

PROJECT DATA SHEET

A = Add
 C = Change
 D = Delete

Amendment Number: _____ CODE: 3

COUNTRY/ENTITY: Bureau for Science and Technology
 PROJECT NUMBER: 936 4144
 BUREAU/OFFICE: Office of Agriculture
 PROJECT TITLE: Postharvest Grain Systems R&D

PDWAM/19

PROJECT ASSISTANCE COMPLETION DATE (PACD): MM DD YY
 ESTIMATED DATE OF OBLIGATION (Under "X" below, enter L, 2, 3, or 4):
 A. Initial FY: 815 B. Quarter: 2 C. Final FY: 8191

8. COSTS / \$000 OR EQUIVALENT \$1 =

A. FUNDING SOURCE	FIRST FY 1985			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AD Appropriated Total						
(Grant) S&I/AGR	600			3,245		3,245
DC Missions	480			2,400		2,400
Other Donors)						
TOTALS	1,080			5,645		5,645

9. SCHEDULE OF AID FUNDING (\$000)

1. APPRO. RELATION	2. PRIMARY PURPOSE	3. PRIMARY TECH. CODE	4. OBLIGATIONS TO DATE		5. AMOUNT APPROVED THIS ACTION		6. LIFE OF PROJECT	
			1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
1) FN	150		-0-		600		3,245	
2) FN	150		-0-		480		2,400	
TOTALS					1,080		5,645	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 070 020 140 150
 11. SECONDARY PURPOSE CODE: 169

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each):
 A. Code: BS/EF RDEV
 B. Amount: _____

13. PROJECT PURPOSE (maximum 400 characters):

To improve the capability of national and international researchers and IDC government agencies to develop, support, and implement economically acceptable and environmentally sound programs which will enable small farmers and marketers to reduce postharvest cereal and legume grain losses.

14. SCHEDULED EVALUATIONS: Location MM YY MM YY Final MM YY
 09/87 09/89 12/90
 15. SOURCE/ORIGIN OF GOODS AND SERVICES: 000 941 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of 8 page PP Amendment)

BEST AVAILABLE DOCUMENT

17. APPROVED BY: _____ Date Signed: MM DD YY
 18. DATE DOCUMENT RECEIVED BY AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

POSTHARVEST GRAIN SYSTEMS
REVISED PROJECT PAPER - TABLE OF CONTENTS

	Page
ACRONYM LISTING	i
Preface	1
1.0 Project Rationale, Purpose and Goal	4
1.1 Project Rationale	4
1.1.1 Background - Perceived Problem	4
1.1.2 Illustrative Problems by Country	6
Latin America	6
Africa	7
Near East	8
Asia	8
1.2 Project Goal	9
1.3 Project Purpose	9
1.4 Beneficiaries	9
2.0 Project Description	9
2.1 Research	10
2.2 Technology Transfer	12
2.2.1 Technical Transfer and Information Services	12
2.2.2 Problem Solving	13
2.3 Training	14
2.4 Networking	15
3.0 Relationship to AID Policy, S&T Strategy	16
Statement and Other S&T Projects	
3.1 Improving Developing Country Policies	17
3.2 Development of Human Resources and Institutional Capacity	17
3.3 Expanding the Role of the Private Sector	17
3.4 Food Aid and Food Security - Problems in and Distribution	17
3.5 Relationship to Other S&T Projects	18

BEST AVAILABLE DOCUMENT

4.0 Cost Estimate and Financial Plan	18
4.1 Cost Estimates	18
4.2 Summary Obligation Schedule	19
4.3 Summary Budget Tables	19
Person Months Per Year	20
Table 1 - Summary Cost by Component	20
Table 2 - Summary by Line Item Expense Category	20
Pie Chart - Components by Millions of Dollars and Percentages	21
4.4 Method of Implementation	22
5.0 Implementation Plans	23
5.1 S&T/AGR Project Management Responsibility	23
5.2 FFGI Management Responsibility and Qualifications	24
5.2.1 Management Responsibility	24
5.2.2 Qualifications, including Key Personnel, Facilities and Equipment	25
Research Qualifications	25
Technology Transfer Qualifications	26
Training Qualifications	26
Other Special Assistance	27
Networking and Linkage Qualifications	27
5.3 Country Selection Criteria	28
5.4 Schedule of Project Events	28
5.4.1 Scope of Work for Five Years	28
Applied Research	29
Technical Transfer and Information Services	29
Postharvest Documentation Service	30
Research Findings	30
Training Materials	30
Problem Solving Assistance	30
Training	30
Network Building	30
5.4.2 Annual Work Plans	31
5.4.3 Projected Person-Months of Effort	32
Table 3 - Projected Person-months	33

BEST AVAILABLE DOCUMENT

6.0 Project Monitoring Plan	33
6.1 Reporting Requirements	33
Trip Reports	33
Annual Activity Reports	34
Technical and Research Reports	34
Annual Expenditure Reports	35
Impact Analysis Reports	35
6.2 Project Review and Evaluation	35
Annual Management Review	35
Indepth Evaluations	35
7.0 Project Analysis	36
7.1 Financial and Economic Analysis	36
7.1.1 Justification of Investments	36
7.1.2 Efficient Use of Scarce Resources	37
7.2 Social-Cultural Considerations	39
7.2.1 LDC and International Researchers	39
7.2.2 National Level Benefits	39
7.2.3 Farmers and Marketers	40
7.2.4 Laborers, Private Investors and Local Institutions	40
7.3 Administrative Analysis	40
7.4 Technical Analysis	40
7.5 Environmental Analysis	41
References	42
ANNEX I Logical Framework	
ANNEX II Table 1-Causes of Loss and Congrol of Loss in Foods	
Table 2-Postharvest Losses of Rice in Selected Countries	
Table 3-Postharvest Losses of Legumes in Selected Countries	
Table 4-Grain Production and Imports	
ANNEX III Projected Input Budget - FY 1985 Through FY 1989	
ANNEX IV Food and Feed Grain Institute - Key Personnel	
ANNEX V Completed and On-Going Research Activities	
ANNEX VI Training Activities	
ANNEX VII Technology Transfer Activities	
ANNEX VIII Network Activities	
ANNEX IX Environmental Threshold Determination	
ANNEX X Cable to Missions and Summary of Responses	

4

ACRONYM LISTING

ADB	African Development Bank
ADI	Agriculture Development Institute (Costa Rica)
AIB	American Institute of Baking
AID	Agency for International Development
AID/S&T/AGR	Agency for International Development, Bureau for Science and Technology, Office of Agriculture
ALAGRAN	Asociacion Latinoamericana de Post-Cosecho de grano
CARE	Cooperative for American Relief Everywhere
CEGRAS	Centro de Consimientos Especializados en Granos y Semillas (El Salvador)
CENTREINAR	Centro Nacional de Treinamento Em Armazenagem
CIAT *	International Center for Tropical Agriculture
CIMMYT *	International Maize and Wheat Improvement Center
CIGRAS	La Universided de Costa Rica
CIP *	International Potato Center
CA	Cooperative Agreement
CNP	Censejo Nacional de Produccion (Costa Rica)
CRS	Catholic Relief Service
CSIRO **	Commonwealth Scientific and Industrial Research Organization, Canberra, Australia
FAO **	The United Nations Food and Agriculture Organization, Rome, Italy
FFGI **	Food and Feed Grain Institute, Kansas State University
GAO	General Accounting Office
GASGA	Group for Assistance on Systems Relating to Grains After Harvest
GATT	Generally Agreed Tariffs and Trade
GTZ	Deutsche Gesellschaft Fur Technische Zusammenarbeir GmbH, Eschborn, Federal Republic of Germany
IARC	International Agriculture Research Centers
IBRD	International Bank for Reconstruction and Development

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ICIPE *	International Center of Insect Physiology and Ecology
ICARDA *	International Center for Agricultural Research in the Dry Areas
ICRISAT *	International Crops Research Institute for the Semi-Arid Tropics
IDRC **	International Development Research Center, Ottawa, Canada
IGP	International Grain Program
IHMA	Instituto Hondureno de Mercadeo Agrícola
IICA '	Interamerican Institute of Cooperation for Agriculture
IITA *	International Institute of Tropical Agriculture
IRAT **	L'Institut de Recherches Agronomique Tropicales et des Cultures Vivrieres, Paris, France
IRRI *	International Rice Research Center
ITC	International Trade Commission
KIT **	Koninklijk Instituut Voor de Tropen, Amsterdam, The Netherlands
KSU	Kansas State University
LIFE	League for International Food Education
NAS	National Academy of Science
PC	Peace Corps
PHDS	Postharvest Documentation Service
PP	Project Paper
REDSO/EA	Regional Economic Development Service Office/ East Africa
REDSO/WA	Regional Economic Development Service Office/ West Africa
ROCAP	Central America Regional Program
SADCC	Southern African Development Coordination Conference
SEARCA	Southeast Asian Cooperative Research and Development Programme, includes Philippines, Indonesia, Malaysia, Singapore and Thailand

TDRJ**	Tropical Development Research Institute, supported by British Overseas Development Ministry
UNCTAD	United Nations Conference on Trade and Development
UNCSTD	United Nations Conference on Science and Technology for Development
UNEP	United Nations Environment Programme
U.S. WA, Inc. ***	U.S. Wheat Associates, Inc.
VITA	Voluntary Institute for Technical Assistance
WARDA *	West African Rice Development Association

* International Agriculture Research Centers

** Members of GASGA

*** Membership includes Colorado Wheat Administration Committee, Idaho Wheat Commission, Kansas Wheat Commission, Minnesota Wheat Research and Promotion Council, Montana Wheat Research and Marketing Committee, Nebraska Wheat Board, North Dakota State Wheat Commission, Oklahoma Wheat Commission, Oregon Wheat Commission, South Dakota Wheat Commission, Texas Wheat Producers Board, Washington Wheat Commission, and Wyoming Wheat Commission.

IRC:5/15/85

8

NARRATIVE JUSTIFICATION AND SUPPORTING DATA

POSTHARVEST GRAIN SYSTEMS R&D PROJECT PAPER

Preface

S&T/AGR recommends that \$5.645 million be authorized for the new five-year Postharvest Grain Systems project. It is also recommended that this project be implemented under a cooperative agreement and related ordering contract with the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) to carry out the scope of work as defined in Section 5.4 of this project paper. Of this amount, \$3.245 million will be provided as core funding by S&T/AGR under the cooperative agreement and it is anticipated that another \$2.4 million will be provided by missions, regional bureaus and other offices under the ordering contract.

FFGI is an organization within KSU which directs and coordinates multi-disciplined projects engaged in scientific research related to postharvest grain systems. KSU has the only Grain Science Department in the United States which is a uniquely valuable resource to support programs in post-harvest grain systems both in terms of the highly trained staff and the research and instructional facilities. These facilities include a milling complex for both food and feed grain processing, a bakery facility, research laboratories, an off-campus grain research facility with classrooms, campus classroom space and equipment, office space and equipment, storage space, access to University computers, and a broad array of micro computers. The staff and facilities could not be duplicated without substantial financial investment which is not available from S&T/AGR's limited budget for this project.

In addition, unique and complementary research and training in the grain sciences are under way at the nearby American Institute of Baking, the USDA's Grain Marketing Research Laboratory, and FFGI's International Grains Program Center. These facilities and staff resources have made the home of FFGI a world-wide grain postharvest scientific and educational center. FFGI uses the facilities of these institutions and the scientific and professional personnel to implement programs and provide information to decision makers in U.S., LDC national and international institutions and organizations in the following areas:

- Drying, conditioning, handling, storage and processing grains as foods for humans and feeds for livestock.
- Qualify preservation, evaluation and control of grains and grain products, including pest ecology, distribution, concentration and migration patterns.

- Grain quality deterioration in storage and the use of natural pesticides and predators and chemical control techniques.
- Social, economic and physical problems associated with handling, transporting, storing, processing and marketing of grains and grain products.
- Domestic and international grain-marketing structures.
- Education and training of personnel for grain and feed processing and marketing industries.
- Nutritional properties of grains and grain products for humans and for livestock consumption.
- New food and industrial uses of grains.

Since 1967, FFGI has been providing assistance to implement international programs designed to solve problems in postharvest grain systems under various agreements with A.I.D. This assistance has included technical advice, information dissemination, research and training in various activities related to grain handling, transporting, storing, processing, marketing and agribusiness development. The Postharvest Documentation Service was established in 1978 to collect information on all phases of postharvest grain systems for dissemination to grain handling LDC national and international institutions. Technical advice ranged from evaluation of farm level storage units to designing evaluations of large grain elevators and from suggestions for emergency storage to warehousing laws and regulations.

Research has focussed on severe postharvest LDC problems: i.e., a master model for estimating future requirements for grain storage and marketing facilities which has been used successfully in Panama, Philippines, Ethiopia, Thailand, Paraguay, Honduras and Venezuela; rice milling feasibility analysis; simple storage unit for humid areas; farm level grain dryer; methods for estimating losses due to insects and molds; rates at which grains absorb moisture under humid tropical conditions; flight behavior on insects which infest grains; and the susceptibility of millet varieties to insect infestation and loss.

Under the training activities, 376 participants from 70 countries attended the Annual Grain Storage and Marketing Short Course, and 1,220 participants in 19 countries have attended in-country training courses. At the graduate level, within the last 10 years, 43 students from 18 LDCs have received advance degrees related to grain storage marketing economics.

11

Even before the emphasis was placed on "networking", FFGI had established linkages and working relationships with U.S., LDC national and international organizations and institutions to: 1) develop joint research efforts, 2) assist in human resources development, 3) exchange information vital to progress towards the improvement of international agricultural systems, and 4) avoid duplication of research being undertaken.

This new project will draw on the vast resources available to FFGI and KSU to continue the activities under the previous project and carry out the proposed scope of work which places emphasis on applied research and provides for training, technology transfer and networking in a variety of activities related to postharvest systems for cereal and legume grains.

In May 1984 the previous project was evaluated by a team of experts from the National Science Foundation who recommended a new five-year project which places emphasis on an integrated, problem solving and applied research component. The major lessons learned under the previous project are listed below. A copy of the team's report can be obtained from Dr. Raja Jaffan.

1. The need for assistance to improve postharvest grain systems is as great now as it has ever been. Postharvest grain losses continue to be extremely high as indicated by reports from NAS and the UN Environmental Programme and as evidenced by the increasing requests from the missions for assistance.

2. Long-term efforts appear to be rather high-risk. Shorter-term projects applied to specific host-country needs are more closely in line with overall project goals.

3. Research should be confined to problem-oriented activities with high potential payoff. For example the natural air drying of rough rice, in-country applied research on quality changes during storage, on use of indigenous fuels for drying and on improved marketing systems are especially important to many LDCs.

4. Research must be integrated with technical assistance and training to achieve goals which are beyond the reach of a single discipline.

5. To help LDCs acquire training capabilities, the project must include training-of-trainers courses adapted to LDC conditions

6. Increased attention should be directed toward reaching the private sector, including both the marketing middleman and the farmer participants.

7. Slide-tape and/or video-tape training sets covering the basics of postharvest grain management, in English, French and Spanish are important elements of a good training project to reach the largest audience.

The Project Identification Document (PID) was unanimously endorsed by the members of the Sector Council on March 29, 1985. At that time the following charges were recommended: 1) The Africa Bureau representative requested that an effort be made by the contractor to ensure adequate French capability among support staff; and 2) the LAC Bureau representative expressed concern that the buy-in level be set high enough to accommodate the high level of use anticipated by the LAC Bureau. In regard to having French speaking support staff, FFGI and KSU will make every attempt to respond to this suggestion. In regard to the second suggestion, the buy-in level has been increased by \$1.0 million to a total of \$2.4 million over the life of the project.

On May 2, 1985 the Postharvest Subcommittee of the Sector Council for Agriculture unanimously endorsed the proposed new five-year project. The recommended changes included: 1) adding a section to the preface on the qualifications of FFGI and past activities; 2) placing more emphasis on the private sector; and 3) bringing the scope of work more in focus to assure that FFGI can implement the program with the funds available.

The above items identified by the NSF and the Postharvest Subcommittee of the Sector Council for Agriculture have been addressed in the appropriate sections of this project paper.

1. Project Rationale, Purpose and Goal

1.1. Project rationale is based on the background statement and perceived problems stated below:

1.1.1 Background - Perceived Problem - Inadequate supplies of food reaching consumers has long been recognized as one of the major problems requiring attention in the Third World. Donor organizations have traditionally invested billions of dollars to increase production to meet this need by clearing new lands, establishing new irrigation systems, increasing crop yields per unit of land, and by adopting multiple cropping systems. However, the cost of increasing production of grain is much greater than the cost of

preserving it after harvest. New cultivars or new systems which increase production of grain bring new postharvest problems which could lead to additional losses. These investments in production have not been matched by corresponding levels of investment in methods to reduce postharvest food losses. Further, they do not by themselves solve the problem of an inadequate food supply. A sound postharvest delivery system is needed to move food products from the point of production to the point of consumption.

The National Academy of Sciences (NAS) reported enormous losses due to spillage, contamination, attack by insects, birds, and rodents, and deterioration in storage in its 1978 publication. These losses are summarized in Table 1 of Annex II. Conservative loss estimates in the NAS study indicate that a minimum of 107 million tons of food were lost in 1976. The amount lost in cereal and legume grains alone would provide more than the annual minimum caloric requirements of 168 million people. NAS estimated these losses at 42 million tons valued at \$6.9 billion. More recent statistics are not available at this time, but large losses are still a valid assumption according to the UNEP 1983 Guidelines for Postharvest Food Loss Reduction Activities.

Figures compiled by FAO and NAS on postharvest losses of rice and legumes are shown in Tables 2 and 3 of Annex II. In rice, postharvest losses range from 2.5 percent in Egypt to as much as 40 percent in Sri Lanka. The losses in paddy in some 18 countries total between 9.5 and 20.1 million tons per year. If paddy is valued at \$200 per ton, this represents a financial loss of between \$1.9 and \$4.0 billion per year.

The pattern of losses in other cereal grains such as barley, maize, millet, sorghum, and wheat is similar to that for rice. Losses from large public storage facilities are different in nature from losses from on-farm or small community storage facilities. Different solutions are needed to solve these problems. A wide range in losses is reported from one country to another and may vary widely from region to region in the same country. The reported postharvest losses for wheat in India range from 2 to 52 percent according UNEP's Guidelines for Postharvest Food Loss Reduction Activities.

Postharvest losses of grain legumes range from quite small (0.25%) to very high (68%). The annual loss of legumes in 19 countries lies between 1.9 and 3.6 million tons - a large and unnecessary waste of protein and income.

Another alternative for obtaining food to meet the ever increasing requirements created by population growth and urbanization are increases in imports. This alternative would require the use of scarce foreign exchange which is needed for development purposes. The NAS study suggested that a

14

five percent reduction in postharvest food losses could significantly reduce and potentially eliminate the current need for some LDCs to import large quantities of food, particularly cereal and legume grains. Table 4 in Annex II illustrates how a 5 percent reduction in postharvest grain losses would affect grain import requirements for certain select LDCs.

In 1976 the GAO recommended that AID give more attention to the LDC storage distribution and marketing systems to reduce food losses and increase the availability of food grains. Then in December 1979, the Congress of the United States recognized that reductions in postharvest food losses are the most economical approaches to increasing food supplies and urged AID to provide proportionally more of its funds for improving postharvest systems.

1.1.2 Illustrative Problems by Country - Many LDCs recognizing the need to improve postharvest food systems have initiated development programs in this important area. Examples of such development activities are as follows:

Latin America

Costa Rica - FAO (1977) and NAS (1978) reported annual losses in dry beans after harvest of approximately 24 percent or 4,300 tons. The GOCR, recognizing the need to attack this problem, developed a national strategy to improve the postharvest system. The strategic plan involves three institutions: CNP for problem solving and applied research strategies, CIGRAS for research and extension strategies, and ADI for price and market policies. CIGRAS is currently conducting a postharvest loss assessment and marketing systems study. The FFGI has been actively involved with CIGRAS in designing this study. The FFGI has also provided in-country training in grain storage management to CNP personnel including private sector participants and has assisted the CNP in reviewing plans for proposed grain handling and storage facilities. It is expected that the Mission will need and request further assistance from S&T/AGR/AP and FFGI.

Peru - The GOP is currently developing grain storage plans to accommodate an expected twofold increase in grain production. FFGI is assisting the GOP with these plans, e.g., in 1984, the FFGI developed an emergency grain storage plan and assisted the GOP in developing operational plans to address grain drying and storage needs. The FFGI presented an in-country short course in grain handling, conditioning, and storage. The FFGI has been requested by the Mission to present this course again in 1985 to a different group of



participants. Prior to 1984, the FFGI developed short course outlines and determined grain storage capacity and grain drying equipment needs of the GOP. It is expected that FFGI will continue to be called upon for assistance.

Haiti - The GOH estimates food losses from many causes including mycotoxin, at 30 percent which prompted a decision to include loss reduction strategies within the national five-year plan. The FFGI provided GOH with appropriate postharvest technical assistance and training. Currently the FFGI is assisting the GOH in the analysis of grain price stabilization and current grain storage facilities to increase utilization.

Honduras - FAO reports that postharvest losses of dry beans on the farm at 20 to 50 percent. The GOH is developing a long-term agribusiness project to attack this problem. Under a marketing development project the FFGI assisted IHMA in market planning, policy planning, facility utilization and management, and postharvest losses. A projection model developed under the adaptive research component of the current S&T/AGR-FFGI project has been used as an analytical tool in the process of delivering assistance to IHMA. The FFGI has also provided short courses and academic training to GOH participants as well as a planning workshop for decision-makers of IHMA.

Other Latin American Countries - Other countries in this region which have suffered severe postharvest losses include Panama, Ecuador, Belize, and Guatemala. They will also be looking to FFGI for assistance.

Africa

East Africa - In Kenya where 80 percent of the crop land is cultivated by human labor, FAO estimates of the legumes produced, 30 percent is lost because of inadequate farm storage. The GOK has addressed the problem through the implementation of an on-farm storage development project to reduce losses at the farm level. In Sudan, where FAO has estimated that 17 percent of the rice is lost after harvest, FFGI has given short training courses for participants from Sudan. These courses and technical assistance have also been provided to other East Africa countries.

Central and Southern Africa - The missions in Uganda, Botswana, and Zambia are helping to develop special strategies for preserving grains after harvest. The FFGI has assisted in these efforts, e.g., performed pre- and post-feasibility studies, held intensive short courses at KSU for participants

from these countries, and presented in-country short courses in grain storage and warehouse management. S&T/AGR/AP and the FFGI will continue to work with the countries to reduce grain losses after harvest.

West Africa - The losses in this part of Africa are reported high. For example, UNEP reported in its 1983 publication that Nigeria imported 0.4 million tons of grain. It should be noted that a five percent reduction in postharvest grain loss would have eliminated the need for imported grains. The missions in Senegal, Gambia, Guinea, Liberia, Ghana, Burkina Faso, Niger, Chad, and Cameroon are working closely with those governments to identify and solve problems in grain storage. The FFGI has also assisted in this effort: e.g., a study was made on regional grain stabilization requirements and recommendations submitted; recommendations were made for construction of feed mills; surveys were made of cereal reserve requirements and rice importation in Senegal; participants from these countries attended intensive short courses at KSU; and in-country short courses were presented in Senegal, Burkina Faso, and Liberia.

Near East

Egypt - FAO estimated postharvest rice losses in Egypt at 2.5 percent or 57,500 tons. The GOE recognized this problem and included programs to improve postharvest food systems in its five-year national plan. It is anticipated that research, training, and technical assistance to implement this program will be required from the FFGI.

Other Near East Countries - Jordan and Yemen are planning to implement postharvest work as a part of their agricultural production projects.

Asia

Philippines - UNEP estimates that in the Philippines under normal conditions losses in rice range from about 10 to 37 percent from harvesting, handling, threshing, drying, storing, and milling. The FFGI has provided assistance to the GOP to reduce these losses; e.g., a management and implementation study for completion of the Food and Feed Processing Center at Central Luzon State University; an in-country training course on postharvest loss prevention of paddy/rice; and an Asian Postharvest Regional Training Course at Los Banos. Assistance will continue to be needed by the GOP in this important area.

Bangladesh - In a two-year study of rice losses in Bangladesh, M. Greeley (1981) came to the conclusion that 6.9 percent is the best estimate of losses

from the current practices of cutting, field stacking, transportation, threshing and storage. However, he found examples of farmers suffering storage losses of over 20 percent. The Mission has recognized this problem and requested assistance from FFGI to: 1) provide specific technical assistance in solving problems of postharvest rice losses; 2) perform studies; and 3) train scientists and technicians at KSU.

Other Asian Countries - Other countries in Asia suffering from postharvest grain losses are: Thailand, soybeans and rice; Nepal, rice; Pakistan, rice and wheat; Indonesia, rice; Sri Lanka, rice; and Philippines, rice and maize. The FFGI has provided assistance to these countries for improved technology and project design and training; e.g., in-country short courses have been presented in Nepal; recommendations on private sector development have been made to Sri Lanka; pre-feasibility studies have been conducted in Burma; and postharvest management design has been completed for Pakistan.

1.2 Project Goal - The project goal is to increase the availability of cereal and legume grain supplies to improve human nutrition and increase productivity.

1.3 Project Purpose - The project purpose is to improve the capability of LDCs to reduce postharvest cereal and legume grain losses.

1.4 Beneficiaries - The ultimate project beneficiaries are LDC farmers and consumers of cereal and legumes grains. Others who will benefit more directly include LDC marketing intermediaries, government educational, research and marketing personnel and government policy makers.

It should also be recognized that benefits will accrue to the US institutions from experiences and knowledge gained through international involvement in solving problem related to postharvest grain systems. Moreover, LDC students may participate directly in project-sponsored research activities. For additional details on the benefits derived from this project, please refer to paragraph 7.2.

2.0 Project Description - This project responds to the recommendations made by the GAO and the U.S. Congress to give more attention and funds to resolve postharvest grain losses in the LDCs. It provides a balanced combination of research, technology transfer, dissemination of information, academic and technical training at KSU and in LDCs and expanding the

18

network linkages. It makes available the services of highly skilled agricultural economists, a grain storage mycologist, storage and processing engineers, stored-grain entomologists, grain storage specialists to assist missions and host governments in preventing, assessing and reducing postharvest grain losses by improving drying, conditioning, handling, storage and processing of cereal and legume grains.

It is designed to further develop and transfer to LDCs economically sound and environmentally acceptable solutions to postharvest cereal and legume grain problems described in the project rationale. It will be implemented under a cooperative agreement and companion ordering contract. The four components and expected outputs of the project are as follows:

2.1 Research - will be applicable to problems of postharvest grain systems in LDCs and will be of an applied or adaptive nature conducted under actual or simulated LDC conditions. Relevant expertise will be provided to backstop the design, management and implementation of research projects at KSU and in selected LDCs. Activities will be in the following priority areas:

- Methodologies for drying, conditioning, handling, storage, and processing of cereal and legume grains, particularly cost-effective methods and technologies aimed at reducing losses in humid and arid tropics and at the small farm and agribusiness level. Special emphasis will be placed on design and testing systems for drying grains using non-fossil fuels which can be adopted by small farmers, groups of small farmers, or small agribusiness enterprises. Emphasis will also be placed on research in small farm storage structures and their applicability to specific environmental conditions and cost factors. (Items 1 and 2 in logframe)
- Applied research will be conducted in grain quality preservation practices which are applicable to LDC conditions and have potential application to small scale farm and agribusiness operations. These practices include: 1) pest ecology, distribution, concentration, and migration patterns; 2) the use of natural pesticides and predators and chemical control techniques; 3) grain quality deterioration in storage; and 4) and storage technology research. (Item 3 in logframe)
- Applied research will be conducted in marketing systems, food security programs, price and market policies, and agribusiness development processes. All such research will be specifically directed toward LDC conditions with

special emphasis on how these research areas will affect small farmers and businessmen. (Item 4 of the Log Frame)

Research in marketing systems includes: 1) identifying and evaluating domestic grain marketing systems in LDCs; 2) determining the nature, pattern, magnitude, and causes of losses and inefficiencies under various systems of post-production technology and management; 3) isolating and measuring factors that explain the choice of marketing channels and procedures in grain post-production systems; and 4) defining domestic policy implications of the research findings.

Applied research in food security will include determination of how systems of stabilizing trade and food grain security reserves would have worked or will work in stabilizing supply quantities within targeted projections. Research in price and market policies includes price analysis, price and production relationships, and evaluation of results of market policies. All research within this area will be directed at assisting policy-makers and implementing agencies in LDCs to formulate and carry out public intervention policies which will achieve more effective national systems for food grain production, distribution, and utilization.

20

- Certain research activities under the Cooperative Agreement will be conducted by approximately 15 - 20 LDC graduate students under the direct supervision of FFGI scientists in areas which lead to reduction in postharvest grain losses and/or by-product utilization in LDCs. This research will be specific to the students own countries. If proper conditions and funding exists, students will either perform research and/or collect needed data in their own countries. (Item 5 on logframe)

In addition, graduate students may also be funded by missions and LDC institutions outside of the Cooperative Agreement and the Ordering Contract.

- Research and loss assessment studies on various types of cereal grains will be conducted in collaboration with LDC research institutions. Research will include, but not be limited to, cost-effective methods of grain conditioning, storage practices, processing techniques and marketing approaches. (Item 6 on logframe)

The expected outputs of the research component are: 1) two methodologies for drying grain; 2) four methodologies for conditioning, handling, and storage of grains; 3) six research projects in practical methods of grain quality preservation undertaken or completed; 4) eight research projects in marketing, food security, and price and market policies, agribusiness development undertaken or completed; 5) research will be performed by 15 - 20 LDC graduate students; and 6) ten collaborative research projects on cost effective technologies in grain conditioning, storage, processing and marketing and loss assessment studies will be undertaken.

2.2 Technology Transfer

2.2.1 Technical Transfer and Information Services - LDCs and missions will identify postharvest grain loss problems which are constraints to adequate food supplies. FFGI will conduct research on these problems and its professionally trained staff will recommend appropriate solutions. As required, technical transfer and information services will disseminate information to LDC national, regional and international institutions. Types of information will include, but not be limited to the following activities:

- Research findings will be published and disseminated to scientists in national, regional, and international institutions. Results of research leading to improved methods of conditioning, handling, storing, and processing of grains will be demonstrated in LDCs to appropriate researchers, agency employees, extension workers, farmers, and agribusinessmen.

21

- Training materials will be developed and disseminated to Missions, LDC institutions, and participants for use in training courses. These training materials will include instructional and "how-to" manuals as well as other reference materials, slide-tapes and/or audio-visual tape training sets in English, French and Spanish.
- Operations of the PHDS will be maintained and its capacity significantly increased. The PHDS systematically collects information relating to postharvest cereal and legume grain systems. This information is obtained from the National Agricultural Library, USDA Technical Information Systems, Current Awareness Literature Service, GASGA, technical journals, miscellaneous LDC national, regional, and international organizations, VITA, CARE, KSU, AIB, CRS, ITC, PC, other PHDS clients, and FFGI staff. The number of acquisitions in the PHDS data base is approximately 7,000. The PHDS organizes, stores, retrieves, and disseminates this information to scientists, researchers, and extension personnel in LDC institutions and international and regional research centers. There are approximately 400 international clients and an average of 4,500 requests per year for information. Clients located in LDCs account for over 95 percent of the requests received by the PHDS. The acquisition of information from PHDS clients, FFGI staff, and national and regional institutions is directed toward the development of a feedback process which will allow successful techniques and procedures to be transferred from one LDC to another.

2.2.2 Problem Solving - The FFGI will provide scientists and experts in LDCs national and international organizations problem solving assistance in the following important postharvest grain systems areas. The majority of services provided in this category will be funded under the companion Ordering Contract.

- Prefeasibility and feasibility studies to determine the potential impact of proposed projects or programs on postharvest system, small farmers and agribusinessmen within the system, and consumers.
- Marketing studies, either of a descriptive nature which result in an understanding of how a system operates, or directed toward determining the affect of changes in such areas as policy or technology.
- Assessment, evaluation, and recommendations for different areas in the postharvest system such as policy actions, facility and equipment requirements, training needs, maintenance programs, research planning,

22

emergency grain storage plans, milling processes, cereal grain reserves, technical assistance needs, project development criteria, and planning and implementation of projects.

- Recommendations especially designed for small farmers and marketers for improvements in grain conditioning, handling, storing, processing, and marketing processes.
- Economic and technical studies and proposals relating to postharvest grain systems in the areas of project development, project design, and management and implementation of improvements.

The expected outputs of the technology transfer component are: 1) thirty research publications and instructional manuals disseminated to LDCs, including pesticides handling; 2) five research results demonstrated to LDC researchers, agency employees, extension workers, farmers and agribusiness firms; 3) five training manuals developed and distributed; 4) increased capacity of PHDS in terms of acquisitions (75%), clients (40%) and requests (50%); and 5) fifty short- and long-term technical assistance in problem solving undertaken and completed. The latter to be funded primarily under the companion Ordering Contract.

2.3 Training - Training activities will be an integral part of this new project and will include academic training at KSU and technical training at KSU and in-country. The training courses involved in this component are designed to reach operating personnel, research and extensions specialists, managers, government officials and administrators and graduate students from cooperating LDCs. The following four basic areas are encompassed by this component:

- A short course (7 weeks) in grain storage and marketing for LDC participants will be conducted annually at KSU. This course is designed and updated, as required to train operating personnel, managers, and mid-level LDC professionals in the fundamentals of grain storage, drying, grading, conditioning, handling, sanitation, marketing, management, loss assessment methodology and design strategies for loss assessment surveys.
- In-country and KSU short courses, workshops, and seminars of three days to six weeks duration will be conducted upon request. These training courses will be developed for and related to specific problem areas in grain

postharvest systems of a particular LDC. The subject matter could include pest management of stored grains, warehouse management practices, and grain handling, conditioning, storage practices and use of pesticides.

- Training programs involving special handling of emergency food supplies will be conducted upon request; e.g. in drought stricken countries in the Sahel. These would encompass training courses for LDC personnel to act as trainers within their own organizations or country, training programs for decision-makers specifically designed for problem identification related to postharvest grain losses, and in-service and on-the-job training at operational levels within ministries of agriculture, LDC public, and private organizations and institutions. These training sessions would be conducted either in-country or at KSU depending upon the specific need and request for training assistance. A basic training course, utilizing audio-visual techniques, will be developed for use by participant trainees under the training-of-trainers courses. This basic training course may then be utilized as a resource as trainees become trainers in their own countries.

Long-term academic training of LDC students at KSU will focus at the graduate level and will be conducted in the disciplines of grain science, agricultural engineering, entomology, and agricultural economics. The participant training costs will be funded from other sources and will not be charged to this project.

The expected outputs in the training component are: 1) Five annual 7-week grain storage and marketing short courses for a maximum of 35 participants; 2) ten in-country and KSU short courses, workshops and seminars of 3 days to 6 weeks; 3) five short-term in-country and/or KSU training-of-trainers courses; 4) two basic training course for LDC participant trainers using slide tapes and/or audio visual techniques; 5) two short-term training courses for decision makers; 6) two in-service and on-the-job training courses at operational levels within the Ministries of Agriculture, LDC public and private organizations and institutions; and 7) twenty-five to thirty MS and PhD dissertations completed.

2.4 Networking - The network system being implemented by FFGI is designed to promote research and planning among national and international programs; identify and develop appropriate programs in postharvest grain systems for specific locations; help promote existing programs to reduce losses by exchanging information on practical programs to eliminate losses; and organize working group meetings and monitoring tours to study problems and

progress; and transfer suitable methodologies and technologies from one environment to another with similar conditions. Under the previous project, the FFGI became an active member of the GASGA organization which is a voluntary association of international organizations whose aim is to stimulate improvement in the technical help given to developing countries in the postharvest handling, processing, storage and transport of grain and to harmonize activities so that the most effective use is made of members' resources. (A listing of member countries is contained on page iii of the Acronym Listing)

FFGI has been involved with IICA on postharvest losses and grain marketing programs and CIGRAS for cooperative research on postharvest grain systems. Other past and current networks and network building activities are detailed in Section 5.2.2.

FFGI will maintain its current network relationships. However, expansion of network building activities will be limited to the following actions because of the budgetary constraints:

- The FFGI will continue to maintain its membership in GASGA and will actively participate in GASGA meetings, activities, and programs.
- The FFGI will establish collaborative linkages with international, regional, and LDC institutions for the purpose of research, technology transfer, and training activities. These collaborative relationships could be with such institutions as ADI, ALAGRAN, CEGRAS, CIMMYT, IHMA, IRRI, IICA, IITA, TDRI, and WARDA. In addition, linkages may be reestablished with SEARCA, whose membership includes the Philippines, Indonesia, Malaysia, Singapore, and Thailand.

The expected outputs of the network building component are: 1) maintenance of membership and active participation in GASGA; and 2) the establishment of relationships with other institutions which are involved in research, technology transfer, or training activities in postharvest grain systems.

3.0 Relationship to AID Policy, S&T Strategy Statements and Other S&T Projects

This project extends and refocuses AID's support to the Food and Feed Grain Institute at Kansas State University to continue assistance to LDCs to reduce postharvest cereal and legume grain losses. As indicated below, it is

25

completely consistent with the four elements of AID's Policy and Strategy on Food and Agricultural Development Assistance and with the related Agricultural Research Priorities. It is also consistent with the Nutrition Policy which deals with malnutrition through, among other things, increasing food availability, including products consumed by the poor.

3.1 Improving Developing Country Policies - This project addresses policy questions concerning postharvest food losses and promotes cost/ effective and environmentally acceptable methods to increase food availability in the LDCs. The developing country policies in storage, marketing, distribution and consumption will be critically examined with mission participation and assistance will be provided to encourage policy reforms, where appropriate.

3.2 Development of Human Resources and Institutional Capacity

The project strengthens LDC institutions by upgrading and developing human resources and generating improved technology which is adaptable to specific environments and disseminated to small scale private farmers and agribusiness enterprises involved in the processing, preserving and marketing of agricultural commodities. It will assist countries to develop and/or strengthen private and public sector capacity dealing with technical, administrative, economic and social problems of postharvest food systems.

3.3 Expanding the Role of the Private Sector - The private sector constitutes a dynamic, efficient and innovative driving force for improvement of postharvest food systems. The project will provide assistance aimed at improving the climate for the indigenous private sector in postharvest losses. Attention will be given to government policies and regulations that encourage private sector involvement; programs to overcome deficiencies in management and technical skills; and private sector access to technical information on storage, processing, marketing and distribution.

3.4 Food Aid and Food Security - Problems in Storage and Distribution . In countries where large quantities of grains are received under food aid programs, FFGI is available to work with the missions to provide long- and short-term problem solving assistance and training in grain storage and distribution. In addition, activities under this project will include analysis of factors which affect national food reserves and development of policy changes aimed at reducing cereal and legume grain losses.

3.5 Relationship to Other S&T Projects - This project will maintain contacts with other S&T/AGR projects working on related problems. Special attention will be given to the following projects: IPM and Environmental Protection, International Agricultural Research Centers, Storage/Processing Fruits and Vegetables, Technology Development Transfer and Feedback Systems in Agriculture, Improved Seed Production and Utilization, and Agricultural Policy Analysis. Coordination will be established with the institutions and organizations implementing these projects so as to further the interrelated objectives by sharing research results and technical information on common problem areas. For example, the models and case studies developed under the Technology Transfer and Feedback Systems in Agriculture Project would assist this project in implementing portions of its technical transfer component. The results of the use of such models and case studies would then be transmitted back to the Technology Development Transfer and Feedback Systems in Agriculture Project for their appraisal and use. Such a working relationship would be mutually beneficial to both parties.

This project will also influence and benefit from CRSP grain research production projects; i.e., sorghum/millet, beans and cowpeas and peanuts. Information generated under other S&T projects may also be of benefit in the implementation of this project. The information on biomass resources, energy crops and agricultural residues as fuel being investigated under the Bioenergy Systems and Technology project may prove useful to FFGI in the grain drying research component. AT International II project is providing assistance in the identification, design, financing, and/or implementation of pilot projects involving an innovation in appropriate technology which will include solving problems related to postharvest cereal and legume grain losses. Under the Access to Land, Water and Natural Resources project, the University of Wisconsin is providing assistance to LDCs to develop approaches for improving access to land, water and natural resources for the rural poor and enhancing the land-holding security of small operators. Michigan State University is developing alternative rural development strategies for food security in Africa which includes solutions to problems relating to domestic food systems. All of these projects will be investigated for possible benefits to this new Postharvest Grain Systems project.

4.0 Cost Estimate and Financial Plan

4.1 Cost Estimates - The total cost for this five-year project is estimated to be \$7.260 million, which includes a core budget of \$3.245 million to be

27

funded under a Cooperative Agreement by S&T/AGR, an expected input of \$2.4 million to be funded under the companion Ordering Contract by missions and regional bureaus and a \$1.615 million to be contributed by KSU as cost sharing. Cost estimates are based upon the calculated level of personnel, material and other cost requirements necessary to achieve targeted outputs of the magnitude specified in the logical framework. Participant training costs of approximately \$210,000 for 35 participants who are expected to attend annual courses at KSU and another \$150,000 for participants attending conferences and workshops in LDCs are not included in these estimates, but are funded directly by Missions and participating governments, institutions and other donors, as determined by the type of training and the requirements of the requestor. In addition, project related costs in LDCs funded outside of the Cooperative Agreement and Ordering Contract are projected at \$1.6 from LDCs to cover local costs and some training and \$1.0 million from international donors and institutions.

4.2 Summary Obligation Schedule - The following obligational schedule is designed to meet the estimated project expenditures.

	(\$1000)					
	FY85	FY86	FY87	FY88	FY89	Total
S&T/AGR	\$600	\$604	\$641	\$679	\$721	\$3,245
Mission	480	480	480	480	480	2,400
KSU	300	300	318	338	359	1,615
Total	\$1,380	\$1,384	\$1,439	\$1,497	\$1,560	\$7,260

It is expected that Mission funding will come from a combination of programmed and unprogrammed sources and will be implemented under the Ordering Contract.

4.3 Summary Budget Tables - The following tables reflect the total five-year budget by: Summary Cost Estimate by Activity (Table 1) and Summary Cost Estimate by Expense Category (Table 2). Project component expenditures from all sources as a percent of total expenditure are: research, 30 percent; technology transfer, 42 percent; training, 17 percent; network building, 3 percent; and administrative support, 8 percent. A detailed budget table by line item is appended in Annex III and by activities included in the input section of the Logframe. KSU's contribution to this project over the five-year period is estimated at \$1.615 million, or 50 percent of the level to be funded under the Cooperative Agreement.

Person Months Per Year

Coordinator	8.4 person months
Economists	18.0 person months
Engineers	18.0 person months
Storage Specialists	14.4 person months
Technical Support Staff	19.2 person months
Clerical Staff	38.4 person months
Graduate Students	36.0 person months
Total	152.4

Table 1 - Summary Cost by Component - (in thousands)

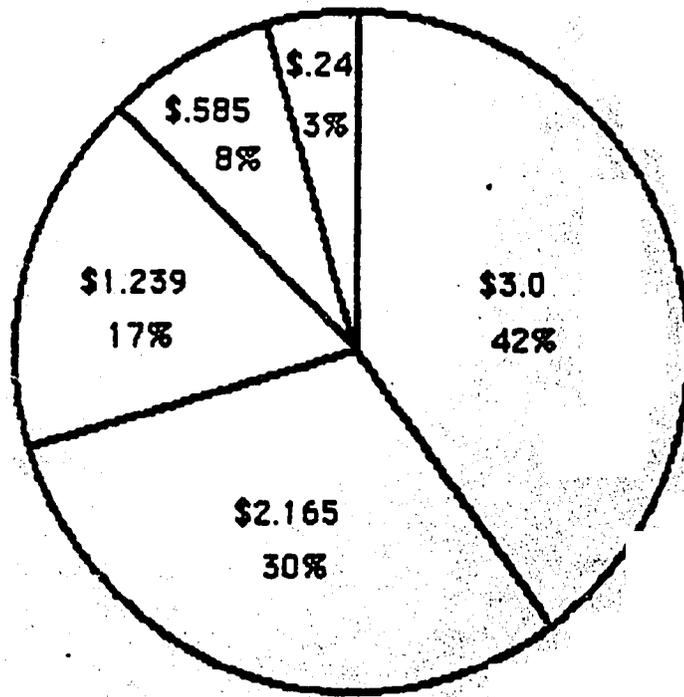
Component	<u>Cooperative Agreement</u>			<u>Mission</u>	Total
	S&T/AGR	KSU	Total	Contracts	
Research	\$ 940	\$ 745	\$ 1,685	\$ 480	\$2,165
Technology Transfer	1,282	307	1,589	1,440	3,029
Training	484	275	759	480	1,239
Network Building	162	80	242	-0-	242
Admin. Support	<u>377</u>	<u>208</u>	<u>585</u>		<u>585</u>
Total	\$3,245	\$1,615	\$ 4,860	\$2,400	\$7,260

Table 2 - Summary by Line Item Expense Category - (In thousands)

Line Item Expense	<u>Cooperative Agreement</u>			<u>Mission</u>	Total
	S&T/AGR	KSU	Total	Contracts	
Salaries	\$1,695	\$ 834	\$2,529	\$ 815	\$3,344
Fringe Benefits	340	165	500	160	660
Transportation	195	56	251	465	716
Direct Costs	246	-0-	246	390	636
Indirect Costs	769	382	1,151	570	1,721
Equipment	<u>-0-</u>	<u>178</u>	<u>178</u>	<u>-0-</u>	<u>178</u>
Total	\$3,245	\$1,615	\$4,860	\$2,400	\$7,260

Postharvest Grain Systems

Components By Millions of Dollars
and Percentage



Technology Transfer	\$ 3.000	42 %
Research	2.165	30
Training	1.239	17
Administrative Support	.585	8
Network Building	.240	3

4.4 Method of Implementation - This project will be implemented under a Cooperative Agreement and an Ordering Contract to support a range of bilateral, regional, and global projects to improve postharvest grain systems aimed at reducing postharvest grain losses. The purpose of the Cooperative Agreement is to assist FFGI and KSU to expand its resource base and collaboration with U.S., LDC and international institutions to reduce grain losses after harvest by improving LDC postharvest grain systems and strengthening LDC institutions and staff to implement economically sound and environmentally safe programs in this area. The assistance is intended to strengthen the FFGI to: 1) carry out priority applied research related to postharvest grain systems and provide training opportunities for LDC participants; 2) provide technical advice and assistance on postharvest grain systems; 3) produce and selectively collect and distribute key materials on critical postharvest problems; 4) increase the capability of Postharvest Documentation Services (PHDS); and 5) upgrade the professional staff as regards to French language capability.

The Ordering Contract will be a companion instrument to the Cooperative Agreement to be negotiated with FFGI and KSU to provide A.I.D. with short-term technical and advisory services relating to planning, designing, and evaluating programs and projects concerned with postharvest grain systems. The practical experience gained through this Ordering Contract will be fed directly back into FFGI's program, design, curricula, teaching materials and the research agendas which are developed under the Cooperative Agreement. It is also intended that the occasion for contract work shall arise from work financed under the cooperative agreement. Contract tasks may be identified by the cooperator and approved by Missions and the Office of Agriculture in the course of the FFGI's engagement in institutional strengthening activities or requests may be received directly from the Office of Agriculture, regional bureaus, missions and/or LDCs for assistance. Much of the field work contracted under this contract will be project design and evaluation, field testing in pilot efforts, in-country training and demonstrations of new approaches to postharvest systems and management of agribusiness activities, including marketing.

On April 3, 1985 a cable was sent to all missions describing research, training, technology transfer and networking to be provided under the new agreement with FFGI. While the responses do not indicate a high level of mission 'buy-ins', S&T/AGR still recommends that the level for the Ordering

Contract be set at \$2.4 million because need to address postharvest problems in the LDCs and the growing awareness of these problems at the national level. In addition, at the PID review the Sector Council recommended a higher level for 'buy-in' to accommodate anticipated needs. The \$2.4 million level is for the life of the project, or approximately \$0.5 million annually. A analysis of mission responses to the outgoing cable is attached as Annex X.

5.0 Implementation Plans

5.1 S&T/AGR Project Management Responsibility - This project will be managed by S&T/AGR in consultation with the Sector Council for Agriculture and the regional bureaus, as required. Current A.I.D. staff and procedures are adequate to implement this project. The project manager will spend approximately 75 percent of the time managing the project. Missions and LDC requests for assistance under the Ordering Agreement will be channelled by the regional bureaus and S&T/AGR to FFGI.

The project manager will ensure that the objectives of the project are achieved, will facilitate acquisition of mission requests and funding, monitor project operations, approve certain administrative actions within the project, maintain close liaison with the grantee, and communicate regularly with the Project Coordinator.

Specifically, the project manager will be responsible for the following actions:

- Prepare for FFGI a listing of mission projects related to postharvest grain systems. This list to be updated annually in time to permit FFGI to consider this information in developing the annual work plan.
- Prepare for FFGI a listing of all S&T projects which are related to postharvest grain systems or that the data generated from the projects may be used by FFGI in the development of programs and research.
- Maintain contact with regional bureaus and missions to identify and expedite receipt and response to requests for assistance in postharvest grain systems and other related matters.
- Communicate directly with the Project Coordinator of FFGI on matters related to mission requests or other information required in the performance of the project manager's duties.

32

- Establish liaison with project managers in project areas set forth in Section 3.5 and assist FFGI to develop relationships with project contractors and grantees.
- Approve consultants hired by FFGI under the Cooperative Agreement and the companion Ordering Contract.
- Monitor project operations by assuring that the FFGI reports meet the reporting requirements as set forth in Section 6.1.
- Schedule and coordinate project evaluations.
- Clear travel requests for FFGI professionals travelling to LDCs.
- Approve the annual work plan, including research to be undertaken by the LDC graduate students.
- Monitor progress of the annual work plan and overall program.

5.2 FFGI Management Responsibility and Qualifications

5.2.1 Management Responsibility

The administrative structure of KSU, the Department of Grain Science and FFGI is adequately staffed, and has the expertise, facilities and procedures to design research projects, provide technical advice, disseminate critical postharvest grain systems information, train participants and expand the current network of international collaborators. The management responsibility will rest on the Coordinator of FFGI who will carry out the following functions:

- Work with S&T/AGR project manager to design the annual work plan and obtain final approval prior to implementation.
- Maintain close working relationships and communicate regularly with the S&T/AGR project manager.
- Develop the necessary reporting structure to conform with project reporting requirements.
- Oversee the timely completion of all reports set forth in the reporting requirements section of this project paper.

- Propose for approval by the S&T/AGR project manager new staff persons for FFGI to implement the activities in this project paper.
- Select consultants and secure approval by S&T/AGR and user missions.
- Select and approve graduate students for funding under the cooperative agreement who meet the academic qualifications of KSU and who have been nominated by the staff.

Day-to-day management responsibilities will include, but not be limited to, the following actions:

- Selection and assignment of staff for specific research, technological transfer, training, and network building activities at KSU.
- Selection and assignment of staff for field activities outside of KSU for research, technology transfer, training and network building activities.
- Selection and approval of staff to participate in postharvest training programs, workshops, and seminars sponsored by various national and international organizations and the understanding by all concerned that the selection qualification for these programs, workshops and seminars is contained within network building activities.

5.2.2 Qualifications, including Key Personnel, Facilities and Equipment - Under this project, FFGI's highly experienced, capable and motivated staff will extend the activities being undertaken at KSU to the LDCs. It will direct and coordinate multi-disciplinary activities in scientific research related to postharvest grain losses; and involve scientists from many departments (Agricultural Economics, Entomology, Agricultural Engineering, and Grain Science and Industry and Education) within KSU and associate organizations, institutions and land-grant colleges and universities. A list of key personnel is appended in Annex IV.

Research Qualifications - Areas of developmental and applied research at FFGI are conditioning, handling, storage, processing, marketing and agribusiness development involving cereal and legume grains. This research focuses on problems in LDCs for which few answers are readily available and has created a large base of knowledge and expertise with which to refocus the project on more research oriented activities; i.e., grain drying for small

farmers, weevil infestation of grain, storage properties of grain and legumes, loss measurement, insect and mold susceptibility of millet varieties, alternative postharvest handling systems for rice, postharvest deterioration of rice and feed processing plant design and analysis. A list of completed and current research activities implemented by the FFGI staff is appended in Annex V.

Technology Transfer Qualifications - Under technology transfer, FFGI has provided technical transfer and information services and problem solving assistance to LDCs since 1967. To aid in the dissemination of technical transfer and information, the Postharvest Documentation Service (PHDS) was established in August 1978. The NAS Bibliography on Postharvest Food Losses in Development Countries which uses a computerized data retrieval system served as a nucleus for this service. PHDS collects information on all phases of harvesting, storage, processing, distributing and marketing of grains for dissemination to existing and to new grain handling systems in the LDCs.

Training materials are updated on a regular basis, and new manuals, audio-slide units, and other forms of information are produced, as required. Training materials have been developed for each of the training courses undertaken in the training activities listed in Annex VI.

Under technical transfer, A.I.D. has used scientists and experts from KSU to assist LDCs in solving problems related to postharvest losses. Over the past 15 years, FFGI has responded to 112 requests from 48 countries for technical advice dealing directly with problems in grain storage, handling and marketing. Countries involved and types of assistance are listed in Annex VII.

Training Qualifications - KSU initiated a variety of training programs to meet the needs of the participating LDCs. In 1970 the annual Grain Storage and Marketing Short Course was initiated for 16 Latin American participants and held over a three-week period. Presently the course runs for 7 weeks with an average of 30 - 40 participants. To date 376 participants from 70 countries have attended this course.

To further accommodate the training needs in LDCs, the FFGI provided in-country training courses to meet the needs of the missions. In this area, FFGI staff has presented courses for 1,220 participants in 19 countries. A more detailed statement of training activities is appended as Annex VI.

The demand for training at KSU leading to BS, MS and PhD graduate level continues to grow. Within the last 10 years, 43 students from 18 LDCs have received degrees in grain storage technical areas and in grain marketing economics. Three KSU graduates are on FAO's field staff and one is stationed in Rome.

KSU has the capacity to increase the number of participants for academic and technical training if additional funds are made available under the Cooperative Agreement and/or the Ordering Contract.

Other Special Assistance - Special on-campus, non-degree programs have also been provided for 17 scientists from 5 LDCs. These were undertaken at mission requests and especially designed to meet specific needs of the participants.

Networking and Linkage Qualifications - Under the previous project, FFGI became an active member of GASGA and participated in SEARCA activities. However, the postharvest systems network constructed and utilized by FFGI is far greater than these two organizations. To maximize the use of limited resources and avoid duplication, the FFGI developed a network system that includes interdisciplinary linkages within the university and working relationships with IGP and its affiliated organizations. Cooperative research was undertaken with the USDA Grain Marketing and Research and the AIB. Collaboration was initiated with other universities and private sector industry; membership in GASGA was established; past and on-going specific postharvest projects in LDCs were initiated; cooperation was initiated with CIGRAS, CNP and IICS on postharvest problems; and new linkages have been established with CARE, CRS and certain educational institutions in LDCs. A detailed description of the linkages used and existing relationships created by FFGI in Postharvest Grain Systems is appended in Annex VIII.

To further expand FFGI's network building activities, the same approach as in the past must be followed. It must be understood that to maintain a successful postharvest grain systems network, FFGI must rely on leadership, the prospect of mutual benefit to the participants, persuasion and support activities to exercise management and quality control and cooperation and coordination. Therefore, innovative and indirect measures such as special purpose working groups, field visitations, collaborative progress reviews must be installed to obtain a reasonable amount of management control over collaborative research, technology transfer and training activities in this network.

5.3 Country Selection Criteria - While it is not possible at this time to schedule country activities, Section 1.1.2 identifies certain countries which are possible candidates for assistance. In order to assure that FFGI responds to requests from countries who have the greatest need and to efficiently and effectively utilize the highly qualified staff at FFGI, it is necessary to establish criteria on which to base the selection and priority of activities to be undertaken. There follows an illustrative listing criteria which may be considered for providing assistance in collaborative research efforts, training, technology transfer, demonstrations of improved methods and network building.

- A strong Mission agriculture program with an interest in, and available resources for, postharvest activities as defined in the missions' Country Development Strategy Statements.
- LDC interest in, and available resources for, postharvest activities.
- Regional Support Offices that have expressed interest in postharvest activities; e.g., REDSO/EA, REDSO/WA, ROCAP and SADCC.
- Technical considerations; e.g., crops involved, postharvest problem definition and ecological zones.
- Past FFGI experience in the requesting country and known problems and available counterparts to assist in the scope of work.

5.4 Schedule of Project Events

5.4.1 Scope of Work for Five Years - Specific activities under this project will include, but are not limited to the following:

Applied research covering problems of postharvest grain systems in LDCs will be undertaken by the recipient to reduce losses in the humid and arid tropics at small farm and agribusiness level. This research activity will encompass, but not be limited to, the following areas:

- Drying, conditioning, handling, storage, and processing technologies - grain drying systems using non-fossil fuels, small farm storage structures, and systems for conditioning, handling, storage and processing.
- Quality Grain preservation practices -- pest ecology, distribution, concentration, and migration patterns; the use of natural pesticides and predators and chemical control techniques; and grain quality deterioration in storage.
- Marketing and Agribusiness Development -- Research in marketing systems will include identifying and evaluating domestic grain marketing systems in LDCs; determining the nature, pattern, magnitude, and causes of losses and inefficiencies under various systems of post-production technology and management; isolating and measuring factors that explain the choice of marketing channels and procedures in grain post-production systems; and defining domestic policy implications of the research findings. Research in food security issues will include determination of how systems of stabilizing trade and food grain security reserves would have worked or will work in stabilizing supply quantities within targeted projections. Research in price and market policies will include price analysis, price and production relationships, and evaluation of results of market policies.
- LDC graduate students sponsored under the Cooperative Agreement will undertake research in areas which lead to reduction in postharvest grain losses in LDCs.
- Research and loss assessment studies in collaboration with LDC research institutions in cost-effective methods of grain conditioning and storage practices, processing techniques and marketing approaches.

Technical Transfer and Information Services which will provide for the dissemination of appropriate technology and other postharvest information. Such activities will include:

- **Postharvest Documentation Service (PHDS)** -- The recipient will operate and expand a centralized source of information on cereal and legume grain postharvest systems for AID and its Missions, LDC researchers and agencies, and regional and international institutions. A computerized data base of postharvest literature which is the core of the system will be continually updated and expanded. PHDS will provide subject matter searches of its data base with printouts of title and/or abstracts. Microfiche or paper copies of articles will be made available.
- **Research Findings** will be published and disseminated to Missions, scientists in national, regional, and international institutions. Also improved techniques in conditioning, handling, storage and processing of grains will be demonstrated in LDCs.
- **Training Materials** will be developed and disseminated to Missions, LDC institutions, and participants for training.
- **Problem Solving Assistance** -- Under the companion Ordering Contract, the FFGI will provide staff to respond to requests from Missions, regional bureaus, LDCs, and S&T/AGR in the following areas: prefeasibility and feasibility studies; project design and evaluation; marketing studies; assessment, evaluation, economic analysis and technical studies. Recommendations will be made for the improvement of postharvest system; i.e., in grain conditioning, handling, storing, processing, and marketing processes which are especially designed for small farmers and agribusiness enterprises.
- **Training** will include both academic training at KSU and technical training at KSU and in-country. The activities will include:
 - A short course (7 weeks) in grain storage and marketing will be conducted annually at KSU. This course is designed and updated to train operating personnel, managers, and mid-level LDC professionals.
 - In-country and KSU short courses, workshops, and seminars of three days to six weeks duration will be conducted upon request. These training courses will be designed to address specific problem areas in grain postharvest systems in the LDCs.

- Training programs involving special needs will be conducted upon request, such as training-of-trainers courses, training programs for decision-makers, specifically designed for problem identification related to postharvest grain losses, and in-service and on-the-job training at operational levels. These training sessions will be conducted either in-country or at KSU depending upon the specific need and request for training assistance. A basic training course, utilizing audio-visual techniques, will be developed for use by participant trainees under the training-of-trainers course.
- Long-term graduate level training of LDC students will be conducted at KSU on the disciplines of grain science, agricultural engineering, entomology, and agricultural economics.

Network building will include expanding existing and creating new relationships as follows:

- The FFGI will continue to maintain its membership in GASGA and will actively participate in GASGA meetings, activities, and programs.
- The FFGI will establish collaborative linkages with international, regional, and LDC institutions for the purpose of research, technology transfer, and training activities.

5.4.2 Annual Work Plans will be submitted by the FFGI to S&T/AGR for approval each project year. The first work plan will correspond with KSU's fiscal year and will cover the period September 30, 1985 to June 30, 1986. It will be submitted not later than 30 days after signing of the cooperative agreement. Thereafter, annual work plans will be submitted not later than 60 days prior to the end of KSU's fiscal year and will cover the reporting period July 1 to June 30.

This annual work plan will include, but not be limited to, the following contents:

- A list of activities to be undertaken during the year, categorized by project component.
- The number and description of each activity listed.
- The projected beginning time frame for execution of the activity.

- The projected ending time frame for completion of the activity.
- The projected expenditure of person-months of input for each activity
- The projected stage of activities at the end of the work plan or the projected output at the end of the work plan.
- Specific qualifications which may be required for certain activities given that many of the activities within the project are predicated on the amount of Mission funding which will be obligated for project activities.
- Attachments to the work plan as may be required which can include, but not be limited to, PERT charts, specific activity reports, and time qualifications conditions.

FFGI will develop the annual work plan since it is a working document to guide the operations and achievements expected from the project.

S&T/AGR will review the contents of the work plan submitted, ask for points of clarification, if required, and grant final approval of the contents as proposed or modified by agreement between FFGI and S&T/AGR. This process of review and approval will be completed not later than 30 days after receipt of the original work plan from FFGI.

5.4.3 Projected Person-Months of Effort - Projected person-months of effort by project component are described in Table 3 on page 34. Under the Cooperative Agreement, 259.5 person-months of services will be provide for technology transfer, 220.0 for research, 161.5 for training and 17.5 for network building and 103.5 for administrative support. As indicated on page 4 of Annex IV, of the 152.4 annual person-months to be funded under the Cooperative Agreement, 70.8 will cover professional staff, 29.8 will cover support staff, 36.0 is for graduate students and 15.8 is for student help.

Mission requirements are projected at 31.0 p/m of effort which will be totally composed of technical staff. KSU's contribution will provide an annual input of 30.8 p/m of effort, including 18.8 p/m of technical staff and 12.0 p/m of clerical staff.

Table 3
Projected Person-months of input
By Core Support, Mission Requirements and KSU Contribution

Component	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY 90</u>	<u>Total</u>
Core Funding						
Research	41.0	41.0	41.0	41.0	41.0	205.0
Technology Transfer	54.9	54.9	54.9	54.9	54.9	274.5
Training	32.3	32.3	32.3	32.3	32.3	161.5
Network Building	3.5	3.5	3.5	3.5	3.5	17.5
Adm. Support	<u>20.7</u>	<u>20.7</u>	<u>20.7</u>	<u>20.7</u>	<u>20.7</u>	<u>103.5</u>
Total S&T/AGR Funding	152.4	152.4	152.4	152.4	152.4	762.0
Mission Funding	<u>31.0</u>	<u>31.0</u>	<u>31.0</u>	<u>31.0</u>	<u>31.0</u>	<u>155.0</u>
Total A.I.D.	183.4	183.4	183.4	183.4	183.4	917.0
KSU	<u>30.8</u>	<u>30.8</u>	<u>30.8</u>	<u>30.8</u>	<u>30.8</u>	<u>154.0</u>
Total Project	214.2	214.2	214.2	214.2	214.2	1,071.0

6.0 Project Monitoring Plan - Expected project outputs, the annual work plan, specified reports, and project reviews and evaluations will provide the basis for monitoring progress. The monitoring plans cover reporting requirements and project review and evaluation.

6.1 Reporting Requirements - FFGI will submit the following reports containing the contents as specified within the required time frame to assist S&T/AGR in the monitoring of project activities.

- **Trip Reports** - After the completion of each TDY assignment, a trip report will be prepared. This trip report will contain information in the following format: 1) summary of logistical information composed of type of activity, geographical area of activity, dates of TDY, and team composure; 2) summary of objective of TDY including attached scope of work, as appropriate; 3) summary of activities of TDY; 4) summary of technical report resulting from TDY; 5) summary of identifiable techniques or

42

information which could be transferred to other LDCs; and 6) summary of future potential needs of, or opportunities for, assistance to LDCs or Missions, including possible networking potential. One copy of this report will be forwarded to S&T/AGR not later than 30 days after staff member returns to KSU.

- **Annual Activity Reports** - An annual activity report will be submitted to S&T/AGR within 60 days after completion of the KSU fiscal year (July 1-June 30). This report shall contain, but not be limited to, the following: 1) a summary of research projects and activities being conducted under and in conjunction with this project; 2) a summary of technological transfer activities conducted under and in conjunction with this project; 3) summary of training activities undertaken under and in conjunction with this project; and 4) a summary of network building activities. Appropriate annexes will be attached as required to detail the preceding areas. In addition, PHDS will report on the number of acquisitions obtained, documents added to the data base, publications and reports disseminated and the number of requests for assistance received. Staff time will be devoted to specific project components will be reported. This annual activity report will be forwarded to S&T/AGR in five copies.

- **Technical and research reports** - These reports will be prepared as a result of technical advice and research activities and will contain technical or research information vital to the successful transfer between and among LDCs with similar environments and problems. Journal articles and other external publications growing out of project activities will also be reported under this requirement and will be formatted according to standard citation procedures, to clearly highlight publisher, date, authorship and precise title of work. Time limitation for final publication of any such report is 60 days from the completion of all work required to produce such reports. Upon completion of research or technical transfer activities, copies of the reports will be forwarded to the requesting mission in quantities specified in the appropriate scope of work. In addition, seven copies of the reports will be forwarded S&T/AGR/AP project manager for distribution to members of the Sector Council Subcommittee. In addition, FFGI may distribute copies of technical and research reports depending on their nature and anticipated use to other Missions, LDC agencies, and regional and international organizations and institutions.

- **Annual expenditure reports** - FFGI will submit annual expenditure reports by project component category and sub-category as defined in the scope of work. The format will be collaboratively developed by S&T/AGR project manager and FFGI.

- **Impact analysis report** - An annual report will be submitted as an adjunct to the annual activity report and which will summarize the impact of FFGI activities in the postharvest grain sector. As recommended by the evaluation team for the current project, this will provide a feed-back system for measurement and evaluation of the impact of services and training provided. The impact analysis is herein defined as a measurement of results generated by activities undertaken by FFGI in accordance with the project description in the project paper and the scope of work in the cooperative agreement. That the analysis will be strictly the direct measurement of FFGI activities and not the end of project status objectives. Qualifications are that, for the most part, the impact analysis will be qualitative in nature with only quantitative factors supplied as appropriate. The analysis will cover activities to be undertaken in this project if such can so be measured without the extra expenditure of project funds. Prior project activities (1981-85) will be included if activities under the current project lend the opportunity to measure such past actions without extra expenditures of project funds. Once an individual activity is measured, then it will be deleted from further consideration. This report will be submitted in five (5) copies to S&T/AGR within 60 days after the end of the KSU fiscal year.

- **No other reports** - will be required of FFGI unless such requests are submitted no later than 90 days prior to need by S&T/AGR.

6.2 Project Review and Evaluation - Annual Management Reviews will be undertaken by the project manager in consultation with FFGI, Missions, regional bureaus and other institutions, as appropriate. Since such reviews may involve visits to FFGI or specific LDCs, the review process will be funded by S&T/AGR. Such annual reviews will be undertaken after submission of the annual reports as described in Section 6.1. The annual reports (activity and impact) will become an integral part of the review process.

Indepth evaluations will be scheduled during the second and fourth year of implementation. These evaluations will be conducted by a team of experts in postharvest systems and will include, but not be limited to, the following:

- Determining the effectiveness of the project by looking at the impact this project has had on removing constraints causing postharvest losses in the LDCs.
- Examining the methodologies used for completing the outputs.
- Highlighting unforeseen internal or external factors that have specific adverse or beneficial impact on postharvest grain systems.
- Determining whether technology is being successfully transferred to the LDCs, national and international organizations and institutions.
- Examining alternative approaches to improving postharvest systems in LDCs.
- Determining if expenditures correspond to the scope of work as defined in the annual work plan.
- Recommending appropriate changes in the project work plans and to chart the future course of action.

The S&T/AGR project manager will be responsible for arranging and coordinating project evaluations with FFGI 90 days prior to the scheduled evaluation. FFGI will cooperate with S&T/AGR in preparing the necessary documentation, financial accounts, and staff time records, as requested by S&T/AGR, to assist the evaluation team. S&T/AGR will fund all evaluations.

7.0 Project Analysis

7.1 Financial and Economic Analysis - The following considerations are relevant to this project: 1) whether investments in reducing postharvest grain losses are economically justified, and 2) whether the project design is the most appropriate and efficient use of scarce resources in terms of achieving the project goal.

7.1.1 Justification of Investments - Increasing the world's food supply becomes an ever-more-urgent priority as the global population continues to grow. A cost-effective method of increasing food supply without increasing production is to reduce the food losses that occur between harvest and

consumption. Reliable current postharvest loss data are lacking, but the consensus among experts (i.e., UNEP) indicates that approximately one-third of the world's annual food production is lost after harvest. UNEP's data places losses of cereal grains as high as 40 percent in some countries. However, the average would be somewhat lower. With respect to rice, in 1974 the losses in the Philippines ranged from 10 to 37 percent from harvest to milling, while a 1981 study places the losses of rice in Bangladesh at approximately 7 percent. In 18 selected countries postharvest losses of paddy rice were estimated at between 9.5 and 10.1 million tons per year with a concomitant value of between \$1.9 and \$4.02 billion at a cost of \$200 per ton.

It is believed among experts that even a slight reduction in the above losses will provide returns far higher than the expenditures involved. It is also evident that a need for specific on-site measurement of losses is needed in order to more effectively allocate resources to technological interventions. As part of the research effort under the project, specific cost-benefit analyses will be conducted to estimate the economic benefits resulting from project interventions. These results will be used subsequently as a basis for investment decision making.

Overall, only an appraisal can be made of the economic rate of return of research and development action directed towards development in postharvest grain systems. First, research and development actions due to their very nature are the type of actions which generate extremely long-run returns due to investment in research and development. Second, it is extremely difficult to isolate and measure the benefits of research and development investment separately from other investment in agricultural processes. Limited analysis of returns to agricultural research investment in the U.S. reveals a long-run rate of return on that investment of approximately 45 percent. It would be expected that the long-run rate of return due to investment in the postharvest grain systems R&D projects would be substantially higher than the U.S. rate of return. This would be due to larger near term benefits which can be expected and the low technical level of market operations in LDCs which can be increased more quickly.

7.1.2 Efficient Use of Scarce Resources - The focus of this project is research, technology transfer, training, and network building, designed to reduce postharvest cereal and legume grain losses. It provides the most

cost-effective means of solving problems in postharvest losses by drawing on a reservoir of experts and scientists from the Departments of Agricultural Economics, Entomology, Agricultural Engineering, and Grain Science and Industry at KSU to meet the needs of Missions, cooperating countries, and international institutions, as required. It provides a mechanism for enhancing the abilities of the LDC public and private sectors to address postharvest loss problems and upgrade the skills of LDC scientists working in this area.

The research and technological advancements developed and promoted by this project will benefit LDC producers and consumers from the farm level upwards. In addition, reduction in food losses will increase the supply of cereal and legume grains for the local economy and reduce the need to import food thus saving foreign exchange.

In choosing the most efficient design for the project, various alternatives were considered and rejected. One obvious alternative would be to take no action to solve problems in postharvest grain losses. In light of the huge losses and growing demand for food, this alternative was rejected outright. Other alternatives would be: 1) to increase production, or 2) to construct more physical infrastructure. With regard to the first, i.e., increased production, the high costs of bringing marginal land into production would not justify the expenditure of AID's resources, and it still would not solve the problem of proportionate losses. Additionally, the process is occurring naturally, as producers make decisions to expand production based on market forces. In many countries, with regard to the construction of more physical infrastructure such as silo, there exists considerable under or unutilized capacity for grain storage, and in many instances it may be more appropriate for the private sector than government to invest in physical infrastructure. Indeed, in both the case of expanded production and infrastructure, the postharvest loss problem is not solved and is made all the more urgent.

In conjunction with the overall research, institution building and training rubric, various courses of action will be open. One approach is to leave the responsibility for the process of project design and implementation to the various missions to undertake. This approach would be inefficient in that such discrete efforts would be more costly and duplicative, and there would be little opportunity for the flow of information and sharing of research

results which a centrally funded project provides. Another alternative would be to choose various private or public organizations, each one with a high level of expertise in its field. This approach would result in a fragmented effort with less informational flow than would be the case with the proposed alternative, and there would be little or no economies of scale resulting from a common effort. Additionally, in many countries there would be little economic justification for a highly specialized local cadre of technicians due to a relatively thin resource base.

From the above justification, it is determined that the proposed research and technology transfer approach through the KSU mechanism is the most cost/effective use of limited resources, based on KSU's predominant capability in postharvest technology disciplines, its long experience in international development, and its capacity to support in-country research and training, while facilitating the flow of new technology from the U.S. to the LDCs.

7.2 Social-Cultural Considerations - Physical, social, cultural, economic, institutional, and political conditions vary greatly among LDCs. It is therefore essential that the research, technology transfer, and training provided by FFGI reflect the desires and resources of those countries and their rural farmers. This calls for a case-by-case evaluation of the appropriateness of technology being transferred. However, there are several levels of people and institutions regardless of what country is involved, that will benefit directly or indirectly from this project.

7.2.1 LDC and International Researchers - LDC and international researchers who participate in KSU, regional and in-country workshops and training and graduate level courses will upgrade their skills and expand their professional contacts through international networking activities. In addition, their sponsoring institutions and organizations will also benefit from the knowledge gained by the researchers which will increase their ability to recognize postharvest grain loss problems and enhance their skills to solve these problems.

7.2.2 National Level Benefits - Benefits at the national level will also include increased food security, self-reliance and conservation of limited foreign exchange reserves as reduction in postharvest food losses reduces the need for grain imports.

7.2.3 Farmers and Marketers - The individual farmers and marketers who participate in the program or who are reached by the extension workers (trained under the training-of-trainers program) will realized additional income from the grain saved by putting into practice improved *postharvest* conditioning, storage, and processing techniques.

7.2.4 Laborers, Private Investors, and Local Institutions - Lastly, the consumers, laborers, private investors, and local institutions will also benefit from improved technology made available to them through the project.

7.3 Administrative Analysis - As noted in Sections 5.1 and 5.2 this project can be implemented successfully by both S&T/AGR and the FFGI. While the evaluation of the current project made constructive criticism for redirection of activities under this project, the evaluation confirms the ability of FFGI to manage postharvest grain systems development activities. FFGI has been involved in in these activities since 1967. The personnel and procedures required for administering the cooperative agreement are well established and are functioning extremely well.

Further, this project paper presents in detail within the implementation plans, the necessary management responsibilities of both S&T/AGR and FFGI for project management. Sound administration of the project is further assured by project monitoring plans set forth in Section 6.0.

7.4 Technical Analysis - The FFGI was established in 1966. Since its inception, FFGI has amassed large amount of experience in providing research results, technical information, problem solving services, and training to cooperating countries. The Staff consists of 22 key personnel with varied technical backgrounds enabling the FFGI to provide the technical services requested by developing nations for postharvest grain loss reduction. In addition, other KSU personnel are available for professional consultation with FFGI staff and frequently travel to cooperating countries under other AID contracts. Research, technology transfer, training, and network building activities are established and functioning as setforth in Sections 5.2.2 and Annexes III, IV, V, VI, VII, and VIII. Over the past 18 years, FFGI has become a comprehensive U.S. source of expertise in postharvest grain systems, capable of servicing the diverse needs of the developing countries. KSU is a research and educational institution which has provided AID with a professional staff with world wide experience and competence to assist in reducing postharvest cereal and legume grain losses in developing countries.

7.5 Environmental Analysis - The Initial Environmental Examination (IEE) recommended a negative determination. The Environmental Threshold Determination (ETD) is based on this negative determination and recommends that approval be given to proceed with this project as the "Proposed Agency action is not a major Federal action which will have significant effect on the human environment". The IEE and ETD are attached as Annex IX

IRC:5/31/85

50

REFERENCES

NAS, 1978. Postharvest food losses in developing countries. U.S. National Academy of Sciences, Washington, D. C.

UNEP, 1983. Guidelines for Postharvest Food Loss Reduction Activities. United Nations Environment Programme.

GREELEY, M. 1981. Farm-level rice processing in Bangladesh: food losses, technical change and future research. Paper presented at the 4th SEARCA Annual Workshop on Grains Post Harvest Technology held January 1981 in Manila.

ANNEX I

LOGICAL FRAMEWORK

ANNEX I

POSTHARVEST GRAIN SYSTEMS - R & D

LOGICAL FRAMEWORK

FFGI/IRC:4/23/85
UPDATED:IRC:5/30/85

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project:
From FY 85 to FY 90
Total U.S. Funding \$5,645,000
Date Prepared: April 22, 1985

Project Title & Number: Postharvest Grain Systems R&D 936 4144

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: 1.2 Goal</p> <p>To increase the availability of cereal and legume grains to improve human nutrition and productivity</p>	<p>Measures of Goal Achievement:</p> <ol style="list-style-type: none"> 1. Farmers have more grain to sell 2. More grain reaches market or distribution points 3. Consumers have more food to eat 4. Imports of cereal and legume grains are reduced 	<ol style="list-style-type: none"> 1. 2. Marketing surveys & on-site inspections of markets & farms 3. National health reports, and household budget surveys and national census data 4. Trade data 	<p>Assumptions for achieving goal targets:</p> <ul style="list-style-type: none"> - LDCs will have the necessary information and data collection systems to measure changes - LDCs will institute or retain policies to provide incentives to farmers and marketers to reduce grain losses - LDCs will adopt policies which facilitate marketing functions - Processors and handlers of grain will assure that these products reach the market places - Farmers will market their grains
<p>Project Purpose: 1.3 Purpose</p> <p>To improve the capability of LDC's to reduce postharvest cereal and legume grain losses</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> 1. Reduction in postharvest grain losses during storage, processing and marketing 2. Researchers and LDC agencies are cooperating to extend information to farmers and marketers 3. Improved storage and handling management at all marketing levels 4. Farmers and marketers are more capable of taking the necessary steps to reduce losses 5. Simple grain dryers in use in certain LDC's 6. KSU trained participants holding important positions in the LDC, public and private sectors and international organizations 	<ol style="list-style-type: none"> 1. Loss reduction studies 2. Technical and economic report from LDC ministries and research institutions 3. Food reserve statistics from national and international institutions 4. 5. Site visits by project personnel 6. Reports from KSU/FFGI 	<p>Assumptions for achieving purpose:</p> <ul style="list-style-type: none"> - National, regional and global institutions will request services from FFGI & disseminate all types of information to researchers, agencies, marketers & farmers - National & International researchers will cooperate with FFGI - Public & private grain storage facilities will accept changes in grain storage techniques and management - That information extended to farmers and marketers by LDC agencies fits the particular needs of farmers and marketers - Trained personnel will return to their home countries to work in postharvest areas

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 90
Total U.S. Funding \$5,645,000
Date Prepared April 22, 1985

Project Title & Number: Postharvest Grain Systems R&D 936-4144

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Output 2.1 Research</p> <p>1. Methodologies for drying grains using non-fossil fuels for small farms and agribusiness enterprises</p> <p>2. Methodologies for conditioning, handling, storage and processing of small farms and agribusiness enterprises</p> <p>3. Applied research projects directed towards the development of practical methods of quality preservation in LDCs and applicable to small farms and agribusiness enterprises</p> <p>4. Applied research in marketing systems, food security programs, price and market policies and agribusiness development</p> <p>5. LDC graduate students performing research at KSU and their respective institutions</p> <p>6. Collaboration with LDC research agencies in development of cost effective technologies in grain conditioning, storage, processing and marketing and in performing loss assessment studies</p>	<p>Magnitude of Output:</p> <p>1. Two (2) LOP</p> <p>2. Four (4) LOP</p> <p>3. Six (6) LOP</p> <p>4. Eight (8) LOP</p> <p>5. Fifteen to twenty (15-20) MS and PhD dissertations completed</p> <p>6. Ten (10) research projects and loss assessment studies</p>	<p>1,2,3,4, and 5 - Cable, Mission reports and publications and project evaluations</p> <p>6. Cables, reports and publications from missions, PFGI and LDC agencies</p>	<p>Assumptions for achieving outputs:</p> <ul style="list-style-type: none"> -LDCs need assistance in these areas, LDCs & Missions will submit requests and Missions will fund activities -Missions and LDCs will fund long-term academic training -Mission funding levels as shown in the projected budget will be forthcoming

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 90
Total U.S. Funding \$5,645,000
Date Prepared: April 22, 1985

Project Title & Number: Postharvest Grain Systems R&D 936-4144

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Output: 2.2 Technology Transfer</p> <p>2.2.1 Tech. Transfer & Info Service</p> <ol style="list-style-type: none"> 1. Research findings disseminated to IARCs, LDC agencies, Missions & other Institutions & Organizations 2. Research results demonstrated to LDC researchers, agency employees, extension workers, farmers and agribusinesses 3. Training manuals developed and disseminated, as required 4. Increased capacity of PHDS <p>2.2.2 Problem Solving</p> <ol style="list-style-type: none"> 1. Short- and long-term assistance <ul style="list-style-type: none"> -Feasibility, feasibility and marketing studies -Assessment, evaluation & recommendations in PHGSs improvement -Recommendations designed for small farmers & marketers for grain conditioning in storage, handling, processing, & marketing processes -Evaluation of economic and technical studies & proposals 	<p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> 1. 30 Res. Publications and instructional manuals disseminated LOP including pesticide handling 2. Five (5) LOP 3. Five (5) LOP 4. LOP increases: <ul style="list-style-type: none"> Acquisitions: 75% increase Clients : 40% increase Requests : 50% increase <p>1. Fifty (50) LOP To be funded primarily under the companion ordering contract</p>	<p>-Correspondence, trip reports FFGI reports, publications & manuals</p> <p>Correspondence, trip reports FFGI reports, publications and manuals</p>	<p>Assumptions for achieving outputs:</p> <ul style="list-style-type: none"> -LDCs need assistance in these areas -LDCs and missions will submit requests and missions will fund activities -Missions and LDCs will fund long-term academic training -Mission funding levels as shown in the projected budget will be achieved since magnitude of outputs will decline drastic without mission funding <p>same as above</p>

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Postharvest Grain Systems R&D 936-4144

Life of Project:
From FY 85 to FY 90
Total U.S. Funding \$ 5,645,000
Date Prepared: April 22, 1985

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs: 2.3 Training</p> <ol style="list-style-type: none"> Annual 7-week grain storage and marketing short course for a maximum of 35 participants annually In-country and KSU short courses, workshops and seminars of 3 days to 6 weeks Short-term in-country and/or KSU training of trainers courses. Development of basic training courses using slide tapes and/or audio visual tapes for use by participant trainers under the training-of-trainers courses Short-term training courses for decision makers In-service and on-the-job training at operational levels within the ministries of agriculture, LDC public and private organizations and institutions Long-term academic training of graduate students at KSU <p>2.4 Networking</p> <ol style="list-style-type: none"> FFGI will continue active membership in GASGA Continue collaborative research technology transfer or training linkages with international and regional institutions and establish new linkages; e.g., IICA, IRRI, CIMMYT, ICARDA, REDSO/W & REDSO/E Continue collaborative research technology transfer or training linkages with LDC institutions and establish new linkages; e.g. CEGRAS, CNP, IMA, and IBMA in LA, and UPCA in Philippines and FCRI-Bogor in Indonesia in Asia 	<p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> Five (5) LOP Ten (10) LOP Five (5) LOP Two (2) LOP Two (2) LOP Two (2) Activities LOP Twenty-five to Thirty (25-30) MS and Phd dissertations completed Active participation by FFGI in GASGA activities Two (2) new linkages and continue on-going activities LOP Three (3) linkages and continue on-going activities LOP 	<p>1,2,3,4, and 5. Copies of training courses, FFGI Reports and mission reports</p> <p>6.FFGI, mission reports and research publications</p> <p>7.FFGI, mission and LDC reports</p> <p>-FFGI, IARCs, and LDC agencies and mission reports and project evaluations</p>	<p>Assumptions for achieving outputs:</p> <ul style="list-style-type: none"> -LDC participants are receptive to change -LDC participants can complete courses or degrees -LDCs need assistance in these areas -Missions will submit requests and will fund activities -Missions will fund long-term academic training -Missions funding levels as shown in the budget will be achieved <p>-National, regional and Global institutions are interested in collaborating with FFGI in conducting research and sharing results and other information on postharvest grain systems</p> <ul style="list-style-type: none"> -That funding is available from missions, LDC or other sources to pursue activities in collaboration with such institutions -Contacts will strengthen the postharvest loss network -Part of KSU project contribution will be directed toward this activity

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 85 to FY 90
Total U.S. Funding \$5,645,000
Date Prepared: April 22, 1985

Project Title & Number: Postharvest Grain Systems R&D 936-4144

NARRATIVE SUMMARY

OBJECTIVELY VERIFIABLE INDICATORS

MEANS OF VERIFICATION

IMPORTANT ASSUMPTIONS

Postharvest Grain Systems R&D
Projected Activities Budget FY 1985 thru FY 1989
(\$1,000)

Activities	FY 85	FY 86	FY 87	FY 88	FY 89	Total
Research	173	175	186	197	209	940
Technology	237	239	253	268	285	1,282
Training	90	90	96	101	107	484
Network Building	30	30	32	34	36	162
Administrative Support	70	70	74	79	84	377
S&T/AGR	600	604	641	679	721	3,245
Mission Funding	480	480	480	480	480	2,400
Total AID	1,080	1,084	1,121	1,159	1,201	5,645
KSU	300	300	310	330	359	1,619
Total Project	1,380	1,384	1,431	1,489	1,560	7,264

Postharvest Grain Systems R&D
Projected Man-Months By Activity
Person Months

Core Funding Activities	FY 85	FY 86	FY 87	FY 88	FY 89	Total
Research	41.0	42.5	44.0	45.5	47.0	220.0
Technology Transfer	54.9	53.4	51.9	50.4	48.9	259.5
Training	32.3	32.3	32.3	32.3	32.3	161.5
Network Building	3.5	3.5	3.5	3.5	3.5	17.5
Administrative Support	20.7	20.7	20.7	20.7	20.7	103.5
Total (S&T/AGR Funding) ¹	152.4	152.4	152.4	152.4	152.4	762.0
Mission Funding ²	31.0	31.0	31.0	31.0	31.0	155.0
Total AID Funding	183.4	183.4	183.4	183.4	183.4	917.0
KSU ³	30.8	30.8	30.8	30.8	30.8	154.0
Total Project	214.2	214.2	214.2	214.2	214.2	1,071.0

¹ Comprised of 56.4 m/m Technical Staff, 19.3 m/m Support Staff, 25.3 m/m Support Staff, 36.0 m/m Graduate Students, and 15.6 m/m Student Employees.

² Comprised of 31.0 m/m Technical Staff equivalent.

³ Comprised of 18.8 m/m Technical Staff and 12.0 m/m Support and Clerical Staff.

- Obligation & Expenditure documents & reports, AID & KSU
- FFGI reports and KSU records
- Site inspection by project officer and/or evaluation team.
- KSU monthly time sheets

Assumptions for providing inputs:

- Funding will be forthcoming on the scheduled obligational dates by KSU and S&T/AGR
- Mission funding levels will be achieved
- Missions will request assistance and fund the requests
- KSU will maintain the current monthly time sheet system.
- KSU will be able to provide the assistance

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Postharvest Grain Systems R&D 936-4144

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Input: Composition of Core Staff and Person-Months</p> <p>Coordinator Economists Engineers Storage Specialists Technical Support Clerical Support Graduate Students</p>	<p>Implementation Target (Type and Quantity)</p> <p>8.4 Person-Months per year 18.0 Person-Months per year 18.0 Person-Months per year 14.4 Person-Months per year 19.2 Person-Months per year 38.4 Person-Months per year 36.0 Person-Months per year 152.4 Person-Months per year</p>	<p>Reports from FPGI</p>	<p>Assumptions for providing inputs:</p>
<p>KSU equipment and facilities</p>	<p>Milling complex, research laboratories, laboratory equipment, Office Space and equipment, classrooms and conference space.</p>	<p>KSU inventory and records</p>	<p>People are available</p> <p>KSU will continue to maintain this complex</p>

52

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE

A

A ADD
C CHANGE
D DELETE

PP

2. DOCUMENT CODE
3

3. COUNTRY ENTITY DS/AGR/AP
Type c Field Service

4. DOCUMENT REVISION NUMBER

5

5. PROJECT NUMBER (7 digits)

931-0786

6. BUREAU/OFFICE

A. SYMBOL **DSB** B. CODE **180**

7. PROJECT TITLE (Maximum 40 characters)

Improvement of Postharvest Grain System

8. ESTIMATED FY OF PROJECT COMPLETION

FY **85**

9. ESTIMATED DATE OF OBLIGATION (for 5-year ext)

A. INITIAL FY **80** B. QUARTER **4**
C. FINAL FY **85** (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	877		877	5614		56
(GRANT)	(877)	()	(877)	(5614)	()	(56)
(LOAN)	()	()	()	()	()	()
OTHER U.S.	1.					
	2.					
MOST COUNTRY						
OTHER COUNTRIES						
TOTALS	877		877	5614		56

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		e. Thru 9/30/79		h. 1st FY 80		k. 2nd FY 81	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) ARDN	172	010I	-	4790	-	877	-	1061	-
(2)									
(3)									
(4)									
TOTALS				4790	-	877	-	1061	-

A. APPROPRIATION

n. 3rd FY 82

o. 4th&5th 83&84

LIFE OF PROJECT

12. IN-DEPTH EVALUATION SCHEDULE

	n. 3rd FY 82		o. 4th&5th 83&84		LIFE OF PROJECT	
	P. GRANT	Q. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN
(1) ARDN	1205	-	2471	-	10,404	
(2)						
(3)						
(4)						
TOTALS	1205	-	2471	-	10,404	

MM . YY
09 82

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 1 = NO
2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE

Donald Fiester
Director, DS/AGR

DATE SIGNED

MM DD YY

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

60

TABLE OF CONTENTS

FACE SHEET	PAGE
I. PROJECT SUMMARY AND RECOMMENDATION-----	1
A. Recipient and Implementing Agent-----	1
B. Total Cost of Grant-----	1
C. Description of Project-----	1
D. Purpose of Project-----	1
E. Beneficiaries-----	1
F. Feasibility Findings-----	2
G. Recommendation-----	2
II. BACKGROUND AND PROJECT DESCRIPTION-----	3
A. Background-----	3
B. Project Description-----	3
1. Institutional Capacity-----	4
a. Research-----	4
b. Information and Training Materials-----	4
c. Cooperation with the University of Costa Rica-----	5
2. Outreach Activities-----	5
a. Training Programs-----	5
b. In-Country Technical Assistance-----	6
c. GASGA Representation-----	7
III. SPECIFIC ANALYSES-----	7
A. Economic Analysis-----	7
1. Alternatives for Achieving Goals-----	8
2. Justification of Postharvest Grain Loss Reduction-----	8
B. Social Soundness Analysis-----	10
C. Technical Analysis-----	11
1. Introduction-----	12
2. FFGI Suitability-----	12
a. Research-----	12
b. Information-----	12
c. Training-----	12
d. Technical Consultants-----	13
e. GASGA Representation-----	13
f. Cooperative Research-----	13
3. Cooperating Countries-----	14
4. Spread Effects-----	14
D. Administrative Analysis-----	14
E. Project Officer's Role-----	15
F. Environmental Analysis-----	15
IV. FINANCIAL PLAN-----	16
V. IMPLEMENTATION-----	17
VI. OVERALL PROJECT EVALUATION-----	18

61

TABLE OF CONTENTS
(Continued)

VII. ANNEXES-----19

A. Logical Framework-----19

B. Social Soundness-----22

C. Professional-Non Professional Person-Months
Requirements by Activity and Year-----24

D. Project Activity Funding Levels-----25

E. KSU/AID Cost Sharing-----26

62

IMPROVI

I. PROJECT SUMMARY AND RECOMMENDATION:

- A. Recipient and Implementing Agent: Food and Feed Grain Institute (FFGI) of Kansas State University
- B. Total Cost of Grant: \$5,614,000 (Five million six hundred fourteen thousand)
- C. Description of Project: The grant money will be used to extend the existing "Improvement of Postharvest Grain Systems" project (931-0786) for five years. FFGI has been implementing the project since 1967. Project outputs include generation of basic and developmental research to reduce postharvest food losses; provision of information, consultants, and training to participating countries; cooperative research staff, student, and information exchange conducted with the University of Costa Rica; and, when requested, AID/W representation at GASGA (Group for Assistance on Systems relating to Grains After-harvest) meetings by FFGI staff. To date over 45 countries have used FFGI services. Over the next five years the project will refocus its activity toward the reduction of postharvest grain and legume losses of the small farmers.
- D. Purpose of Project: To improve the capability of small farmers, agribusiness, and government agencies in cooperating countries in the design and implementation of improved postharvest systems for cereal grains and pulses.
- E. Beneficiaries: Developing country small farmers, agribusiness, government agencies, and the staff and students of the University of Costa Rica participating in the collaborative research and training exchange with FFGI.

F. Feasibility Findings:

The project has been found to be economically, socially, technically, administratively, environmentally, and financially sound. FFGI has proven its managerial ability over the last 13 years and has performed with excellence. The infrastructure to achieve the project purpose is already established and functioning. The five year Cooperative Agreement with special emphasis on the postharvest problems of small farmers poses no implementation problem. FFGI is eager to assist AID in this project of technical assistance and is willing to refocus its efforts toward alleviating the postharvest grain and legume losses of the poor majority in the developing countries.

G. Recommendation:

Authorization of a grant for \$5,614,000 per the terms specified in this Cooperative Agreement.

LCF

II. BACKGROUND AND PROJECT DESCRIPTION

A. Background

The continuing goal of this project is to reduce postharvest cereal and legume grain losses in Cooperating Countries through improving postharvest systems for small farmers, industries, and government agencies. AID/W and the Food and Feed Grain Institute (also referred to as FFGI or the Recipient) propose, as a pathway, increasing the capability of agribusiness and government agencies to design and implement improved cereal and legume grain postharvest systems appropriate for small farmers.

A National Academy of Sciences' (NAS) study and the United Nations General Assembly have indicated the relative importance and magnitude of the problem postharvest grain losses represent to developing countries. The NAS study suggested that a 50 percent reduction from 1975 levels of postharvest food losses could significantly reduce, and potentially even eliminate the current need for some developing countries to import large quantities of food, particularly cereal and legume grains. The UN General Assembly has targeted 1985 as the date by which to achieve the goal of reducing postharvest food losses by 50 percent over the 1975 levels. Increasingly, as developing country governments recognize the importance of the problems and the benefits accruing from the achievement of the UN General Assembly's goal, AID is receiving more requests for help in addressing the problem. Recent estimates indicate that up to 80 percent of the food produced in some developing countries does not leave the farm (NAS). To effectively address the concern of cereal and legume grain losses, attention needs to be focused on the small farmer. This includes the complete postharvest system - harvesting, processing, storage, handling, and marketing.

It is equally important that investigation, development, and implementation of improved and technologically appropriate systems be analyzed in terms of the relevant social and cultural context of the proposed beneficiaries.

In addition to the small farmers/producers and their families, beneficiaries include rural inhabitants other than the producer and his/her family; related agribusiness and its employees; rural services centers; and ultimately, all other consumers.

B. Project Description

To achieve the project purpose -- improving the capability of agribusiness and government agencies in Cooperating Countries in the design and implementation of postharvest systems of cereal and legume grains, with an emphasis on grain losses of small farmers -- AID and the Recipient will be involved in two general areas of concentration: (1) improving the FFGI's institutional capacity to provide assistance in dealing with the problem; and (2) applying the FFGI's expertise through outreach activities.

To achieve project purpose
1. Institutional Capacity
2. Outreach

To achieve institutional capacity. will have four main parts.
1. applied research.
2. Colloq. assembly & Discussion
3. Training
4. Review of each annual

1: Institutional Capacity

To improve their institutional capacity, FFGI will have three main activities: (a) the Recipient will initiate and continue basic and applied research concerned with improving cereal and legume grain postharvest systems, particularly those involving small farmers; (b) FFGI will continue to develop and collect information and training material related to postharvest systems, with an emphasis on small farmer systems; and (c) the Recipient will develop research, personnel, recommendations, and information exchange with a qualified institution in one Cooperating Country (Costa Rica).

a. Research FFGI will concentrate its research efforts on research appropriate for application to the postharvest grain loss problems of small farmers. Annual research plans for work supported by this Cooperative Agreement will be submitted to DS/AGR Project Officer for annual approval. Appropriate research topics may include topics such as:

- Harvesting technology as it affects the small farmer in terms of grain condition, length of harvest period, cost (equipment vs. labor) and constraints on handling, drying, and storage facilities;
- Storage, particularly cost-effective methods and technologies aimed at reducing losses of cereal and legume grains in humid and arid tropics at the small farmer level;
- Marketing, locality, and country specific methods and techniques that promote more efficient and effective marketing channels which benefit the small farmer;
- Agribusiness development, involving the identification, development, and implementation of systems for processing, storage, and distribution of grain and legume products that are culturally feasible, suitable, and encouraging to small agribusiness and small farmers;

b. Information and Training Materials The second activity to improve the institutional advisory capacity has three major components.

- Postharvest Documentation Service (PDS) will be operated and expanded to provide a computerized data base from which subject matter searches with computer printouts of title and/or abstracts can be extracted and provided when requested.
- Information and training materials including instructional, informational, and reference material will be developed and made available to AID, Cooperating Countries, and the Recipient for training, operations, and other activities. These instructional materials will be produced in English, French, and Spanish when requested and approved by the AID/W Project Officer.

- Technical information response, utilizing the Postharvest Documentation Service to requests from AID, Missions, Cooperating Country Agencies, institutions, and individuals throughout the world.

c. Cooperation with the University of Costa Rica An agreement will be developed by FFGI for the exchange of research, information, and personnel with the University of Costa Rica. The program will include the following goals:

- Planning and conducting adaptive research on problems associated with tropical postharvest systems, including:
 - 1) Design and evaluation of grain dryers for developing countries in humid climates using indigenous construction materials, agricultural residues as fuel, and natural convection for air movement;
 - 2) Infestation reduction as it relates to postharvest storage losses, including the use of natural products and compounds to deter insects in stored cereal and legume grains;
 - 3) Evaluation and modification (when applicable) of traditional storage methods and facilities; development of culturally feasible, durable on-farm storage units from indigenous materials;
 - 4) Listing, evaluation, and recommendation or modification of emergency cereal and legume grain storage methods for use in developing countries;
 - 5) Assessment of various physical phenomena such as moisture migration patterns, environmental conditions on grain stored in various types of containers with emphasis on containers feasible for local use.
- Interchange of information and research data between FFGI and the University of Costa Rica.
- Reciprocal training of students from the the University of Costa Rica and the Recipient.
- Joint training of Cooperating Country participants by the University of Costa Rica and the FFGI.

2. Outreach Activities

The second area of concentration, the Recipient's outreach program, has three activities: (a) conducting training programs, (b) providing in-country technical assistance, and (c) representing AID in meetings of the Group for Assistance on Systems relating to Grain After-harvest (GASGA), when approved by AID/W Project Officer.

a. Training Programs The training programs include the following:

- In-country workshops and seminars of three days to three weeks duration developed and related to specific problem areas in the grain and legume postharvest systems of the particular Cooperating Country.
 - The AID Postharvest Grain Handling and Marketing Short Course will be offered at KSU each summer for participants with moderate to extensive experience in grain handling, storage, or marketing. Extensionists responsible for relating appropriate postharvest practices designed to reduce and minimize losses at the small farmer level will be included in each short course presentation when possible. Topics to be included are: the fundamentals of grain storage, drying, grading, conditioning handling, sanitation, marketing, management policies, loss assessment methodology and design strategies for loss assessment surveys. The AID Postharvest Grain Short Course will address the problem of extension activities designed to reach small farmers in Cooperating Countries. The DS/AGR/AP Project Officer will approve the course outline and training materials annually.
 - Academic programs (on the KSU campus) with any AID support from this Cooperative Agreement with the Food and Feed Grain Institute will focus on graduate training (particularly at the Master's degree level) and will be designed to reduce and minimize postharvest grain and legume losses in the developing countries. To help evaluate and determine the appropriateness of such programs supported by AID, plans for research and qualifications of any Graduate Assistants supported by this Cooperative Agreement will be submitted to the DS/AGR/AP Project Officer for review and approval. Special non-degree training programs may be arranged by special request and consent of both FFGI and the DS/AGR/AP Project Officer.
 - Special programs which may include: (a) Recipient staff members participation when approved by the DS/AGR/AP Project Officer in nationally or internationally sponsored training programs, workshops, seminars, etc. when such participation is in the best interest of AID, Cooperating Countries and the FFGI; and (b) the Recipient meeting with groups or organizations representing grain storage, processing and/or marketing entities to discuss and solve problems related to postharvest systems, or identify new areas for research or technical assistance; and (c) special programs for extension agents who work with producers or small farmers.
- b. In-country Technical Assistance The Recipient will undertake three activities under this program:
- Short-term assistance: Specialist teams will be assigned to focus on specific postharvest problems for a brief (maximum of 30 calendar day per mission per year) period of time upon requests approved by AID/W. Assistance may be in the form of: (1) development of feasibility and pre-feasibility studies;

(3) specific recommendations on postharvest grain and legume storage, handling, processing, and marketing problems, especially for small farmers; (4) agribusiness projects designed to assist the small producers; and (5) evaluation of economic and technical studies and proposals.

Long-term assistance: An agricultural engineer will be assigned to the Southeast Asia Cooperative Postharvest Research and Development Programme team which is associated with the Southeast Asian Regional Centre for Graduate Study and Research (SEARCA) in fiscal years 81, 82, and 83.

Impact evaluations: FFGI consultants will assist in the design and implementation of appropriate follow-up impact evaluations of previously supplied assistance when approved by DS/AGR/AP Project Officer in consultation with appropriate agricultural staff of AID Bureaus, or Missions.

c. GASGA Representation A representative of the Recipient staff will attend GASGA activities when approved by DS/AGR/AP Project Officer.

III. SPECIFIC ANALYSES

A. Economic Analysis

The purpose of this Cooperative Agreement is to provide technical assistance and advisory services to AID missions and Cooperating Country governments upon request. The assistance is intended to help in reducing postharvest cereal and legume grain losses in Cooperating Countries. Because of the indefinite quantity of services to be rendered under the terms of this Agreement as well as the necessary vagueness about sites for postharvest food loss (PFL) projects under this Agreement, it is difficult to assess costs and benefits of a specific PFL project. The economic feasibility of each proposed PFL project must be made on a site by site basis taking into account the specific alteration being proposed, the economic, technical and social soundness of institutions in each specific area, as well as other location-specific and cultural factors.

These site specific analyses will be conducted by the Recipient as part of the in-country technical assistance and advice. The effectiveness of this type of technical assistance Agreement can be analyzed and quantified in retrospect by identifying the aggregate benefits in all Cooperating Countries and assessing the contribution of the planning and implementation of PFL project designs. Also the country inputs can be quantified and compared to the amount of stored products saved following implementation of FFGI recommendations for PFL projects. Loss assessments and country or regional loss surveys may be requested to help identify where inputs are most critically needed in the postharvest systems of Cooperating Countries.

The analysis will . . . the viability of PFL projects only in general terms. The evaluation of PFL projects will consider two major questions: "What is the effectiveness of the recommended PFL project compared to alternative means to achieve the goal?" and "What is the economic justification of this particular project?" In designing the evaluation of PFL projects, the Recipient must also consider how costs and benefits to the local populations are to be measured and what components will be included in site-specific analyses.

1. Alternatives for Achieving Goals

The goal of this project is to increase the quality and quantity of cereal and legume grains available to consumers in Cooperating Countries. This is the explicit or implicit goal of most food production projects. Historically, the most common approach to achieving this goal has been to increase production of foodstuffs within the country. Another alternative for achieving this goal is in the promotion and expansion of food import programs to supplement local production and satisfy nutritional requirements of the population. An indirect approach would be to reduce the number of consumers, thereby increasing the amount of food available on a per capita basis—population control programs would fall into this category.

Clearly the latter two programs are less desirable alternatives. Increasing imports is at best a short term solution which exacerbates the already severe foreign exchange and debt repayment problems in many developing countries without addressing the basic problems underlying food shortages. Conversely, population control is a very slow process which offers little relief to the immediate problems. While increased food production is an integral part of any long term solution, it is only one part of the total system of food production, distribution, and consumption. As in many systems, strengths in one part will not offset weaknesses in another. This is particularly true with the problems of postharvest losses. Estimates of postharvest losses range from 10-50%. In countries with high postharvest losses, production oriented programs are significantly less effective than they might be. Therefore, logic dictates that to make more effective use of development monies and projects addressing other aspects of the food system, high priority should be placed on reducing and preventing postharvest food losses.

2. Justification of Postharvest Grain Loss Reduction

This Agreement is intended to provide technical assistance on postharvest systems for cereal and legume grains to institutions in developing countries. With this purpose, the direct benefits of the project are both tangible and intangible and relate to the increased capability of host country officials, small farmers, and AID Mission personnel to plan these types of interventions.

Whether the benefits are intangible or not, the services are necessary for successful reduction of postharvest losses in developing countries. At the origin of this project, it was determined that the most

cost effective means of providing these services would be to establish a reservoir of expertise which could be tapped by AID missions and Cooperating Countries whenever necessary. This expertise was to be applied through training programs, short courses, and consultant services. The current project (as a Cooperative Agreement) will continue the original project objective, build and strengthen the reservoir of expertise of FFGI in providing increased support to small farmer situations in developing countries.

The indirect benefits of the project include the results of PFL projects initiated through the technical assistance. Although these benefits depend entirely on how the Cooperating Country governments choose to utilize the information, the benefits of improved project design can be attributed to the technical assistance.

The Recipient, as part of each PFL project proposal or recommendation for interventions in a Cooperating Country project will include a specific analyses of the cultural and economic feasibility of the project. An understanding of the relevant costs and benefits of this type of project is helpful in appreciating the worth of the proposed interventions. Therefore, a brief summary of the benefits and costs common to PFL projects which will result from the Recipient advisory services is presented below:

Postharvest losses can occur in any of the many harvesting, storage, marketing, and processing functions which are performed before the product finally reaches the ultimate consumer. These losses may take the form of physical, qualitative, or nutritional losses through harvesting, drying, spillage, contamination, pest damage, or deterioration in storage. A particular postharvest system utilizing the services of the Recipient might focus on any or all of the many steps of the process in which problems or losses are identified.

Within any one country, the benefits and costs of a particular project would be quite specific. The costs of a system would include the direct costs, such as personnel costs, purchase of materials, commodities and the indirect costs. Negative spillovers of the PFL projects might include losses by merchants involved in traditional marketing and processing systems being replaced by different technologies, and additional expenses incurred by farmers and merchants due to changes in the traditional systems.

The economic benefits of a well designed project fall in three major areas. The first area involves the quality and quantity of crucial foodstuffs on small and traditional farms. The calories and proteins of cereal and legume grains are an important source of nutrition for most poor families in the world. This fact, in conjunction with the estimate that 80% of the food grown in the developing countries remains on the farm justifies the emphasis of the project on "small farm systems". A reduction in postharvest losses can mean an immediate increase in available food supplies for the farm family. This increased supply might either reduce or eliminate the need for the family to purchase additional

food during the year, or it might be used to sell as surplus on the market — either way being an obvious quantifiable family benefit. An additional benefit of reducing postharvest grain and legume losses would be an improved nutritional value of the stored grain, and as a result the labor productivity of a healthy family may be increased.

A second area of benefit from reducing postharvest losses results from an increased potential of small farmers to enter the market as less grain is lost to insects, rodents, etc. Increasing the quality and quantity of safely stored grain would help to increase the farmer's income. The effect of physically and visually being able to recognize fewer losses would help to promulgate the innovations or technologies designed to reduce losses to neighboring farmers. These effects would be contingent upon market conditions and structure as well as government food policies.

In the third area, consumers both rural and urban would benefit through increased supplies and quality of cereal and legume grains, and a possible lowering of processed grain product prices. Some of the introduced innovations would spawn agribusiness enterprises (such as grain bin fabricators, suppliers of pesticides, or fumigation specialists) and tend to create rural employment, as well as increased income for existing middlemen/women by reducing their spoilage and increasing the market volume. The increased quality of grain and legume products may also be reflected in higher prices.

In summary, these direct intangible benefits appear in the form of increased capability by host country officials and institutions to design and implement improved postharvest systems and they are not now quantifiable. The potential benefits are sufficient, however, to justify this project on economic grounds.

B. Social Soundness Analysis

Physical, social, cultural, economic, institutional, and political conditions vary greatly among Cooperating Countries. It is therefore essential that the technical assistance and training provided to Cooperating Countries accurately reflects the desires and resources of those countries and their rural farmers. This calls for a case by case evaluation of the appropriateness of this assistance and training

A crucial component of the evaluation is the social soundness analysis. This addresses concerns such as:

- (a) The acceptability of a proposed system or project within a particular social structure—do the people want it and to what degree will the current structure of society be altered?
- (b) Who will benefit and who will be hurt?
- (c) What foreseeable obstacles will hinder the implementation of the project?

(d) Through what avenue will the innovations be channeled?

(e) And to what extent will the adoption of a particular system or PFL project component by the initial target group lead to increased awareness and change among others in similar situations?

Economic and social analyses will be integrated in evaluating PFL project appropriateness. Social gains are often quantified in economic terms. To the extent possible, postharvest systems being introduced should expand on existing technologies and social structures. Local labor sources, raw materials, and technical skills should be used in providing needed components of these systems. Since a major portion of cereal and legume grains produced in developing countries are stored and consumed on the farm, technologies and postharvest systems should focus on the poor majority in the rural areas (small farmers who are not active in the market economy, and village level merchants or dealers). ANNEX B presents an outline for providing to AID and the Cooperating Country results of the social soundness analysis. The Recipient is responsible for providing to AID the results of a social soundness analysis in conjunction with technical responses to Mission requests when requested by AID/W.

C. Technical Analysis

1. Introduction

Traditionally, governments have attempted solution of the world food shortage dilemma by emphasizing (A) slowed population growth, and (B) expanded food production. The problem of postharvest food loss has not been adequately addressed. Losses are manifested in three ways: (1) physical loss of food; (2) reduction in quality resulting often in lower commercial value; and (3) loss in nutritive value. Increased food production strains existing postharvest systems, resulting in increased losses to these overloaded systems.

Cereal and legume grains are generally considered the most important part of the diet in developing countries. A summary of calorie and protein sources in developing countries indicates that over 1.5 billion people get more than half of their calories and protein from cereals. Grain legumes also play a critical role in global nutrition with production estimated at 50 million tons (FAO, 1977). Half of these cereal and legume grains are produced in developing countries. Grain legumes supplement cereal diets with essential amino acids which improve nutrition, where meat is scarce.

The purpose of this project is to improve the capability of agribusiness and government institutions in Cooperating Countries in the design and implementation of improved postharvest systems of cereal and legumes, with an emphasis on grain losses of small farmers. This purpose can be achieved and meets an existing demand in the developing world. For clarity of discussion, the technical justification is divided into the following three parts: 2. FFGI Suitability; 3. Cooperating Countries; and 4. Spread Effects.

FFGI Suitability

The Food and Feed Grain Institute of Kansas State University was established in 1966. Since its inception, FFGI has amassed a great deal of experience in providing technical information and problem solving services to Cooperating Countries. The staff consists of 30 people with varied technical backgrounds enabling the Food and Feed Grain Institute to provide the technical backstop services requested by developing nations for postharvest grain loss reduction. In addition, KSU personnel are available for professional consultation with FFGI staff and frequently travel to Cooperating Countries under other AID contracts. Research, information retrieval, training, and publication services are established and functioning in support of the current contract obligations. Foreign language translation specialists and persons experienced in training extensionists are readily available to FFGI and the needs of AID missions as a result of the services provided in this Agreement. Over the past 13 years, FFGI has become a comprehensive U.S. source of expertise capable of servicing the diverse needs of the developing countries. The FFGI has developed an excellent reputation with Missions and developing countries. This credibility with the developing countries will assist the implementation of the continuing Project. FFGI's ability to meet the specific project outputs is discussed below.

a. Research - Areas of developmental and applied research planned by FFGI cover aspects of grain harvesting, storage, processing, marketing, and agribusiness development. Recent and ongoing research involves grain drying for small farmers, appropriate techniques to control weevil infestation of grain, insect and mold susceptibility of millet varieties, and alternative cost effective postharvest handling systems for rice. Planned research areas include design for loss assessment surveys, natural products for insect control in stored grain, improved storage structures made from locally available materials, and a methodology for determining cost/benefit ratios of innovations in postharvest systems.

b. Information - A Postharvest Documentation Service (PDS) collects relevant reports, references, and documents on all phases of postharvest storage, processing, and marketing of grains from periodicals, world literature, and individual authors and scientists. Documents (microfiche or paper copies) are available free to requestors from AID countries or for a fee to developed countries requesting information. Subject searches of titles and abstracts are available as well as a monthly or annual acquisition list. The PDS collects documents at the rate of approximately 1,000 per year. Over 150 requests for documents are processed each year and over 50 countries have asked for the services of PDS. A Postharvest Grain Newsletter is planned in addition to the ongoing service. Technical information requests from scientists in developing countries are answered by the FFGI staff. In 1978-1979 there were 104 requests for technical information to which the FFGI staff responded.

c. Training - Training materials are updated on a regular basis, and new manuals, tape/slide units, and other forms of information are

produced as necessary. A series of cassette-tape slide lectures, in English, Spanish, and French are planned for two subject areas per year during the proposed project period. Over the past 13 years, FFGI has trained 491 participants in-country and 234 participants at the Recipient's site in Manhattan, Kansas. The on-campus AID Postharvest Grain Handling and Marketing Short Course planned for 1981-82 includes seven weeks of training at the Food and Feed Grain Institute. A minimum of ten in-country seminars and/or training workshops are planned (two minimum per year) for the proposed project period.

d. Technical Consultants - The FFGI staff are experienced in developing country problems and represent a broad spectrum of professional disciplines including: agricultural engineering, storage entomology, agricultural economy, library science, mycology, etc. When needed, consultants can be contracted by FFGI to satisfy additional Mission requests. FFGI is developing an international listing of postharvest grain and legume specialists in addition to a list of consultants available to the FFGI for technical consulting services under this Agreement. Types of assistance available to Cooperating Countries include (but are not limited to):

- development of pre-feasibility studies
 - specific recommendations on harvesting, storage, processing, marketing, and agribusiness development; and
- post-project evaluation of economic and engineering studies and proposals.

e. GASGA Representation - The Recipient will continue to act as AID's representative at meetings of the Group for Assistance on Systems relating to Grains After-harvest (GASGA), when requested. The Recipient will designate a staff member to act as the GASGA correspondent for AID when requested. The Recipient, on approval from the AID/W Project Officer, will represent AID at annual GASGA meetings, technical seminars and other GASGA activities. It is expected that the AID/W Project Officer will attend GASGA activities such as the annual meeting, depending upon the availability of funds, and may be accompanied by one staff member of the FFGI familiar with GASGA. Close communication will be maintained between the GASGA correspondent from FFGI and the AID/W Project Officer relating to GASGA activities. Materials printed or published relating to GASGA activities shall indicate the Recipient's representation of AID.

f. Cooperative Research - During 1980-81 FFGI will confer with the University of Costa Rica to plan research programs on postharvest problems under tropical conditions and to develop an agreement for cooperative research, reciprocal training, joint training, and exchange of personnel. The AID/W Project Officer will approve annual research plans, selection of trainees, and personnel including FFGI staff travel in relation to funds expended by the Recipient in support of this effort.

3. Cooperating Countries

Over the past 13 years, 45 developing countries have requested and received services from the FFGI. Increasingly, these countries are recognizing the economic losses experienced by small farmers, governments, and industries due to spillage and spoilage during harvesting, storage, processing, and marketing of grains. Technologies and training materials are available to encourage grain handlers to improve postharvest grain systems. Countries involved with FFGI have welcomed the availability of technical expertise for planning, designing, and implementing their programs. The technologies recommended by FFGI will continue to be evaluated for soundness and appropriateness to the countries involved. Cooperating Countries have been effectively utilizing the information, consultants, and training provided through the project to address their problems.

4. Spread Effects

Assistance provided by FFGI can be viewed as the "seed" for improvement of postharvest grain and legume systems in the participating developing countries. Information and technology provided to small farmers, private entrepreneurs, technicians, and managers becomes incorporated into new and existing postharvest systems. These serve as models for replication, provided they demonstrate perceivable improvements over previous systems. In this manner the technology can be spread throughout the Cooperating Countries. Once subsistence farmers and commercial producers adopt "grain saving" practices, more food will be available to the consumer and the quality of his nutrition may be increased accordingly. Should grain surpluses occur due to more efficient systems (estimates of grain losses range from 10-50% of the total production in developing countries) export markets can become stronger and provide employment for a larger segment of the population.

D. Administrative Analysis

The Food and Feed Grain Institute at Kansas State University has been receiving AID funding for this postharvest loss project since 1967. The personnel and procedures required for administering the Cooperative Agreement are established and have functioned satisfactorily since the beginning of the project. There is no reason to question the continued competence of the Institute administrators.

KSU is a solid educational foundation and will provide AID with a professional staff who have worldwide experience and the competence to assist in reducing postharvest grain and legume losses in developing countries. The staff has established a library and a retrieval system on grain storage, handling, processing, and marketing based on a bibliography produced by the National Academy of Sciences under contract from DS/AGR.

Mission and Cooperating Country requests for assistance will continue to be channeled through the regional bureaus and DS/AGR to FFGI.

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The scope of work for requests for technical assistance or training assistance from Missions will be prepared by FFGI. The consultant team will be selected by FFGI with the scope of work and team selection subject to approval of the AID/W Project Officer. Briefing and debriefing in AID/W will be arranged by the regional bureaus and DS/AGR, if desired. Consultants not on the FFGI staff require AID Contract Office approval and non-citizens hired as staff require AA/DS approval. All travel is approved by DS/AGR with copies of itineraries sent to AID contract regional bureaus and concerned Missions for Mission and country clearances. No consultants will be reimbursed for services unless their use has prior written approval of the AID/DS/AGR Project Officer.

E. Project Officer's Role

The role of the AID/W Project Officer will be to monitor and approve administrative decisions within the Project (Cooperative Agreement). The DS/AGR Project Officer will have the final decision and approval for consultants hired by the Recipient, training seminars, workshops, research plans, technical short courses, and the selection of participants for these activities. The DS/AGR Project Officer will have final approval for graduate assistants funded under this Agreement who have been selected by KSU to work with Recipient staff. FFGI staff members funded partially or totally under the Agreement who wish to participate in training programs, workshops, seminars, etc., sponsored by various national or international organizations will seek approval from the DS/AGR Project Officer. The Project Officer will coordinate Project (Cooperative Agreement) evaluations. The DS/AGR Project Officer will represent AID at GASGA when possible and may delegate AID representation to GASGA to the Recipient when appropriate. The DS/AGR Project Officer will approve Cooperative Agreement funds expended by the Recipient in relation to the Cooperating Country Agreement to be signed by FFGI and the University of Costa Rica.

F. Environmental Analysis

Because this project is restricted to technical assistance and training, it will have no direct effects on air, water, land, flora, or fauna. Therefore, this activity is not deemed a major Federal Action (Section 1500.6, CEO Guidelines). It is recommended that the Threshold Decision be deemed negative, constituting a negative determination. The FFGI will ensure that all such pesticide use recommendations are reviewed under and comply with the provisions of para 216.3 (b) of AID's Environmental Procedures, Rule 16, as amended, and that appropriate pesticide residue tolerance levels have either been established by the USEPA or recommended by the Joint FAO/WHO Meeting on Pesticide Residues. The DS/AGR Project Officer will facilitate close communication with FFGI Mission responses and any resulting pesticide recommendations and the DS/AGR Pest Management and Related Environmental Protection Project. Within three months of signing of this Cooperative Agreement the DS/AGR Project Officer will review with FFGI all past Mission responses funded by this Project which relate to pesticide recommendations to determine if such recommendations have been in compliance with AID's Environmental Procedures. FFGI may subcontract pesticide residue analysis if deemed necessary and if approved by the DS/AGR Project Officer.

IV.

FINANCIAL PLAN

A total of \$5,614,000 will be granted to the Recipient, disbursed over the next five years. The first disbursement is for fiscal year 1981. Annex C shows a breakdown of person-months requirements for both professional and non-professionals by activity and year. Annex D is an estimate of the approximate levels of funding by project activity. The estimates are based on the person-months requirements of the activities. The actual formula used is
$$\frac{\text{activity person-months}}{\text{total person-months}} \times \text{Yearly Budget.}$$
 Annex E shows the project funding by year, donor and item. KSU and FFGI will provide part time consultants from their faculty, use of equipment, offices, resources, and fringe benefits, as well as covering indirect costs.

Since the initial funding in 1967, the FFGI has managed the project's financial matters according to sound and approved policy and practices. Such financial management of a program from the research stages through supplying technical assistance can be measured in two ways: through the success of its endeavors and the increasing numbers of requests for assistance. This Agreement will assure the continuation of FFGI activities in the area of postharvest grain loss reduction in developing countries. Annual reports should include costs and expenditure justification.

This project has changed slightly in this proposal to include a greater emphasis on technologies appropriate to small farm systems. It is financially more sound to redirect the focus of an existing institution to the appropriate needs than to develop a completely new research center. As mentioned previously, the Recipient has the technical capabilities, the managerial competence, and the experience to carry out the necessary new directions of the project.

V. IMPLEMENTATION

Implementation of this project depends on several parties, primarily the AID/W Project Officer and the FFGI. Secondly, the project depends upon the Cooperating Countries' governments and the USAID Missions to request the assistance FFGI is to provide under the terms of the Agreement. Both the AID/W Project Officer and the FFGI are responsible for negotiating and signing the Cooperative Agreement. Correct and timely submission of the PIO/T is the responsibility of the AID/W Project Officer. The AID/W Project Officer is also responsible for seeing that the authorized and allocated Cooperative Agreement funds are dispursed to the Recipient in a timely and orderly manner.

FFGI, the Recipient, shall apply the funds according to the negotiated budget. Project activities shall be carried out as stipulated in the Agreement by the Recipient to the satisfaction of the AID/W Project Officer. As this is a continuing project, activities currently in progress shall continue on a reasonable, as determined by the Recipient and AID/W Project Officer, timetable. New activities, such as new research, shall be approved by the AID/W Project Officer. Initiation of new research shall occur when appropriate in terms of budget, academic schedules, personnel availability, and agreement by the AID/W Project Officer and, when appropriate, the Cooperating Institution. Implementation of other activities related to the Documentation Center, training, technical assistance, and GASGA representation are the responsibility of the Recipient with concurrence of the AID/W Project Officer. Activities related to joint work with a Cooperating Institution will proceed according to joint decisions of the Recipient and the Cooperating Institution, with the approval of the AID/W Project Officer.

Responsibility for the monitoring of this project is on the AID/W Project Officer. Summary reports, the FFGI annual reports, the consultants reports on their activities and recommendations, theses and research publications, and appropriate USAID Mission reports may be used by the AID/W Project Officer in determining the efficacy of the Recipients efforts. The same reports can be used to determine if the Recipient is fulfilling the terms and spirit of the Cooperative Agreement.

Based upon the FFGI'S annual reports, field reports and other appropriate sources, the AID/W Project Officer shall evaluate the Recipient's past efforts to determine if they adequately satisfy the Congressional mandate to focus on the poor majority. If, it is determined that some degree of improvement is required, the Recipient and the AID/W Project Officer will determine what needs to be done to more closely satisfy the mandate.

VI. OVERALL PROJECT EVALUATION

The Recipient, by means of summary reports, contributes much to the project evaluation. These short reports are submitted to the AID/W Project Officer in a timely manner after each approved activity. The Project Officer may request an additional report from AID missions if an independent verification is deemed advisable.

The AID/W Project Officer will request a summary of the Recipient's contribution from a sample of USAID missions once a year. These reports, together with the Recipient's annual report, will constitute the yearly formative evaluation of the project. The Project Officer, through the approval mechanism, and the Recipient staff shall be responsible for routine formative and summative evaluations of activities. During the fifth year, the Recipient executive officer will assemble and submit a long-term report of the progress of the project. (This report, written in lay terms, will be very concise; illustration and summary tables are preferred to profuse explanation.) This overall report represents a summative evaluation of the project. Among its uses may be: justification of project expenditure before Congress, basis for future cooperative agreements, and illustration to the general public of AID and Recipient accomplishment. The AID/W Project Officer will approve the draft of this report before orders for reproduction are made.

During the second quarter (April-June) of the second year of the Cooperative Agreement (1982) the AID/W Project Officer will arrange for a comprehensive one week evaluation of the project with the Food and Feed Grain Institute. DS/AGR will fund the evaluation, depending upon the availability of funds, and the FFGI will cooperate with DS/AGR in preparing the necessary reports, financial accounts, and research summaries requested by DS/AGR for distribution to the evaluation team (to be selected by DS/AGR) prior to the evaluation. Results of this comprehensive evaluation will be used to determine:

- A. The effectiveness of the FFGI in responding to the postharvest grain and legume loss problems of small farmers in developing countries;
- B. The overall success of various project components;
- C. The effectiveness of the on-campus short course versus in-country training;
- D. Which adaptive research projects have had the greatest impact;
- E. Other criteria to be determined by DS/AGR prior to the evaluation.

The evaluation will review the period from 1967 to 1982 and shall compare the effectiveness of the project under the contract AID/ta-C-1162 with the changes resulting from the implementation of this Cooperative Agreement.

80

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project: \$10,404,000
From FY 80 to FY 81
Total U.S. Funding \$5,614,000
Date Prepared: 8/15/80

ANNEX A

Project Title & Number: Improvement of Postharvest Grain Systems 931-0786

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: To reduce losses of cereal and legume grains through improved postharvest systems for small farmers, industries, and government agencies.</p>	<p>Measures of Goal Achievement: 1) Quality of target crops remains stable after harvest. 2) Quality of marketed target crops in the cooperating country shows less spoilage, water, rodent, insect, and handling damage.</p>	<p>1) Recipient/host country conduct analysis for comparison to baseline data. 2) Same as 1.</p>	<p>Assumptions for achieving goal targets: Cooperating countries make local grain available to consumers at levels sufficient to meet nutritional requirements.</p>
<p>Project Purpose: To improve the capability of farmers, agribusiness, and government agencies in cooperating countries in the design and implementation of postharvest systems for cereal grains and pulses.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status: 1) Target crops show decreased physical and biological loss. 2) Selected postharvest systems show increased efficiency.</p>	<p>1) Recipient and host country analyze crop statistics to verify decrease from baseline data. Amount of decrease to be negotiated by IIC/USAID/Recipient. 2) Recipient/IIC analyze agribusiness and marketing statistics to verify an increase from baseline data. Amount of increase to be negotiated by IIC/USAID/Recipient.</p>	<p>Assumptions for achieving purpose: Financing is available to upgrade postharvest systems. Host country values a reduction in postharvest losses. Technical systems supplies by Recipient are effectively utilized Farmers and merchants accept systems provided by Recipient.</p>
	<p>3) Improved postharvest systems continue to operate.</p>	<p>3) Personnel, equipment, facilities and training are available in-country to prolong project functions.</p>	<p>Continuing political stability occurs in the host country.</p>
<p>Outputs: 1) Basic and applied research for improving postharvest systems of small farmers in cooperating countries initiated and continued.</p>	<p>Magnitude of outputs: 1.a) Analytical instruments exist for measuring harvest technology, storage, processing, marketing, and agribusiness development. b) Plans are filed by Recipients prior to beginning research; work is summarized at appropriate intervals.</p>	<p>1.a) A summary of development method, validity and reliability testing is available. b) A completed work plan is on file at Recipient's office, including study goals, methods, duration and cost estimates.</p>	<p>Assumptions for Providing Outputs: Missions and cooperating countries continue to request technical assistance. Qualified participants are available for training.</p>

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Page 2

Life of Project: \$10,404,000
From FY 80 to FY 81
Total U.S. Funding \$5,614,000
Date Prepared: 8/15/80

Project Title & Number: Improvement of Postharvest Grain Systems, 211-0786

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS:	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <p>2. Information and training materials on postharvest systems collected and disseminated to USAIDs, cooperating countries and the Postharvest Documentation Service.</p>	<p>Magnitude of Outputs:</p> <p>c) Research is brought to the attention of scientific and development community.</p> <p>2.a) Appropriate technological publications are available to users.</p>	<p>c) A list of published papers and a summary of unpublished work is included in the annual report.</p> <p>2.a) Records are kept by recipient on the number, type, and size of requests, and the project which will use the information.</p>	<p>Assumptions for achieving outputs:</p> <p>USAIDs will fund participant training.</p> <p>An appropriate institution can be found to cooperate.</p>
<p>3. Training in appropriate postharvest systems adapted and conducted in-country and in academic and short courses.</p>	<p>b) Follow-up inquiries are made on selected requests to determine the efficacy of the provided materials.</p> <p>3.a) On-campus training of participants is available, conducted, and evaluated.</p>	<p>b) A summary of follow-up results is included in the annual report.</p> <p>3.a) Summary of training courses, including curricula, country, target positions of students, and student evaluation appears in recipient's annual report. Instructor's evaluation includes initial student abilities and expected benefits from training.</p>	
	<p>b) Follow-up inquiries are made to students whose training lasted 7 days or more.</p> <p>c) Goals, format, and materials exist for in-country workshops. Appropriate presentation methods have been devised.</p>	<p>b) A year after completion, Recipient will ascertain that participants obtained target position and are using skills from the training.</p> <p>c) Explicit goals and a summary of format, materials are available in OS/ACR.</p>	
<p>4. Technical consultants provided to USAIDs and cooperating countries for long and short term work.</p>	<p>d) Workshops are evaluated.</p> <p>4.a) Consultant services provided at request of missions and countries.</p>	<p>d) Summary of workshops, including country, target positions of students, level of training on entry to workshop, cost, duration, and direct and indirect benefits, is included in the Recipient's annual report.</p> <p>4.a) Recipient keeps records of requests, including staff, duration, cost, goals of consultation.</p>	

LOGICAL FRAMEWORK

From FY 081 to FY 81
 Total U.S. Funding \$5,614,000
 Date Prepared: 8/15/80

Project Title & Number: Improvement of Postharvest Grain Systems 931-0786

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <p>5. AID/W represented to GASGA.</p>	<p>Magnitude of Outputs</p> <p>b) Consultation evaluated by USAID/IIC/Recipient.</p> <p>5.a) Recipient consults with DS/ACR prior to GASGA meetings.</p>	<p>b) Summary of consultation, including goals, principal activities, social and economic effects of the project, design advantages and disadvantages, cost and duration, appears in Recipient's annual report.</p> <p>5.a) Memoranda of consultations/instructions are on file at DS/ACR and with Recipient</p>	<p>Assumptions for achieving goal targets:</p>
<p>6. Cooperative research staff, student, and information exchange conducted with an appropriate institution.</p>	<p>b) Recipient attends GASGA meetings when approved by Project Officer</p> <p>c) GASGA attendance evaluated.</p> <p>6.a) Agreements exchanged between institutions.</p>	<p>b) GASGA proceedings and papers presented by Recipient are available to DS/ACR.</p> <p>c) Recipient prepares a summary of GASGA long and short term goals and progress made since last meeting.</p> <p>6.a) Summary of agreement included in annual report, with names, curricula, goals, costs, duration, benefits of exchange.</p>	
	<p>b) Cooperative research is carried out.</p> <p>c) Research activities made available to scientific and development community.</p> <p>d) Personnel (including students).</p>	<p>b) See lb) and lc) above.</p> <p>c) List of published papers and summary of unpublished work appears in Recipient's annual report.</p>	
<p>Inputs:</p> <p>A.I.D. Grant to F.F.G.I.</p> <p>1. Salaries</p> <p>2. Fringe Benefits</p> <p>3. Indirect Costs</p> <p>4. Consultants</p> <p>5. Transportation</p> <p>6. Allowances</p> <p>7. Other Direct Costs</p> <p>8. Equipment</p> <p>9. S.E.A.R.C.A.</p>	<p>Implementation Target (Type and Quantity)</p> <p>A.I.D.</p> <p>1. \$2,494,791</p> <p>2. 383,248</p> <p>3. 1,383,159</p> <p>4. 142,800</p> <p>5. 499,520</p> <p>6. 252,237</p> <p>7. 254,600</p> <p>8. 98,348</p> <p>9. 105,000</p> <p>\$ 5,613,703</p>	<p>A.I.D. & F.F.G.I. Records</p>	<p>Assumptions for providing inputs:</p> <p>A.I.D. Funds Available</p>
<p>F.F.G.I. Contribution</p> <p>1. Salaries</p> <p>2. Benefits</p> <p>3. Indirect Costs</p> <p>4. Consultants</p> <p>5. Other Direct Costs</p>	<p>F.F.G.I.</p> <p>1. \$ 416,347</p> <p>2. 69,738</p> <p>3. 239,649</p> <p>4. 125,000</p> <p>5. 175,546</p> <p>\$1,044,471 TOTAL.</p>		

-21-

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ANNEX B

SOCIAL SOUNDNESS

There are 3 major components to a social soundness analysis:

- (1) social cultural compatibility;
- (2) spread effect of the innovation, system, or training;
- (3) social impact-degree of equity resulting.

In addressing how appropriate a project is within a social cultural setting, several questions should be considered.

- Who are the projects beneficiaries or targeted group?
- Who may suffer from the projects implementation?
- Who may pay for the project, either directly or indirectly?
- Is the project appropriate within the context of the affected people's lives?
- Will the peoples roles be altered; are there minimum qualifications such as training, financial means, attitudes or beliefs for involvement in the project; are there levels of qualification which would exclude involvement in the project?
- Who would oppose the project and for what reasons?
- What would motivate people to seek assistance or involvement in the project?
- How will the information or assistance be made readily available?

The spread effect of the assistance should be evaluated in terms of the extent it is likely to occur to related sectors beyond the initial target group and what additional inputs are necessary to encourage or speed up the spread of a particular innovation or system.

- How will the spread effect occur (through what avenues will others learn of the innovation)?
- What will assure continued use of the system or innovation?
- To what extent can the existing social structure (community leaders, family structure) be used in encouraging project acceptance?

24

- What is a realistic time frame for having significant impact on the achievement of the project goal through dissemination of the system or innovation?

The degree of equity from a given projects' implementation is a key concern for measuring development progress.

- How will the project affect income redistribution, employment opportunities, and social strata?
- Will changes in authority and responsibility negatively influence other aspects of the social structure?
- Will the poor benefit directly?
- What is the nature of the effect on the poor (increased income from traditional occupations, changes in occupational status, entering into the market economy)?
- Does the project focus on using available technologies, labor, raw materials, and expertise?
- How are various groups in the society (women, minorities) involved or influenced by the project?

85

ANNEX C
Professional/Non-Professional Person Months Requirements
By Activity and Year

OUTPUT	Person/months		Professional (Non-professional)		
	Year 1	Year 2	Year 3	Year 4	Year 5
1. Increase and Maintenance Tech Capabilities	31.8 (10.1)	36.4 (10.1)	37.8 (10.1)	35.8 (10.1)	35.8 (10.1)
2. Information Services	18.7 (4.8)	21.4 (4.8)	22.24 (4.8)	21.04 (4.8)	21.04 (4.8)
3. Training Programs	35.5 (9.1)	40.66 (9.1)	42.25 (9.1)	40 (9.1)	40 (9.1)
4. In-country Tech Assistance	74.7 (13.4)	85.6 (13.4)	89 (13.4)	84.1 (13.4)	84.1 (13.4)
5. G.A.S.G.A.	1.9 (1)	2.1 (1)	22 (1)	2.1 (1)	2 (1)
6. Co-op Tropic Institute (Costa Rica)	16.8 (1)	19.2 (1)	20 (1)	19 (1)	19 (1)
7. Adm. Support	7.4 (8.6)	8.6 (8.6)	8.9 (8.6)	8.41 (8.6)	8.41 (8.6)
TOTAL Prof. Non-prof.	186.8 (48)	214 (48)	222.4 (48)	210.4 (48)	10.4 (48)

54

ANNEX D
Project Activity Funding Levels

OUTPUT BUDGET	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Increase & Maintain Tech Capabilities	\$156,500	188,258	213,660	209,311	229,060	996,789
Information Services	87,775	106,118	120,590	117,916	129,042	561,441
Training Program	166,585	201,543	229,040	223,950	245,080	2,118,953
In-country Tech Assistance	329,062	400,980	456,510	445,199	487,202	2,118,953
G.A.S.G.A.	10,832	12,718	14,380	14,165	15,500	67,595
Co-op with Tropical Institute	66,484	82,059	93,730	90,975	99,559	432,807
Adm. Support	59,762	69,503	78,030	77,650	84,975	369,920
TOTAL	877,000	1,061,179	1,205,940	1,179,166	1,290,418	\$5,613,703

17

ANNEX E

AGENCY FOR INTERNATIONAL DEVELOPMENT AND THE FGSD AND FEED GRAIN INSTITUTE COOPERATIVE AGREEMENT COST SHARING

ITEM	1980-1981		1981-1982		1982-1983		1983-1984		1984-1985	
	A.I.D.	F F G I	A.I.D.	F.F.G.I.	A.I.D.	F.F.G.I.	A.I.D.	F.F.G.I.	A.I.D.	F.F.G.
Staff Salaries	\$383,279	\$ 68,196	\$470,285	\$ 75,017	\$534,945	\$ 82,517	\$529,063	\$ 90,770	\$577,219	\$ 99,8
Fringe Benefits	59,060	11,423	71,760	12,565	82,666	13,822	80,848	15,204	88,914	1
Indirect Costs	207,283	39,252	255,359	43,178	291,427	47,495	300,686	52,245	328,404	1,4
Consultants	24,600	* 25,000	29,550	* 25,000	29,550	* 25,000	29,550	* 25,000	29,550	* 25,0
Transportation	73,500	-----	89,300	-----	108,580	-----	108,550	-----	119,670	-----
Allowance	41,292	-----	47,225	-----	53,146	-----	51,539	-----	59,035	-----
**Other Direct Costs	52,986	28,887	62,700	31,600	70,706	34,761	28,930	38,237	83,626	42,0
S.E.A.R.C.A.	35,000	-----	35,000	-----	35,000	-----	-----	-----	-----	-----
TOTALS	\$877,000	\$172,758	\$1,061,179	\$187,360	\$1,205,940	\$203,595	\$1,179,166	\$221,456	\$1,290,418	\$24,000

* KSU faculty consulting at no salary cost to Cooperative Agreement at estimated 217 day @ \$115/day.
 ** KSU sharing includes facilities, utilities, and equipment use.

NOTE: Figures calculated to include:
 49.3% domestic overhead
 27.1% overseas overhead
 10.0% post differential
 10-15% inflation rate

92

MINUTES

TPCA MEETING AUGUST 19, 1980

T. Babb called the meeting to order at 10:08 a.m., August 19, 1980. He asked R. Morris DS/AGR to explain the focus of the KSU effort toward the small farmer.

L. Holdcroft Pointed out the strength in working with regional programs such as SEARCA and GASGA and other existing networks, this method can be extraordinarily effective. In this way linkages to missions, and U.S. technologies can be made. It is a mistake for AID not to have greater interest in such regional programs--AID should send one of the AID/W staff to GASGA meetings.

D. Fiester AID should even consider funding regional men to attend GASGA meetings, and Bureaus and/or Missions should be encouraged to participate in GASGA activities where appropriate. KSU should be strongly supported at the technical level, however KSU cannot commit AID funds nor pronounce AID policy. KSU will represent AID on only technical issues.

B. Jadwin Cross reference of U.S. and European pesticide products, as mentioned in TPCA Subcommittee-- This should be done to help Missions.

D. Batyhrick Small farmer focus on page 15 of PP: What is the ability of KSU to analyze the value of their activities to the small farmers? KSU has more information, but are not being asked by AID/W to use it for Social Soundness Analysis or Cost/Benefit. They should be requested to do more Cost/Benefit analysis.

K. Sherper The planned early 2nd year comprehensive evaluation of the KSU effort should include top notch evaluators. It is to KSU's and AID's advantage to have people they respect evaluate their effort. Agricultural economists should be part of the project evaluation.

A. Hankins The services offered should be evaluated in terms of cost/benefit, especially to the small farmer.

L. Holdcroft AID/W needs a better handle on the success/problems from past KSU mission responses. In the past there KSU has been only one actor with the host government with minimal Mission involvement and little or no AID/W input. Quantitative and qualitative assessment of the contractor's performance is needed.

- D. Bathrick Early evaluation of the project's extension or the KSU Cooperative Agreement needs to be comprehensive and cover the last 13 years of the project's activities. AID/W needs to place the refocus toward the small farm level in perspective to past levels of activity.
- D. Fiester The Scope of Work for the second year evaluation of KSU should be approved by TPCA.
- T. Babb Guidance and direction as a result of the evaluation will give AID a better handle for assessing project impact.
- K. Sherper Could PPC assist in planning the evaluation?
- L. Holdcroft PPC-Evaluation Office may be able to assist. Contact T. Johnson.
- A. Hankins It is time to let the field know what services are available. There is a new crop of people in place and they may be unfamiliar with this contract or the services it offers. Draft a cable informing Missions of the available assistance with TPCA clearance. It should contain a thumbnail summary of the project, how Missions use the service and who the contact Project Officer is.
- L. Holdcroft A complete list of current AID/W Project Officers and their fields of specialty needs to be communicated to the Missions.
- T. Babb Asked if any other issues remain--TPCA members had no further comment. TPCA approves the KSU Cooperative Agreement Project Paper in view of the issues discussed.
- T. Babb &
D. Caton Energy in Agriculture Paper: Energy & Irrigation, Fertilizer, Storage and Processing, and Transportation. A paper prepared by E. Simmons.
- T. Babb Is this a duplication? TVA and IFDC monitor markets, costs, etc. of fertilizer for AID currently. Who will do the papers? Consultants and University people?

- K. Sherper Fertilizer-IFDC doing these things. Scope of work: First page, number 4: assess the enhancement of soil fertility. Efficiency and current use of fertilizers. Enhancement for use-thus reduce application rates. Fertilizer demand and supply by regions. IFDC regularly reports this information. If there are gaps in IFDC ability, then may go the route proposed in Caton paper. Somebody may be able to go beyond fertilizer scope and look at energy.
- D. Hughes What would PPC do with papers?
- D. Bathrick Have 3 or 4 papers relating to energy in Agriculture.
- K. Sherper Crop residues issue-burning dung for energy versus use for fertilizers.
- D. Fiester Substitute for energy, inorganic versus organic: cost/benefit of nonrenewable versus renewable Patterns of use-dry versus wet tropics. No mention in paper of varying ecological conditions depending upon fertilizer use. Source of supply-political effects. Russia may be a major supplier of fertilizer in the years ahead, how will this affect world markets and LDC use?
- T. Babb LDC costs for fertilizer: \$50 Billion in coming years. Indigenous sources of phosphates and technologies for extracting fertilizers in LDC needs to be considered. Alternative N generation--Kettering research--other than natural gas manufacturing. Their research is working on hydropower for N extraction from the atmosphere, also solar and wind energy systems Their goal is for small village level N manufacturing facilities--an economic unit with low maintenance.
- L. Holdcroft A proposal of 1.5 million from Kettering was received. Is central engineering following? Perhaps more bench work is needed before proposing a pilot testing program is launched? The information they are developing is not proprietary and Kettering is making the results readily available. It is transportation cost which makes fertilizer costly in addition to energy or fossil fuel costs.
- D. Fiester Should TPCA be reviewing an outline or the paper?

T. Babb Use IFDC to prepare papers on fertilizer.

A. Hankins List groups that come up with recommendations.

T. Babb IFPRI and FAO have done some work on fertilizer projections. Someone may need to pull all the material together.

K. Sherper Did this start out being an energy project? Fertilizer impact alone would justify the workshop.

D. Bathrick According to "World by 1990", IBRD Report, the small farmer will be less well off than now.

K. Sherper What does AID really need? Nervous just having more superficial papers.

T. Babb IFPRI Project on Rainfed Agriculture. Even when being generous, the world will be way short of food needs. The only hope is to increase irrigation. Small farmers working together could learn to use water more efficiently.

K. Sherper Salt buildup is a major problem with irrigation. and water rights have a major impact as well

A. Hankins How long will the workshops be? Momentum--if AID goes into it--do it right.

K. Sherper Agriculture has been shortchanged on energy issues. It is important to raise awareness--this is an important purpose of workshops.

D. Bathrick Budget of \$30,000 low?

D. Fiester Policy for \$30,000, then it may be superficial, 35 days is perhaps too short for submission? Quality or speed? Will the papers be background for policy?

K. Sherper Energy policy papers neglect agriculture, TPCA should push for more focus on energy issues in agriculture.

D. Fiester What about having a workshop after the papers?

T. Babb Suggested a meeting be held with Energy, TPCA, Emmy Simmons, and Project Officers in DS/AGR. So far the paper neglects fuel for tractors and other equipment and this area should not be ignored. Proceed to schedule meeting, to coordinate effort. TPCA interested by wants a clear idea in terms of policy and program development.

- D. Fiester Animal energy, labor efficiency, light energy and crop production energy costs in opening new areas versus improving old agricultural areas needs to be included.
- K. Sherper Agricultural competition with biomas, forrestry, and firewood should also be included.
- T. Babb Involve Dr. Popenoe, University of Florida.
- A. Hankins Define parameters then bring in outside people.
- T. Babb Global 2000--gives reference to many other related studies.
- K. Sherper The employment issue should also be raised.
- T. Babb Closed the TPCA Meeting of August 19, 1980.