the Semi-Arid Tropics
International Livestock Center for Africa
International Laboratory for Research on Animal Diseases
International Centre of Insect Physiology and Ecology
International Potato Center

FUNDING:

FY 86: Actual:	\$700,000
FY 87 OYB:	\$550,000
FY 88 proposed:	\$500,000

Highlights and Accomplishments:

1. The project awarded nine (9) research projects to nine (9) different universities for collaborative research with seven (7) IARCs totaling \$800,300 in 1986. See attached listing of these projects. Research results will be known in 2 to 3 years. The proposals for FY 87 have been received and are being evaluated.
2. This project is strengthening and increasing the research network between the IARCs and U.S. institutions and familiarizing researchers with LDC research problems.

PROPOSALS FUNDED IN 1986

1. Evaluation, Management, and Utilization of Maize Germplasm and Breeding Systems. CIMMYT - University of Nebraska (C. O. Gardner).....\$84,668.
2. The Urgent Requirement by IITA for a Taxonomic Resolution of Cylas in Africa. IITA - Rutgers University (G. W. Wolfe).....\$49,852.
3. Chemotherapy and Thermotherapy of In Vitro Potato and Sweet Potato Plantlets. CIP - University of Wisconsin (S. A. Slack).....\$84,000.
4. Monoclonal Antibodies and Cloned DNA to Index for Sweet Potato and Yam Viruses. IITA - USDA/ARS, Beltsville - (R. H. Lawson).....\$143,610.
5. Development of a Barley Yield Simulation Model. - ICARDA and IFDC - Michigan State University - (J. T. Ritchie).....\$110,000.
6. Differentiating the Corn Stunt and Maize Bush Stunt Diseases in Latin America. - CIMMYT - Ohio State University - (D. T. Gordon).....\$55,432.
7. Reproductive Biology of Striga hermonthica. - ICRISAT - Old Dominion University - (L. J. Mussleman).....\$112,667.
8. Removing Soil Structural Constraints to the Production of Maize and Legumes Following Rice. IRRI - University of Minnesota - w. E. Larson)\$110,000.
9. Determination of Plants from Wild Glycine Species to be Resistant to Phas-
kospora pachyrhizi. AVRDC - University of Illinois (T. Hymowitz) \$50,000.
- Total.....\$800,232.

The International Agricultural Research Centers participating are: CIMMYT (2), IITA (2), CIP, ICARDA, IFDC, ICRISAT, IRRI, AND AVRDC.

PROJECT: Agricultural Biotechnology-Plant Tissue Culture (936-4137). Initial FY 84, est. compl. FY 89. LOP fund. \$5.0 million.

PURPOSE/APPROACH/DESCRIPTION: Expand and accelerate tissue culture research on LDC crop production problems by strengthening LDC capacity; linking and coordinating world wide research. Expand field testing of stress tolerant plants in collaboration with IARCs and LDC research institutions. Train LDC researchers to use plant biotechnology/tissue culture for crop production problems. Stimulate a network of research institutions to share technology, information and materials. Apply tissue culture techniques to additional important LDC crops.

RESEARCH OBJECTIVES: Produce and characterize such LDC crops as wheat, rice and pearl millet tolerant of salt, drought, aluminum and heat stresses. Develop techniques for regenerating plants from protoplasts or cell cultures of soybean, green beans, cowpea, corn and sorghum. Develop techniques to accelerate translocation of genes from wild species into domesticated crops during wide crosses. Test derived crop lines at field locations including IARCs testing networks. Develop and apply techniques such as anther culture, embryo culture and protoplast fusion to improve LDC crops.

SERVICES AVAILABLE:

- Subgrants for research where LDC and U.S. institution scientists cooperate.
- Train LDC personnel in tissue culture to obtain stress tolerant crops.
- Annual network conference to enhance research cooperation and information exchange.
- With A.I.D. mission funding establish U.S.-LDC technical support linkages and upgrade LDC laboratories and staff to participate in the International Tissue Culture Network for cooperation with CSU staff on specific problems including linkage for diagnostic analysis, information/technology transfer and training.

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

- CSU will supply bibliographies and journal article reprints to LDC members.
- A network newsletter published twice yearly.

EXAMPLES OF ACTIVITY:

Worldwide--A Collaborative Research Screening Network to field test regenerated cereal plants. Initial members: IRRI, CIMMYT, ICRISAT, ICARDA, CSU, LSU and several LDCs. Computer access file of plant tissue culture literature for access by LDC cooperators.

GEOGRAPHIC SCOPE: Worldwide

S&T PROJECT OFFICER:

S&T/AGR/R, AID/W, (703) 235-8877/8959.

CONTRACTOR/IMPLEMENTING ORGANIZATION: Colorado State University, Ft. Collins.

Integrated Pest Management and Environmental Protection (936-4142)

Contractor: Consortium for International Crop Protection
Central Program Headquarters: University of Maryland
Other consortium members (total 14):
U. of Florida N.C. State University
U. of Miami, Florida U. of Illinois
U. of Hawaii U. of Minnesota
U. of Puerto Rico Purdue University
Cornell University Oregon State University
Texas A&M University USDA
University of California

Description: This project provides a multidisciplinary approach to pest and pesticide management and has technical assistance, training, networking and research as project elements. Each of the major crop protection disciplines, entomology, plant pathology, and weed science, is represented by a core staff member.

AID to LDCs: The project will conduct a regional seminar/workshop in pest and pesticide management and conduct training courses in crop loss assessment, weed technology and pesticide residue analysis. In addition, the project will assist in project planning in crop protection as related to AID country projects and will conduct train-the-trainer programs in pesticide safety. Also, the project will assist in planning and will backstop a local currency research project and prepare a number of environmental assessments for clearance of pesticides in country projects. The project also has been very active in the current African grasshopper/locust emergency and has provided substantial technical assistance in pest management related activities.

AID to U.S. Agriculture: Involvement of U.S. crop protection scientists in the project will allow them to observe, first hand, how crop pests are controlled in both the semi-arid rainfed zone and in the not humid tropics. Both of these conditions in a sense represent the extreme of U.S. agriculture and therefore provide valuable insights in terms of effectiveness of pest management procedures under extreme conditions of variation. Also, many pests which are indigenous in the LDCs are not present in the U.S. However, if accidentally introduced they can wreak havoc. Better knowledge of foreign pests materially assists in early recognition of accidentally introduced pests thereby allowing for the development of effective control/eradication techniques before the pest reaches epidemic proportions.

R&D - IMPROVED SEED PRODUCTION AND UTILIZATION (936-4143)

PURPOSE: To improve capabilities in LDCs for the efficient production, conditioning, distribution and utilization of seeds of improved food and feed crop varieties.

CURRENT STATUS:

Initiated: March 1958, under project 931-0203. Last extension in July, 1986 with a new project and cooperative agreement for the period 9/86-7/91.

U.S. SUBGRANTEE INSTITUTION:

Seed and Technology Laboratory (STL) of the Mississippi State University (MSU).

Linkages:

The STL has established a working relationship with research and training centers in many countries.

Following is an illustrative list of these institutions:

Country

Colombia	CIAT-Seed Unit (IARC); Seed Multiplication, MOA
Honduras	Escuela Agricola Panamericano (EAP)
Costa Rica	CIGRAS (Center for Grain and Seeds), University of Costa Rica
India	National Seeds Corporation, Pusa
Malaysia	Agricultural University (Dept. of Agronomy)
Thailand	Kasetsart University; Department of Agriculture & Department of Agricultural Extension (Seed Division)
Philippines	University of Philippines, College of Agriculture, Agronomy Department (Los Banos)
Nigeria	IITA; National Seeds Service
Liberia	WARDA
Egypt	FCRI, Giza; Central Administration Seeds (CAS); MISR Pioneer Seeds Co., Cairo

FUNDING:

AID LCP total thru FY 86: \$360,000
FY 87 OYB: 130,000
FY 88 anticipated: 255,000

Highlights and Accomplishments:

A) For LDCs:

Training: 253 students from 57 countries have earned degrees in Agronomy-Seed Technology and Management (33, B.S.; 175 M.S.; 45 Ph.D.). 61 participants have received special, non-degree training for 4 to 9 months. 461 participants from 71 countries have completed the annual 9/10 weeks "Seed Improvement Course" (OICD/TC-130-3) held at MSU. Most of the key positions in the seed program/industry of LDCs are occupied by MSU-trained persons.

Technical Assistance: 265 short-term technical assistance consultations have been made to 55 countries. MSU has been substantially involved in seed program/industry development activities in Brazil, Burma, Cameroon, Chile, CIAT (for Seed Unit), Colombia, Costa Rica, Dominican Republic, Ecuador, Ghana, Guinea Bissau, Guyana, Honduras, India, Indonesia, Morocco, Nepal, Niger, Nigeria, Panama, Paraguay, Peru, Philippines, Taiwan, and Thailand.

Technology Transfer and Information Services: MSU has been the major medium for technology transfer in seed technology from the developed to the developing countries and the main source of technical information since the mid-1950s. For example MSU developed a low-cost reusable kit (value U.S. 15¢) for farmers to determine the moisture content of seeds for storage. This kit will be introduced into several LDCs.

Allied Activities: MSU has provided the technical assistance and management for three of USAID's most successful seed projects: Brazil (1964-76); India (1968-71); Thailand (1978-87).

B) For U.S.A.

There has also been a unique synergy between the international and domestic work which has greatly benefited both LDC and U.S. agriculture. Seed drying and storage problems, for example, are the same in warm, humid Mississippi as in warm, humid Java, and the crops are also similar, e.g., rice, soybeans, peanuts, corn. Technologies such as temperature and humidity controlled storage and high air volume/low supplemental heat drying devised and developed to solve problems in the humid tropics of Central America or the Far East have been modified and widely adopted in the humid Southeast U.S.

POSTHARVEST GRAIN SYSTEMS R & D
(Project Number 931-4144)

PURPOSE: To improve the capability of LDCs to reduce postharvest cereal and legume grain losses.

CURRENT STATUS:

Initiated: 1967

New project initiated in 1985; new Cooperative Agreement for period February 1986 to February 1991.

Management Entity: Kansas State University

Linkages with Research and Development Institutions:

- Group for Assistance on Systems Relating to Grain After-Harvest (GASGA). It includes representatives from West Germany, France, Canada, Great Britain, Australia, the Netherlands, the U.S. and the Food and Agriculture Organization.
- Centro para Investigaciones en Granos y Semillas (CIGRAS) in Costa Rica.
- Consejo Nacional de Produccion (CNP) in Costa Rica.
- Instituto Interamericano de Cooperacion para la Agricultura (IICA).
- Escuela Agricola Panamericana (EAP) in Honduras.
- Instituto Hondureno de Mercadeo Agricola (IHMA) in Honduras.

Funding:

AID LCP Total thru FY 86:	\$9,000,000
FY 87 OYB:	\$370,000
FY 88 anticipated:	\$425,000

Highlights and Accomplishments:

1. Analyzed the marketing system in Belize and provided a strategic plan for altering the functions of the Belize Marketing Board so that its sole concern be with price stabilization.
2. Renovated the rice mill and the training of operational personnel in Belize which led to an improvement in the milling yields and /or higher quality of rice being produced.
3. Results from research in grain marketing systems, analysis of food security programs and quantitative analysis to support grain policies are applicable to all marketing systems and are used in marketing strategies and tactics in the U.S. and LDCs.

4. Training and technology transfer benefits recipient countries enabling them to preserve and handle their basic food commodities and thereby increase the efficiency of the agricultural system. This is the prerequisite that has to be met in order to improve the economics and subsequently to be involved in commercial world trade (see South Korea, Taiwan and Colombia).

COLLABORATIVE RESEARCH SUPPORT PROGRAM
FISHERIES STOCK ASSESSMENT CRSP

PURPOSE: The purpose of this CRSP is to improve analytical and sampling methodology for assessment of the size and sustainable yields of tropical fisheries populations.

CURRENT STATUS

Initiated: December, 1984

Management Entity: University of Maryland

U.S. Subgrantee Institutions:

University of Washington

University of Rhode Island

LDC Linkages in 2 countries: Costa Rica, Philippines

FUNDING:

AID LCP Total thru FY 86: \$1,300,000

FY 87 OYB: \$895,000

FY 88 anticipated: \$700,000

Research was initiated in July 1985 at the participating institutions. LDC work was begun in 1986.

Highlights and Accomplishments of the Stock Assessment CRSP

The University of Rhode Island has developed the first stage of a useful multispecies model for tropical fisheries. The University of Washington has initiated hydroacoustic (sonar) surveys of fishes in Costa Rica as input to assessment models for inshore pelagic fishes. The University of Maryland has progressed further toward recruitment models, including economic aspects relating desirable levels of fishing to recruitment patterns.

Project activities include development of models to test statistical gathering theories, management theories, multispecies interactions and age/size relationships. Field testing of special sampling methods including sonar are being evaluated for use in LDCs. Techniques for aging tropical fish are being studied and economic implications of new management methods are being analyzed.

A stock assessment manual for use by developing country fishery resource managers and researchers will be prepared utilizing results of the study. The new methods developed, tested and described will provide fishery resource managers with improved scientific tools for regulating the harvesting rates of fish stocks to obtain maximum sustainable yields from the resources. Benefits in terms of incomes, employment and high protein food will be substantial if improved management techniques are applied.

PROJECT: Reproductive Studies on Milkfish (Cooperative Agreement), #936-4161. Funding of \$1,250,000. for two years, beginning July 15, 1984. *3yr. extension to July, 1989 at \$1.2 million per yr.*

PURPOSE/APPROACH/DESCRIPTION: Milkfish are a highly important food fish in southeast Asia. Two major problems exist in making the species more available and efficient to rear: 1) maturing adult fish to the spawning condition in captivity, and 2) reducing the mortality of larvae during culture, which is presently at 90%. This Cooperative Agreement directly addresses these problems through research. It allows considerable interaction between the Oceanic Institute and Project Manager(s) of A.I.D. It also provides a mechanism for collaboration with research institutions in LDCs which work on milkfish. Principle involvement is in Taiwan, the Philippines, and Indonesia. Scientist exchange, training, and technology transfer is included.

RESEARCH OBJECTIVES:

- Determine techniques to improve maturation and spawning of captive milkfish.
- Determine techniques to improve larval survival of cultured milkfish.
- Determine stocks/subpopulations of milkfish through electrophoresis.
- Determine nutritional requirement of cultured milkfish, at all stages.
- Determine environmental parameters necessary for proper culture of milkfish.

SERVICES AVAILABLE:

- Training of LDC research personnel in techniques of culturing milkfish.
- Transfer of technology of milkfish culture to LDCs.

KEY PUBLICATIONS AVAILABLE FROM PPC/E/DIU:

- State of the Art document to be prepared as draft during first six months of Cooperative Agreement.
- Other publications, newsletters, etc. to be developed.

EXAMPLES OF ACTIVITY:

Research to be coordinated with TungKang Marine Research Institute in Taiwan, Southeast Asia Fisheries Development Commission in the Philippines, and Government of Indonesia.

GEOGRAPHIC SCOPE: Southeast Asia and the Pacific.

S&T PROJECT MANAGERS: Tejpal S. Gill, S&T/AGR/RNR, AID/W, (703) 235-1275

CONTRACTOR/IMPLEMENTING ORGANIZATIONS: The Oceanic Institute, Makapuu, Hawaii

PROJECT BRIEF

PROJECT: Improved Biological Nitrogen Fixation (BNF) through Biotechnology. (936-4177) Initial FY 86, est. completion FY 97. LOP funding - S&T/AGR - \$9,690,000; Missions, Regional Bureaus and AID/W - \$10,300,000 for total \$19,990,000.

PURPOSE/APPROACH/DESCRIPTION: (1) Increase the efficiency of nitrogen fixing microorganisms adapted to LDC conditions through methods of biotechnology; (2) Promote the use of BNF in LDCs by assisting them to adapt, use and disseminate information about BNF; and (3) Increase their capacity to produce and distribute BNF inocula. This project is a follow-on project to N-Fixation, Symbiotic (931-0613), and will continue to provide (1) training; (2) leadership in global, regional and in-country networks of LDC scientists and DC scientists; (3) germplasm resources and antisera for rhizobia; and to provide technical assistance to LDCs. The strategy is to develop better BNF systems so farmers can increase income through increased efficiency in crop production by optimizing the use of "home-grown" nitrogen.

RESEARCH OBJECTIVES: (1) Genetic improvement of rhizobia for tropical legumes, (2) improvement of host performance in BNF symbiosis, (3) maintain, characterize and evaluate germplasm resources for BNF systems, (4) developing methodologies for monitoring microorganisms (rhizobia) introduced into the environment, (5) collection of environmental (field) data for practices to maximize BNF. Techniques used will include recombinant DNA, antigen-antibody reactions, cell selection, breeding and statistical modeling. Overall objective of the research is to improve the BNF technology so LDC farmers can use it to produce crops more efficiently.

SERVICES AVAILABLE:

With Mission support, backstop regional center for training activities, germplasm distribution, technical assistance and research on local problems.

Subgrants for research in which LDC scientists cooperate.

Train LDC personnel in rhizobium technology, BNF legume production, genetic technologies, fate of introduced microbes, commercial BNF inoculant production and distribution.

Periodic network conferences to enhance cooperation and technology transfer.

Technical assistance in project identification, project development, evaluation and assessment of national BNF programs.

KEY PUBLICATIONS AVAILABLE:

Network newsletter (BNF Bulletin) published twice yearly.

NIFTAL will supply limited numbers of reprints of technical articles from world-wide sources, and miscellaneous publications.

Annual reports and reprints available from PPG/E/DIU.

EXAMPLES OF ACTIVITY:

Worldwide - Build a model to describe crop response to rhizobia inoculation so farmers can use inoculant effectively (or choose other legumes), using LDC cooperating scientists in several countries.

Haiti - NIFTAL staff member participated in assessing inoculant production situation for tree project using legume and other nitrogen-fixing trees.

GEOGRAPHIC SCOPE: Worldwide

S&T PROJECT OFFICER: Lloyd R. Frederick, S&T/AGR/RNR, AID/W, 703-235-1275

IMPLEMENTING ORGANIZATION: University of Hawaii

BIOTECHNOLOGY PROJECTS
IMPROVED ANIMAL VACCINES

Phase I: An engineered vaccine against the ruminant disease rinderpest (Project Number 936-4178)

Purpose: To transfer the immunizing antigens of the rinderpest virus (which is prevalent throughout Asia and Africa) to the vaccinia virus in order to have a vaccine which, because it requires no refrigeration nor costly equipment for its administration, is better suited to Third World conditions than the existing vaccine which has not been adequate for the eradication of rinderpest.

Current Status:

Initiated: September 1986
Management Entity: University of California/Davis
LDC Linkages: Kenya

Funding: AID LOP total through FY 89: \$870,000 (Forward Funded)

Phase II: An engineered vaccine (s) against the hemoparasite diseases of livestock, Anaplasma and Babesia

Purpose: No truly adequate vaccines against these diseases exist. It has, therefore, been felt that the existence of the chronic carrier (chronically infected) state in endemic areas was the best that could be achieved because, through natural infection, a sufficient degree of immunity was attained to prevent outright death losses. Recent data shows, however, that production losses due to the carrier state of these diseases (which occur throughout the world, including anaplasmosis in the United States) costs more than does the acute disease. The latest biotechnological research on these diseases indicates that it is feasible to seek improved vaccines, using the stable vaccinia virus as the carrier of the hemoparasite antigens, to eliminate the carrier state or to, perhaps, provide a basis for eradication of these diseases.

Current Status: A Request for Application for this grant will be issued and the project will be funded in FY 87.

Phase III: An engineered vaccine against heartwater disease of ruminants.

Purpose: To support present efforts to develop diagnostic techniques for and a vaccine against (there is no adequate vaccine at present) heartwater disease which has been translocated from its origin in Africa to the Caribbean Islands where it poses a threat to the livestock industry of the American Mainland.

Current Status: The development of this project is dependent upon the availability of funds.

DESCRIPTION
AID'S SUPPORT
TO THE
INTERNATIONAL AGRICULTURE
RESEARCH CENTER

ROLE OF THE INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

The international agriculture research centers help developing countries in four basic ways:

- (1) Performing research which provides technology to solve agricultural problems;
- (2) Providing practical and scientific training to developing country research and extension personnel (and some degree training in cooperation with developed country universities);
- (3) Taking part in the research networking nucleus that facilitates exchange of scientific information and materials among developed and developing nations; and
- (4) Assisting individual developing countries in national food production programs.

AID provides major support to the international research centers sponsored by the Consultative Group on International Agricultural Research (CGIAR). In addition, AID helps sponsor other international research centers that are not members of the CGIAR.

- The centers are the heart of an expanding global agricultural research network designed to help increase stable food production in developing nations, generating small-farm income and greater availability of food to low-income rural and urban consumers.
- The centers are concerned with research on major food sources crops, livestock, and fish, and on allied technologies, such as irrigation and fertilization, which impact on food production.
- The centers are making solid contributions in all of these areas and we intend to continue support and use of their efforts.

LOCATIONS OF INTERNATIONAL RESEARCH CENTERS

<u>Abbreviation and Name</u>	<u>Location</u>
<u>CGIAR CENTERS:</u>	
CIAT. International Center for Tropical Agriculture (Centro Internacional de Agricultura Tropical)	Cali, Colombia
CIMMYT. International Center for Maize and Wheat Improvement. (Centro Internacional de Mejoramiento de Maiz y Trigo)	Mexico
CIP. International Potato Center (Centro Internacional de la Papa)	Lima, Peru
IBPGR. International Board of Plant Genetic Resources	Rome, Italy
ICARDA. International Center for Agricultural Research in the Dry Areas	Aleppo, Syria
ICRISAT. International Crops Research Institute for the Semi-Arid Tropics	Hyderabad, India
IFPRI. International Food Policy Research Institute	Washington, D.C., U.S.A.
IITA. International Institute of Tropical Agriculture	Ibadan, Nigeria
ILCA. International Livestock Centre for Africa	Addis Ababa, Ethiopia
ILRAD. International Laboratory for Research on Animal Diseases	Nairobi, Kenya
IRRI. International Rice Research Institute	Manila, Philippines
ISNAR. International Service for National Agricultural Research	The Hague, Netherlands
WARDA. West Africa Rice Development Association	Monrovia, Liberia
<u>NON-CGIAR CENTERS:</u>	
AVRDC. Asian Vegetable Research and Development Center	Tainan, Taiwan
IFDC. International Fertilizer Development Center	Muscle Shoals, Alabama, U.S.A.
IIMI. International Irrigation Management Institute	Kandy, Sri Lanka (established in 1984)

- IBSRAM. International Board for Soils Research and Management Bangkok, Thailand
- ICLARM. International Center for Living Aquatic Resources Management Manila, Philippines
- ICIPE. International Center for Insect Physiology Nairobi; Kenya and Ecology.

MEMBERSHIP OF THE CONSULTATIVE GROUP ON
INTERNATIONAL AGRICULTURAL RESEARCH

CONTINUING MEMBERS

Countries

Australia	India	Philippines
Austria	Ireland	China (PRC)
Belgium	Italy	Saudi Arabia
Brazil	Japan	Spain
Canada	Mexico	Sweden
Denmark	Netherlands	Switzerland
France	Nigeria	United Kingdom
Finland	Norway	United States
Germany		

International Organizations

African Development Bank
Arab Fund for Social and Economic Development
Asian Development Bank
Commission of the European Communities
Food and Agriculture Organization of the United Nations
Inter-American Development Bank
International Bank for Reconstruction and Development
International Fund for Agricultural Development
OPEC Fund
United Nations Development Programme
United Nations Environment Programme

Foundations

Kellogg Foundation	Ford Foundation
Leverhulme Trust	Rockefeller Foundation
International Development Research Centre	

FIXED-TERM MEMBERS REPRESENTING DEVELOPING COUNTRIES, 1985-86*

Asia: Thailand, Pakistan.	Southern & Eastern Europe:
Africa: Tanzania, Guinea.	Portugal, Poland.
Latin America: Argentina, Colombia.	Near East: Egypt, Libya.

* The countries of the five major developing regions of the world participate in the Consultative Group through representatives elected for a two-year term by the FAO members in each region. Two countries are elected from each region, one serving as member and the other as alternate, as they may decide, in the Group's deliberations.

AID CONTRIBUTIONS TO INTERNATIONAL AGRICULTURAL
RESEARCH CENTERS SPONSORED BY THE CGIAR*

Year	AID Funding	Total Funding	AID Proportion
Pre CGIAR	-millions of dollars-		-percent-
1969	0.425	NA	NA
1970	1.679	NA	NA
<u>1971</u>	<u>2.984</u>	<u>NA</u>	<u>NA</u>
CGIAR			
1972	3.770	20.750	18.17
1973	5.390	24.990	21.57
1974	6.805	34.600	19.67
1975	10.755	47.590	22.60
1976	14.870	62.920	23.63
1977	18.140	77.270	23.48
1978	21.145	85.090	24.85
1979	24.800	99.540	24.91
1980	29.000	119.630	24.24
1981	35.000	130.950	26.72 ^{2/}
1982	40.785	143.840	28.35 ^{2/}
1983	44.550	164.670	27.05 ^{2/}
1984	45.250	173.160	26.13 ^{2/}
1985	45.160 ^{1/}	170.170	26.54 ^{2/}
1986	46.250	190.400 est.	24.29 ^{3/}
1987	40.000	191.000 prelim.	20.94 prelim.
Total CGIAR	431.670	1,736.570	24.86 ^{4/}

*Consultative Group on International Agricultural Research.

^{1/} Slight decrease in AID funds because of drop in value of other contributions due to decline in exchange rates of foreign currencies.

^{2/} AID contribution was 25% of total when the level was set; the percentage grew during year due primarily to an increase in value of the dollar and occasional shortfalls in funding by other donors.

^{3/} AID contribution was 25% of total when the level was set in December 1985. The decrease was primarily due to a weakening in the value of the dollar and a slight increase in other contributions.

^{4/} Weighted average. Unweighted average of annual percentages is 23.9%.

Source: CGIAR Secretariat (November 11, 1986) (annual data from 1972 to 1983 are provided in CGIAR Annual Reports for 1984 and 1985, pp. 63, 64 respectively).

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Notes on Current Status and Activities of the International Agricultural Research Centers

Following are some brief notes on the status and activities of the International Agricultural Research Centers (IARCs). Each center is listed, noting any outstanding issues or recent achievements, plus funding data on each. Seventeen centers receive core budget support from A.I.D.; two others receive special project grants to undertake specific research and development activities. Before beginning the listing, two system-wide issues are noted:

Africa - An increasing amount of the centers' effort and resources is addressing agricultural research and production in Africa. Coordination of center activities has grown as the need for multi-disciplinary effort has become more evident. The centers are also cooperating in donor efforts to work more effectively in a concerted fashion, for example through the World Bank-sponsored Special Program on African Agricultural Research (SPAAR).

Scientific Linkage to U.S. Research Institutions - Also noteworthy is the increasing collaboration of the centers with U.S. researchers and institutions. The small but effective Scientific Liaison Officer activity depends on the interest and skills of key U.S. scientists, acting in a volunteer capacity, to assist and foster technical cooperation with the centers. The "Special Constraints" collaborative research project provides funds to focus the expertise and facilities of U.S. universities or other research institutions on difficult problems facing centers, but beyond their technical or resource capabilities.

CGIAR Centers

International Center for Tropical Agriculture (CIAT), Colombia. CIAT continues to make excellent progress in rice and has received special recognition for recent breakthroughs in bean virus resistance and associated production increases. Funding: 1986 core budget \$21.4 million, A.I.D. contribution \$5.6 million, 26.2%.

International Maize and Wheat Improvement Center (CIMMYT), Mexico. The maize improvement program impact is growing; a forthcoming NAS study indicates major potential return to years of CIMMYT research on high-lysine maize and triticale. Funding: 1986 core budget \$21.9 million, A.I.D. contribution \$6.1 million, 27.9%.

International Rice Research Institute (IRRI), Philippines. IRRI continues to provide world-wide rice research leadership, and is sensitive to issues raised in Congress. Research focuses on non-export rices. With Dr. Swaminathan retiring in 1987, A.I.D. is suggesting candidates for the new Director General. Funding: 1986 total budget \$22.9 million, 1986 A.I.D. contribution \$6.05 million, 26.4%.

International Potato Center (CIP), Peru. CIP also is the world leader in its field, and most recently has made significant strides in the study and control of several viruses, greatly facilitating movement of disease-free germplasm. A new thrust is limited research and germplasm activity with sweet potato. Funding: 1986 core budget \$11.8 million; A.I.D. contribution \$2.325 million, 20.3%.

International Board for Plant Genetic Resources (IBPGR), Italy. The IBPGR-FAO working relationship appears to be improving. The Board continues to pursue a scientifically strong research and service program. Funding: 1986 core \$4.5 million; A.I.D. contribution \$975,000, 20.6%.

International Center for Agricultural Research in the Dry Areas (ICARDA), Syria. ICARDA has completed its building phase, focusing strongly now on agronomy and soils research in its cereals, legume and forages improvement programs. Funding: 1986 core budget \$18.2 million; A.I.D. contribution \$5.6 million, 30.8%.

International Center for Crops Research in the Semi-Arid Tropics (ICRISAT), India. ICRISAT continues to expand its activities in semi-arid Africa. Promising new sorghum and millet varieties for the Sanel region are noteworthy. The new ICRISAT Sanelian Center in Niger serves as a focal point for the activities of several other centers as well. Funding: 1986 core budget \$22.1 million; A.I.D. contribution \$4.85 million, 21.7%.

International Food Policy Research Institute (IFPRI), U.S. IFPRI has greatly expanded its Africa programs and is working closely with many A.I.D. missions there and elsewhere. Funding: 1986 core budget \$4.8 million; A.I.D. contribution \$1.5 million, 31.3%.

International Institute for Tropical Agriculture (IITA), Nigeria. IITA plays a lead role in research on alley cropping, which holds great potential for humid and sub-humid Africa. The center received this year's King Baudouin award for its work on maize streak virus resistance. Funding: 1986 core budget, 21.9 million; A.I.D. contribution, \$6.3 million, 28.8%.

International Livestock Center for Africa (ILCA), Ethiopia. While its research program has continued to strengthen and progress (it received good marks in this year's external review), ILCA has suffered due to difficulties between management and the Board of Trustees. A new DG has arrived, and the board chairman soon retires. An effort is being made to ensure that the problem does not recur. Funding: 1986 core budget \$14.8 million; A.I.D. contribution \$3.475 million, 23.5%.

International Laboratory for Research on Animal Diseases (ILRAD), Kenya. ILRAD continues cutting edge research on Trypanosomiasis and East Coast Fever, both devastating to African livestock. A vaccine for ECF has been developed and is currently being tested. Funding: 1986 core budget \$10.1 million; A.I.D. contribution \$2.525 million, 25.1%.

International Service for National Agricultural Research (ISNAR), Netherlands. ISNAR services are in demand from LDCs and donors. The center is held in high regard by A.I.D. missions, and has developed close working relationships with many of them. Funding: 1986 core budget \$4.2 million; A.I.D. contribution \$950,000, 22.5%.

West Africa Rice Development Association (WARDA), Liberia. WARDA remains in a period of transition after a prolonged managerial and financial crisis, but its situation appears to be improving. Most notable is the agreement of the African member states to remove WARDA's sizeable debt; substantial progress has been made. Funding: 1986 core budget \$2.8 million; no A.I.D. core funding has been provided since the late 1970s, but AFR provided about \$2 million project support.

Other Centers 1/

Asian Vegetable Research and Development Center (AVRDC), Taiwan. AVRDC continues to make a significant impact despite a limited budget. Its successful home vegetable gardening activities in Asia are being modified for application in Africa under a new A.I.D.-funded activity to combat vitamin A deficiency. A new DG (American) recently arrived. Funding: 1986 budget \$4.5 million; A.I.D. contribution \$1.0 million, 22.2%.

International Fertilizer Development Center (IFDC), U.S. IFDC is expanding its African activities, most recently through its new site in Togo. Funding: 1986 budget \$8.5 million; A.I.D. contribution \$4.0 million, 47%.

International Irrigation Management Institute (IIMI), Sri Lanka. IIMI's programs are developing well and generating much interest, but the center continues to suffer from a lack of core support. Prospects for increased World Bank involvement are good, providing some relief to the institutional support problem. Funding: 1986 budget \$2.7 million, A.I.D. contribution \$250,000, 9.25%.

International Center for Living Aquatic Resources Management (ICLARM), Philippines. A small center doing excellent fisheries research on a shoestring budget, ICLARM also suffers from a lack of core funding, and is currently trying to attract new donors as it adjusts to the loss of Rockefeller funds, and the anticipated decrease in A.I.D. funding. Funding: 1986 budget \$2.5 million; A.I.D. contribution \$500,000 (\$200,000 from S&T, \$300,000 from ANE), 20%.

International Board for Soils Research and Management (IBSRAM), Thailand. IBSRAM is primarily a soils research information exchange and coordination activity. It is working closely with centers, national programs and other soils research programs. Funding: 1986 budget \$700,000; A.I.D. contribution \$50,000, 7.1%.

1/ The distinction between core and extra-core funding varies among the centers outside the CGIAR--budget figures listed reflect principal headquarters-based and core-like activities.

International Center for Insect Physiology and Ecology (ICIPE), Kenya. ICIPE research focuses on various crop and livestock insect pests. A.I.D. provides special project support for research on ticks (S&T) and plant resistance to insect attack (AFR). Funding: 1986 budget \$6.5 million; A.I.D. provides no core support, but approximately \$600,000 project funds supported the two special projects noted above.

ALLOCATION OF A.I.D. FY 1987 CORE FUNDING
OF INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

SPONSORED BY THE CGIAR

Overall funding level- The overall level of core funding from all donors to the IARCs sponsored by the Consultative Group on International Agricultural Research (CGIAR) is expected to be \$191 million in 1987. Under normal circumstances, this indicates a U.S. contribution of \$47.75 million in FY 87 funds, based on the application of the 25% formula for overall funding. Because of the extremely tight budgetary constraints facing A.I.D., a decision was made to deviate from the traditional formula, at least for the present year. A consensus was reached that the 1987 A.I.D. contribution to the core budgets of the CGIAR centers would be \$40 million. FY 87 funds for this purpose were authorized on December 17, 1986.

The proposed 1987 contribution by A.I.D. represents a 13.5% decrease from the 1986 level of \$46.25 million. Fortunately for the CGIAR centers, the continued decline of the dollar has meant relative gains in the values of contributions denominated in other currencies, offsetting some of the impact of the decreased U.S. contribution. (This process will, however, further lower the U.S. proportion.) More importantly, the World Bank funds contributed to center budgets will increase by \$5 million, through a diversion of funds which would otherwise go to the Stabilization Fund. This step has been taken in order to offset the U.S. cut, but this is expected to be possible for one year only. As a result of these offsetting factors, system-wide core funding is expected to be nearly the same as in 1986, implying a slight decline in real funding when inflation is considered.

Allocation of Funds Among Centers: General Comment- The proposed allocation of funds among centers is listed in Table 1 (attached). The decrease of \$6.25 million is allocated among all twelve centers receiving A.I.D. core support. The cuts have been relatively equally distributed in percentage terms: nearly all are being cut 13% to 14%. The principal exceptions are IFPRI (-1.8%) and IBPGR (-17.9%). The dollar values of the the cuts vary more widely, ranging from \$25,000 (IFPRI) to \$865,000 (IITA). The amounts involved in the contributions to two centers which received larger and smaller cuts (IBPGR and IFPRI) were small and thus had little impact on the overall allocation.

The relative levels of funding for the twelve centers do in 1987 do not differ markedly from those provided by A.I.D. in recent years. This consistency of funding reflects the continued satisfaction of A.I.D. with the research and outreach programs of the centers it is supporting, and the generally stable priorities of the centers, A.I.D. and national agricultural research programs. Some adjustments have been made, and these, along with observations on the longer-term aspects of A.I.D. support are discussed in detail in the following sections on individual centers.

There are a variety of issues and considerations which provide the basis for determining A.I.D. support to an individual center. The principal considerations and criteria have evolved over time with A.I.D.'s continuing support to, and interaction with, the centers and other donors of the system. A general articulation of the major criteria and considerations used by the agency is included in the June 1985 report of the PFC-S&T Committee on the CGIAR (pp. 26-31). More specific reference to these is made in the following discussion.

Proposed 1987 Contributions: Global Crop Centers

International Rice Research Institute (IRRI)- Proposed 1987 contribution: \$5.25 million, representing 21.3% of the expected core budget. IRRI has long been one of the centers receiving strong support from A.I.D. For many years, the A.I.D. contribution has been well over 25%, a position maintained in recognition of the key role IRRI has played in the green revolution, and because of the continuing and overwhelming importance of rice in much of the developing world and in particular in heavily populated areas of Asia. Although concentrating in Asia (where 90% of LDC rice is produced), IRRI also works closely with CGIAR centers and some national programs in Africa and Latin America.

It is a mature center in the broad sense, and has experienced little growth in recent years. The decrease in A.I.D. support will somewhat be offset by the World Bank, which will increase its contribution to IRRI in 1987. A.I.D. has strongly supported rice research at IRRI, and has opposed a diminution of effort in order to fund new initiatives on other crops. In the view of A.I.D., the crop is too important to risk removing significant resources from it to fund other efforts. This view is further supported in a recent study which shows the returns to research investments in rice to be far higher than for any other crop. A more recent A.I.D. concern lies in the potential competition to U.S. rice exports that could result from IRRI's activities and U.S. domestic opinion that could view the center's impact as helping competitors. However, such impact, if any, is minimal since IRRI does not work with export-type rices, focusing rather on domestically consumed types.

IRRI enjoys good relationships with A.I.D. missions in the Asian region, and several of the latter sponsor bilateral research programs involving IRRI. A regional meeting of ADOs was held at IRRI in May, 1985, and a strongly positive reporting cable indicated a high level of satisfaction with IRRI among A.I.D. staff in the region. The good relationships that exist with national programs are part of a large IRRI outreach effort, involving extensive research interaction and the CGIAR system's largest training program. IRRI also has an excellent and growing interaction with the Bureau for Africa.

IRRI thus continues to be a center of highest priority to A.I.D. The need for rice research has not diminished. Better adapted, disease and pest resistant varieties and improved technologies are needed for upland and less favored areas, as well as maintenance research to defend the very substantial advances already made in rice production in irrigated areas. IRRI technologies continue to spread (as documented in Dana Dalrymple's recent report on high-yielding varieties), demonstrating their continuing relevance to the small rice farmer in the LDCs.

International Maize and Wheat Improvement Center (CIMMYT)- Proposed 1987 contribution \$5.25 million, representing 23.1% of the expected core budget. Along with IRRI, CIMMYT is a high priority center for A.I.D. Budgetary growth in recent years has been very low, in part due to the large peso devaluations which have helped to keep down operating costs in Mexico. The center has traditionally received well over 25% of its support from A.I.D., but in recent years, this has meant a nearly stable contribution. A.I.D.'s high percentage and large contribution (with IRRI and IITA, the largest) reflect the importance of wheat and maize (CIMMYT's principal mandate crops) on a worldwide basis. The center has played a critical role in the vast expansion of wheat production in many LDCs, and although progress has been slower in maize, great potential exists for a large impact in the near future. Considerable attention is being given to areas where drought, heat, cold or soil properties keep yields of these crops low.

CIMMYT underwent a TAC-sponsored program review in 1982, and A.I.D.'s liaison scientist reports that the center has actively implemented the report's recommendations. Key positions have been added in the Headquarters research staff, training has been strengthened, and the level of scientific exchange with researchers in developed countries has increased. An independent review of two innovative research programs--triticale and high-lysine maize--was conducted in 1986, and found that both programs have made significant progress and should begin to have an impact in the near future.

CIMMYT generally has good linkages with a variety of A.I.D. regional and bilateral programs. Latin American and Caribbean region ADO's recently met at the center and report that an active dialogue took place. CIMMYT conducts a very large, world-wide outreach effort which has been critical to the success of the materials developed by the center and cooperating national programs. CIMMYT's economic program has stressed on-farm activities and has been of significant interest to A.I.D. field missions in the design of their agricultural research and extension programs, particularly in eastern and southern Africa.

Wheat and maize are crops of major importance in many areas of the developing world, and remain of high priority in A.I.D.'s planning. CIMMYT technologies, along with those of IRRI, have had the greatest impact on food production in the LDCs of any agricultural research program. Continued efforts are needed to maintain the gains made in wheat, and additional efforts are needed to continue to move closer to large-scale impact in maize production. A.I.D. investment in CIMMYT's wheat and maize continues to be of highest priority.

International Potato Center (CIP)- Proposed 1986 contribution \$2.0 million, representing 16.0% of the estimated budget. CIP is a globally active center, but with only about one-half the budget of CIMMYT and IRRI. Potatoes are a crop of increasing importance in the LDCs, being at once an excellent source of high-quality food and income generation. Potatoes are a highly productive crop in the high-altitude tropical areas and in the cool seasons in the sub-tropics. Demand continues to pull the crop into the warmer tropics, where potato is popular despite the lower adaptability.

Greater promise for those areas lies with sweet potato, which is well adapted to hot, humid conditions. CIP has begun a small germplasm program, at present limited to germplasm collection and storage, and procedure to eliminate viruses from collected materials. A.I.D. has encouraged CIP to undertake this effort and support the center's limited activities with this important, but under-researched tuber crop.

The quality of CIP's research is seen as first rate, as witnessed by its very active involvement with U.S. and European research efforts. The center has a small, highly focused headquarters program, and large, interactive regional outreach activities. CIP's relationships with national programs is collegial, and among the most effective of the IARCs. Although not as old as some of the centers, considerable impact through release of new varieties, improved crop storage techniques and greatly improved germplasm storage and handling technology have been achieved.

Although potato as a crop is not one for which many A.I.D. missions have portfolio activities, the center generally enjoys good rapport with A.I.D. field missions. Interaction has increased, and the Bureau for Africa has developed a project to strengthen regional potato research in Great Lakes countries of Africa. CIP's Director General participated in the most recent LAC meeting of ADOs.

A.I.D.'s lower percentage level of support to CIP does not indicate any dissatisfaction with the program. Rather, it reflects the fact that potatoes are a lower priority crop for A.I.D. worldwide than, for example, wheat and rice. It also is a result of both potato's, and the Latin American region's, being of high-priority for a number of other donors (CIP has developed a strong and broad donor base). A.I.D.'s contribution is very important, but it is less critical than at some other centers.

Proposed 1987 Contributions: Regional Crop Centers

International Center for Tropical Agriculture (CIAT)- Proposed 1987 contribution \$4.82 million, representing 21.4% of the expected core budget. Although a regional center, CIAT is one of the most important in the CGIAR system. The center has a Latin American focus, especially in the rice and pastures programs. Its cassava and bean research programs are less restricted geographically, with substantial activities in Asia and Africa, respectively.

In much of Latin America, rice and cassava are mainstays of agricultural production, particularly in the areas made up of small farms. Beans are important component of the farming systems of many areas, as well as a critical protein-rich component of the diets of the poor. The pastures program has concentrated in the past on the Llanos of Colombia and Venezuela, but has begun to work on other areas where the need for sustainable pastures is great. This shift is supported by A.I.D. as consistent with the centers' main goal of improving small-farmer agricultural production. Nevertheless, it is useful to remember that the role of beef in the diet of Latin American low-income consumers is much greater than the comparable role of meat in other developing regions.

CIAT's programs are all beginning to have an impact, and in some cases it appears to be substantial. Part of this impact has been achieved through close cooperation with national programs through networks and joint ventures. The virus-resistant bean lines developed jointly with Guatemala (partly with USA.I.D. bilateral funding) are now being adopted in a number of countries. The rice program has had a substantial impact in the region, and is now moving to address the needs of farmers in the less favored upland rice areas.

Interaction with A.I.D. field missions has generally been good, although somewhat hindered by the fact that A.I.D. has little or no program in several of the agriculturally important countries of the region (Colombia, Venezuela, Brazil, Mexico). CIAT's use of networks has proven attractive to A.I.D. missions and the LAC Bureau, and the center will likely play a pivotal role in some of the crop networks being organized with A.I.D. support. CIAT has for several years been developing an East African Bean network (beans are a major food in the region), and it's efforts are now partly supported through an African Bureau regional project.

A.I.D. has generally funded CIAT at roughly the median level. It is viewed as an important and well-run center, but has not attracted more A.I.D. funds in the past because of the relatively adequate funding. The decrease proposed for the A.I.D. contribution in 1987 will leave the center, along with ICARDA, at the upper end of the regional crop centers.

International Institute for Tropical Agriculture (IITA)- Proposed 1987 funding \$5.435 million, representing 26.6% of the expected core budget. A.I.D.'s proposed decrease (\$365,000) is the largest in terms of absolute amount, however the center will still receive the largest contribution of any center. 1986 was a year of change for IITA. In-country costs for IITA have declined markedly due to the devaluation of the long over-valued Nigerian Naira.

Under the new director general, Dr. Laurence Stifel, formerly of the Rockefeller foundation, a comprehensive review of the center's programs has taken place. More emphasis will be given to on-farm research targeted to the humid areas of West and Central Africa. Further focusing of the research programs is planned through the phasing out of some activities on root crops and legumes in Latin America and the Caribbean. Work on cocoyam will also be curtailed to primarily a program of germplasm maintenance.

IITA is one of the few institutions conducting research on agricultural production for the humid tropics of Africa. Much of the area has a relatively short history of food crops research, and the needs for advances, due to growing population, urbanization and rapid land degradation, are critical. These factors, and the overall deterioration of the food situation in sub-Saharan Africa, have led A.I.D. to make the region one of high priority.

For several years now, the center has received the largest A.I.D. contribution; this trend will continue in 1987. The center deals with difficult ecological areas, and works in many countries having undeveloped research programs and poor infrastructures. Its mandate crops of maize, sweet potatoes, rice, cassava, yam and cowpeas are major staples of tropical Africa, and for many of these, little research is conducted elsewhere. The need to develop new technologies and systems is clear, and one of these that is most promising is alley cropping, where nitrogen-fixing trees are intercropped with food crops, preserving soil fertility and yielding mulch and forage.

Interaction between IITA and A.I.D. Missions is quite extensive in several countries in equatorial Africa where A.I.D. sponsors large agricultural research projects (Cameroon, Zaire). Similarly, the SAFGRAD program involves a large activity for the sub-humid and semi-arid regions of West Africa where maize and cowpeas are important. In fact, A.I.D. bilateral support is a cornerstone of the center's outreach activity. A new area of cooperation is developing in the sponsoring of maize research involving CIMMYT and IITA in Eastern and Southern Africa.

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)- Proposed 1987 contribution \$4.175 million, representing 17.7% of the expected budget. ICRISAT is an important center in two main regions, Asia and, more recently, Africa. The crops in its mandate (sorghum, millet, various legumes) are of critical importance in some of the most difficult, but heavily populated, of the world's agricultural areas. Like IITA, the center features a farming systems approach, and through it the center has developed a revolutionary system which in its modified forms is being widely adopted in India. ICRISAT's impact in other parts of Asia has been less, but the center's activities in the semi-arid areas there are rather recent.

In Africa, ICRISAT's efforts are directed toward the countries of the continent's Sahelian, Eastern and Southern regions. These are largely agrarian areas with few alternatives in the way of crops or industry. The center has established a regional sub-center in Niamey, Niger to work on millet and groundnut, and is establishing regional sorghum research programs in East, South and West Africa. Over the past few years, a steady shift of resources has occurred as core funds are shifted from the sub-continent to Africa.

ICRISAT has continued to consolidate its African programs into regional activities, having enough staff to conduct multi-disciplinary research. A.I.D. regional and bilateral programs involve ICRISAT in a number of countries, and the general level of interaction is high. In addition to the SAFGRAD activities in the Sahel, a large sorghum and millet program is being developed in Zimbabwe financed by SARDO. In Asia, contacts between A.I.D. Missions and ICRISAT are good. In December 1986, ICRISAT hosted an A.I.D. meeting of ANE Mission research staff and their host country counterparts.

A.I.D.'s overall level of core support to ICRISAT has generally been at less than median levels on a percentage basis. There are two principal reasons for this. First, and most importantly, the center generally enjoys strong support from a large number of donors, as it addresses the problems of two regions where agricultural progress is vital. Second, and of less importance, A.I.D. special project funds support large scale activities in Africa integral to the center's programs, somewhat reducing the need for core funding from A.I.D..

The decrease proposed for 1987 will be somewhat offset by the greater dollar values of the contributions received from the European donors and Japan. Increased costs associated with the development of the ICRISAT Sahelian Center in Niamey have been somewhat made up for by payments out of the World Bank-financed Stabilization Fund.

International Center for Agricultural Research in the Dry Areas (ICARDA)-
Proposed 1987 contribution, \$4.82 million, representing 27.0% of the expected core budget. A.I.D. has traditionally been a strong donor to ICARDA, helping to establish the center and its research programs for an area where relatively little research has been done. The center features a farming systems-commodity approach, concentrating on the small farmer cereal-legume-livestock system predominating in the Near East and North Africa. It is a system marked by traditional technologies and low production levels, and exists in a region of rapidly increasing population and incomes, with a growing need for food and livestock feed.

ICARDA is a relatively new center, most of the research programs being about 7 years old. The environment, featuring recurrent drought and early high temperatures, poses difficult challenges to researchers and farmers. The center has completed most of the permanent building program. In addition to the main station near Aleppo, the center tests materials through cooperative arrangements in a number of countries in the region. Most recently, ICARDA programs are becoming increasingly active in North Africa and Pakistan with the help of USAID Missions in those countries. A major regional effort for North Africa has been developed in Tunis. Important training activities are conducted both at headquarters and in-country.

A.I.D. has encouraged ICARDA to develop strong research programs in the management of soil resources. In an area where water is so often limiting, the impact of optimal planting date, cultivation and fertilization are critical. Marginal lands are being effectively reclaimed and used for forage production. Plant breeding efforts at the center play an important role, but must be undertaken in close cooperation with agronomy and farming systems programs that help breeders understand the specific needs and limitations of farmers in the region.

The A.I.D. proportion of total funding for ICARDA is on the high side. However, the center is presently in a relatively difficult funding situation and any precipitous reduction in the A.I.D. proportion could cause serious problems.

A.I.D. is encouraging the center and the CGIAR to pursue opportunities to attract new donors from within the region and beyond, which will result in a gradually declining U.S. proportion in the future.

124

Africa Livestock Centers

International Livestock Center for Africa (ILCA)- Proposed 1987 contribution, \$3.0 million, representing 20.9% of approved budget. A.I.D. has generally supported ILCA at just below the median percentage level. This in part was due to a variety of problems at the center in the late 1970s and early 1980s, which were exacerbated by the unstable political situation in Ethiopia. A major overhaul of the center's programs took place after the first program review in 1981, and a new administration was put in place. The 1986 External Review gave the center high marks, noting significant progress in developing a cohesive program.

The center nevertheless faces a difficult mandate, the problems of livestock production in Africa being both enormous and complex. Over time, the center has focused increasingly on feeding of large and small ruminants, livestock in mixed cropping systems, and problems of reproduction and fertility. The center has also developed a strong livestock economics and policy unit, which is working with African nations to foster the adoption of policies which encourage livestock production.

The outreach programs have been quite extensive, with active research activities in Kenya, Botswana and Mali (rangelands), Nigeria (humid tropics), and Niger (farming systems). Interaction with A.I.D. has been close in Mali and Niger, where A.I.D. bilateral money has funded part of ILCA's activities. A.I.D. has also been involved on the policy side, with A.I.D.'s Africa and central bureaus helping to sponsor a policy conference for senior policy-makers from African countries in 1984. Following the conference, a special session was held for A.I.D. livestock officers from a number of missions and from A.I.D./W. ILCA also has close linkages to the Small Ruminant CRSP, which is active in several African countries.

In late 1986, a new Director General, Dr. John Walsh, was appointed. He is currently presiding over a renewed effort to articulate a long-term plan for ILCA, which was recommended by the review team. Given ILCA's extensive experience and substantial data base, these choices can now be made with greater confidence.

On the management side, the review team faulted the Board of Trustees for ineffective and occasionally counter-productive leadership. The newly appointed American on the Board, Dr. Ralph Cummings Sr. can be expected to work closely with the new Director General and the Board to improve the situation. A.I.D. will continue to monitor the situation closely as the new team takes over.

International Laboratory for Research on Animal Diseases (ILRAD)- Proposed 1987 contribution \$2.15 million, representing 19.3% of the expected core budget. ILRAD is unique among the CGIAR centers as having been, during its development thus far, an institute with a primarily basic science research program. The center has developed a modern, high-technology facility, where cutting-edge research is seeking solutions to Trypanosomiasis and East Coast Fever (ECF), both major constraints to livestock production in large parts of East and Central Africa.

The center underwent its External Review in 1986 which found that significant progress had been made in regard to ECF, most notably synthesis of a vaccine which is currently being tested. ILRAD is working with an American firm to develop the vaccine on a larger scale. The situation regarding the development of prophylaxis against Trypanosomiasis is less evident. ILRAD's research has resulted in a much better scientific understanding of the nature of the infectious agent, but it has also demonstrated the complexity of its genetic make up, which renders it highly resistant to common types of vaccine preparations. However, Dr. Neville Clarke of Texas A&M University, A.I.D. liaison scientist to ILRAD, believes that though a preventive will probably remain elusive for some time to come, a breakthrough could come at any time. Further, the disease is so important that a continuing research effort is needed.

The review gave the institution the go-ahead for the beginnings of a Heartwater program. This is another important disease of cattle in Southern and Eastern Africa. A.I.D. Zimbabwe plans to develop a joint project with the University of Florida and ILRAD to work on this disease.

ILRAD's interaction with national research programs is understandably less than for some other centers, but the center does conduct a variety of training activities. It also conducts, jointly with ILCA, the Trypanotolerance network, which coordinates disease testing with African national program researchers. Similarly, interaction with A.I.D. Missions and regional programs has been less than for other centers, but that is beginning to change as field applications of ILRAD's research are tested and evaluated (note example above). The center's Nairobi location, close to both the Mission and REDSO, does provide opportunity for informal contacts.

ILRAD has been very productive at the scientific level, but its impact at the farm level understandably has been limited to date. However, the chances for substantial impact in the medium term appear very good. A.I.D. support of ILRAD is consistent not only with the Agency's emphasis on African development, but also with the great potential for animal production found there.

Other Global Centers and Programs

International Food Policy Research Institute (IFPRI)- Proposed 1986 contribution, \$1.475 million, representing 27.6% of the approved program budget. The nominal decrease of \$25 thousand reflects strong A.I.D. support for policy research in the CGIAR. IFPRI joined the CGIAR in 1980, and since then A.I.D. has been a strong supporter. For the most part, A.I.D.'s traditionally strong level of funding has reflected the agency's conviction that policy issues deserve study and greater discussion in LDCs. The relatively small cut proposed for 1987 also reflects the center's dependence upon A.I.D. due to the slow growth in funding from European donors. There are probably two principal reasons for this: a) a lack of conviction about the need for policy research (especially in light of EEC policies); b) U.S. location. This has begun to change, but most of the European donors give only small amounts, leaving A.I.D., the World Bank and Canada as principal donors: LDC donors have also been strongly supportive.

A.I.D. has been pleased with the development of IFPRI. The external review in 1984 found that the center is well-known and respected among researchers and policy makers in LDCs and developed countries. The economic research capability is first rate, and the program features a variety of applications related to production, consumption, trade and development. The publications series issued by the center provides several types of information for public consumption. The review emphasized that the main clientele of the center is policy makers in LDCs. It also encouraged the center to focus a substantial portion of its resources on Africa.

Although a small center with a primarily research orientation, IFPRI has conducted a variety of training activities. Usually these consist of conferences and workshops, but a small number of fellowship-type activities are available. IFPRI has also participated with other centers in the CGIAR system in both research and training capacities.

There has been a variety of interaction between IFPRI and A.I.D. The center has conducted consumption-related research for the Office of Nutrition in the S&T Bureau. Many Missions in Asia, Africa and Latin America are funding special studies involving IFPRI analysis of issues ranging from production policies to food subsidies, to food security. IFPRI is increasing its efforts to directly tie its research to development-related issues. The results of this new effort will be useful to donors as well as to LDC governments.

International Board for Plant Genetic Resources (IBPGR)- Proposed 1987 contribution, \$800,000, representing 16.2% of approved budget. The IBPGR, or "genes board", as it is called, coordinates a worldwide effort to collect, characterize and preserve crop genetic resources. It works with national programs, the IARCs and universities and institutions in both developed and developing countries. With modest budget levels, it has been able to put in place a comprehensive system of genetic collections of major, and more recently, minor crops and their wild relatives.

Interaction between the IBPGR and A.I.D. field missions is not extensive, but this is in large part due to the nature of the center's programs. Even so, the Board has worked closely with many host country national programs receiving A.I.D. support. The experience and training gotten through cooperation with IBPGR complements the on-going efforts of A.I.D. Missions to build national program research capabilities. The potential for greater involvement exists in situations where significant losses of genetic resources have occurred and donors seek to help restore national seed stocks.

A.I.D. views the work of the IBPGR as being of the highest priority. This view is shared by a number of other donors, resulting in a fully funded budget without a particularly high percentage coming from A.I.D.. A.I.D. plans a fairly large percentage decrease in 1986 (17.9%), reflecting the strong funding from other sources, and bringing our overall budget share to just over 16%. The contribution will help to fund additional training activities, plus general areas of conservation, collection, evaluation and documentation. In addition, some strategic research (e.g., in-vitro collections, genetic stability in cold storage) is slated to begin in response to the recommendations of the recent external program review.

The question of the relationship of the IBPGR to FAO continues to need attention, although the relationship between the two appears to be improving. A two-year trial period in which both FAO and IBPGR make efforts to improve their cooperation has been decided on. The freeze on board membership and hiring has been lifted, and some progress is expected on other administrative points. These more operational issues are set against a larger background of the on-going genetic resources debate within FAO, and the political situation that reflects.

A.I.D. participates with USDA and State in monitoring the larger situation with respect to the FAO Commission on Plant Genetic Resources and the International Undertaking on the same subject. Efforts will continue to ensure that, whatever the development of these other FAO initiatives, the IBPGR can continue to operate effectively and efficiently.

International Service for National Agricultural Research (ISNAR)- Proposed 1987 contribution, \$825,000, representing 16.3% of the approved budget. ISNAR is the newest of the CGIAR activities, having joined the system in 1982. It was established as a result of general recognition among the research and donor communities that stronger national programs were needed for effective uptake and application of the new technologies generated at the centers and elsewhere. A.I.D. has provided strong support to the center, although the percentage level has diminished as ISNAR has successfully attracted a growing number of other donors.

ISNAR maintains a very active interaction with A.I.D. Missions and Regional Bureaus. It has worked closely with A.I.D. in its review of a number of national programs where A.I.D. wishes to support follow-up and implementation activities. On a regional scale, ISNAR has worked closely with Africa Bureau in developing a regional training and technology transfer activity, and with the Asia and Near East Bureau in planning regional research coordination activities.

ISNAR underwent its first external review in late 1985. The review panel's findings were quite positive, and the strong demand for ISNAR's services on the part of LDC research systems was noted. Considerable effort was devoted to assessment of the reactions of host country officials to ISNAR activities, and the results were strongly positive. Combined with A.I.D.'s own positive assessment, it appears clear that ISNAR has succeeded in developing and pursuing a role that is unique in agricultural development activities.

The area of information service is one that has been targeted as being of high priority to A.I.D.'s region bureaus, which see ISNAR as a resource in planning and implementing programs to strengthen national research capabilities. Informational activities are also being developed with the assistance of the ANE Bureau. A.I.D. will continue to encourage the center to incorporate and expand information activities.

Another area needing more consideration is the arrangements for follow-up to ISNAR reviews through stages of donor coordination, implementation and evaluation. These are areas A.I.D. hopes to see addressed as the activity continues its gradual growth toward its planned size.