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AGRICULTURAL TECHNOLOGY TRANSFORMATION PROJECT  
USAID CONTRACT NO. 527-0282-C-00-8168-00

FINAL REPORT  
OF THE TECHNICAL ASSISTANCE TEAM

NORTH CAROLINA STATE UNIVERSITY  
AND  
MID-AMERICA INTERNATIONAL AGRICULTURAL CONSORTIUM

Lima, Peru  
Raleigh, North Carolina  
Ames, Iowa

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## EXECUTIVE SUMMARY

The USAID Agricultural Technology Transformation (ATT) Project in Peru began 1 April 1988 and is scheduled to terminate 31 August 1993. Technical Assistance (TA) was provided from the beginning until 31 December 1992 through a contract with North Carolina State University (NCSU) and a subcontract with the Mid-America International Agricultural Consortium (MIAC). The Project strategy utilized lessons learned from prior experiences to assist in further growth of ongoing science-based agricultural development and promoted the development of an effective agricultural technology generator and transfer (ATG&T) system.

The ATT Project integrated the efforts of important public and private sector institutions: the National Agricultural and Agroindustrial Research Institute (INIAA), the National Agrarian University at La Molina (UNALM), the National Farmers Organization (ONA), and the Agricultural Development Foundation (FUNDEAGRO) -- the latter created by the Project to facilitate the modernization of agriculture in Peru.

The USAID and GOP goal to which this project contributed was to increase agricultural incomes, rural employment and on-farm capital formation in Peru, while increasing agricultural output for domestic consumption and exports. Its closely interrelated components were (1) technology generation, (2) technology transfer, and (3) human resource development.

The NCSU/MIAC USAID ATT Contract utilized seven long-term professionals in the six budgeted positions, plus a Campus Coordinator at NCSU and one at Iowa State University (MIAC). The Contract utilized international professionals for short-term assignments; including one administrative advisor and 26 consultants. The Contract also utilized Peruvian professionals for short-term assignments (25 as National Advisors, 8 in administrative support roles, and 104 for special studies).

The "Analysis and Interpretation of Components" and the Conclusions and Recommendations" of this report provide in-depth TA Team descriptions of Project accomplishments and problems. Lessons learned from this effort will benefit future agricultural development efforts. Despite persistent chaotic social and economic conditions, the ATT Project has realized substantial accomplishments:

- Strengthening of the implementing institutions; INIAA, UNALM, ONA and FUNDEAGRO.
- Integrated activities of the implementing institutions and enhanced involvement of regional universities while focusing on a science-based agricultural strategy.
- Establishment of a national seed program consisting of:
  - A National Seed Commission and eight Departmental Seed Committees.
  - Foundation seed production for private companies.
  - A Certification program to assure seed quality.
  - Peruvian Association of Seed Enterprises.
- Scholarships to support:
  - 21 M.S. and Ph.D. students overseas.
  - Over 200 M.S. students at national universities, 132 of which are returnees on partial funding to facilitate the completion of their degrees.
- Development of an integrated technology diffusion activity to provide a base for rebuilding Peru's extension system by:
  - Implementing a network of Technology Diffusion Centers, staffed with subject matter specialists, to conduct technology transfer activities through the integrated efforts of local producer associations, Experiment Stations and universities.
  - Publishing a series of technical manuals and bulletins for farmers.
  - Developing the rural woman, and youth agricultural programs.
- Introduction of over 50 improved varieties of crops ranging from corn to tree fruits.
- Research resulting in over 80 improved agronomic practices for transfer to farmers.

Due to continuing unrest in Peru, the TA component of the Project was one of the several activities identified for early termination (31 December 1992 instead of 31 March 1993). Ongoing Project activities are being continued by INIAA, UNALM, ONA and FUNDEAGRO.

## ACRONYMS

APHIS	Animal Plant Health Inspection Service
ATG&T	Agricultural Technology Generation and Transfer System
ATT	Agricultural Technology Transformation Project
BAN	National Agricultural Library
CEAC	Economic Analysis Center (ONA)
CGIAR	Consultative Group of International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIMMYT	International Center for the Improvement of Corn and Wheat
CIP	International Potato Center
CODESE	Departmental Seed Committee
CRSP	Collaborative Research Support Program
CTTA	Communication for Technology Transfer in Agriculture
ECASA	Rice Marketing Enterprise
EE	Experiment Station (INIAA)
ENA	National Agricultural School
ENCI	National Marketing Enterprise of Agriculture Inputs
EOP	End of Project
FAX	Facsimile communication system
FDA	Foundation for Agricultural Development (at UNALM)
FELAS	Latin American Federation of Seed Associations
FUNDEAGRO	Agricultural Development Foundation
GOP	Government of Peru
GREPI	National Research Project Evaluation Group
IARC	International Agricultural Research Center
II	Insufficient Information
INIA	National Agricultural Research Institute
INIBAP	International Network for the Improvement of Banana and Plantain
INIPA	National Agricultural Research and Promotion Institute
IPAE	Peruvian Institute for Business Management
IPM	Integrated Pest Management
IPAE	Peruvian Institute for Business Management
ISU	Iowa State University
LOE	Level of Effort
LOP	Life of Project
MIAC	Mid-American International Agriculture Consortium
MINAG	Ministry of Agriculture
MT	Metric Tons
NCSU	North Carolina State University
NGO	Non-Government Organization
NI	No Information
NR	National Research (Program)
NQ	Non Quantifiable

NRS	National Research Support (Program)
ODA	Departmental Farmers Organization
OFA	Office of Food and Agriculture (in USAID)
ONA	National Farmers Organization
PACD	Project Assistance Completion Date
PCEA	Cooperative Program of Agricultural Research
PIO/P	Project Implementation Order/Personnel
PL 480	Public Law 480, U.S. Food Aid funds
PVO	Private Volunteer Organization
REE	Research, Extension and Education Project
SCIPA	Cooperative Service for Agricultural Research and Promotion
SIPA	Agricultural Research and Promotion Services
SNIDA	Computerized Information Network
TDC	Technology Diffusion Center
TTE	Technology Transfer Enterprise
UNA	National Agrarian University (at La Molina)
UNALM	National Agrarian University at La Molina
USAID	United States Agency for International Development

## INTRODUCTION

This is the Final Report of the Technical Assistance Team of the ATT Project. The text presents Project accomplishments and shortcomings in the "Analysis and Interpretation of Components" section. As a basis for future agricultural development activities in Peru, lessons learned are presented in the "Conclusions and Recommendations" chapter. Supporting materials are presented in the appendices.

This report was prepared by L. George Wilson, Joseph Cortes and William L. Johnson, with the assistance of Arthur Coutu, William Merrill, Jay Barton and Jan Holman. Special appreciation is expressed to Megan Mehaffey for her expert and efficient word processing and editing assistance. Documents utilized in the preparation of this report are cited in Appendix VI, Bibliography.

The ATT Project began in April 1988 and is scheduled to terminate in August 1993. Its strategy is to utilize lessons learned from prior experiences to assist in further growth of the ongoing science-based agricultural development strategy. The Project has focused on integrating the efforts of important public and private sector institutions to enhance productivity in the agricultural sector. The specific USAID and GOP goals to which the Project contributed were to increase agricultural incomes, rural employment and on-farm capital formation in Peru, while increasing agricultural output for domestic consumption and exports. Its closely interrelated components were (1) technology generation, (2) technology transfer, and (3) human resource development.

Technical Assistance (TA) services to the Project were provided from the beginning until December 1992 through a contract with North Carolina State University (NCSU) and a subcontract with the Mid-America International Agricultural Consortium (MIAC). This report details TA activities, financial and Log Frame components dictated under the Contract, trainee activities and off-shore procurements.

## BACKGROUND: NCSU AND ISU IN PERU

North Carolina State University (NCSU) has collaborated with Peruvians continuously for 38 years on science-based agricultural development. The first NCSU team initiated its technical assistance activities in 1954 under a contract with the U.S. Foreign Operations Administration (a predecessor agency to USAID) to conduct Cooperative Program of Agricultural Research (PCEA) research projects. Subsequent USAID-sponsored programs led to the establishment of National Commodity Research Programs in 1966. These programs were based in SIPA (which later became INIA), but included UNALM faculty as well.

In 1971, the International Potato Center (CIP) evolved out of the NCSU Mission's national potato research program. In 1972, NCSU entered into an agreement with USAID/Washington for soil management research in Yurimaguas which later (1980) resulted in the establishment of the Tropical Soils Collaborative Research Support Project -- a global activity.

Suppression of agricultural research and extension by the Military Government, which came into power in 1968, resulted in an agreement to terminate the USAID Contract in 1972. However, several research projects between NCSU, CIP and others continued.

NCSU programs for technical assistance to Peru were resumed in 1982 with the establishment of the USAID Research, Extension and Education (REE) Project. In 1988, NCSU joined forces with the Mid-America International Agricultural Consortium (MIAC) to provide technical assistance through the Agricultural Technology Transformation (ATT) Project until 31 March 1993. Due to continuing social unrest in Peru the U.S. State Department began reducing the size of the American Mission there. The ATT Project Technical Assistance Team-NCSU/MIAC Mission to Peru was prematurely terminated in October 1992.

NCSU's continuous involvement in Peru over these four decades can best be characterized by the Mission's commitment to the science-based agricultural development strategy, plus the training, research and education benefits to Peru. For example, many of the more than 200 Peruvians who have earned undergraduate and graduate degrees at NCSU, have held prominent positions in Peru. The involvement of over 120 NCSU faculty members in Peru since 1955 has had very positive impacts on them, their programs, their students, NCSU, the community of Raleigh, and North Carolina.

Iowa State University (ISU) has been involved in various agricultural development projects in Peru since 1962. It's initial project covered 15 years from 1962 to 1977, and provided economists, statisticians and forestry economists from ISU and the University of Iowa who assisted the Government of Peru in:

- Training Peruvian students in economics and statistics
- Assisting young professionals in Peru to carry out research related to agricultural development, economic policy, food price and international trade policies
- Carrying out economic policy analysis
- Designing land reform laws and agricultural development policies.

Many of the more than 75 Peruvians who received graduate training under this program currently hold important positions in their country.

ISU's involvement in Peru was renewed in 1984 when they became the lead institute for two MIAC projects. The "Agricultural Policy and Institutional Development Project" (1984-1989) provided technical assistance in agricultural policy planning and the development of Peru's agricultural policy institutes. This involved increasing the policy research capabilities of the MINAG and increasing the macroeconomic research capability for the agricultural sector within the Ministry of Economy and Finance. The second project (1985-1988) provided technical assistance to the National Agrarian University at La Molina (UNALM) to strengthen their training programs in farm management, irrigation, and agribusiness.

**ATT PROJECT BACKGROUND:  
RESEARCH, EXTENSION AND EDUCATION PROJECT**

In 1979, when the military government began the process that would return the government to civilian rule, they requested USAID and NCSU, in collaboration with counter-part Peruvian professionals, to conduct a Baseline Study of the public sector agricultural research, extension, and educational programs of the country. This effort resulted in recommendations that have guided the redevelopment of Peru's public sector agricultural institutions and programs.

The overall Research, Extension and Education redevelopment strategy recognized the severe economic constraints of Peru, pressure on the agricultural sector to increase unit productivity and national food supply, and the shortage of trained personnel. This strategy resulted in the Research, Extension and Education (REE) Project which was designed to encourage short term payoff, concentrate limited resources to high priority commodities and geographic areas, and promote human resource development.

By 1988, the REE strategy had built a firm foundation on the recapitalization of human and physical resources, the creation of an administrative capacity, the establishment of national commodity and support programs, and the development of a user-based REE clientele. The outputs of the science strategy of redevelopment were a major contributor to Peru's 3-3.5% annual agricultural sector growth rates during 1984 -1987.

Major accomplishments of the USAID REE Project include;

- Organization, training and support of scientists and transfer agents which resulted in the production of:
  - Over 70 new crop varieties
  - Associated cultural production packages
  - The establishment of a capacity for the continuous flow of new knowledge and technologies

- Strengthening of seven national commodity programs for: corn, grain legumes, small grains, potatoes, rice, oil crops and livestock/pastures
- Development of Andean and Selva regional programs
- Development of national support programs for: human resources, agro-economics, soil and water, plant protection, genetic resources, computing center, and soil/water laboratories

#### ATT PROJECT: COOPERATING INSTITUTIONS

Previous USAID agricultural development projects since 1980 in Peru had only involved the public sector, probably due to the destruction of an effective private sector role during the military Government rule, 1968-1980. The ATT Project collaborated with the following public and private institutions:

#### UNALM

The Universidad Nacional Agraria at La Molina (UNALM) was established in 1902 as the National School of Agriculture (ENA). In 1960, Law 13417 mandated the transition to university status with the formation of UNALM. UNALM was reorganized academically on a faculty and departmental structure and currently consists of the faculties of: Agronomy, Animal Husbandry, Agricultural Engineering, Economics, Fisheries, Food Science, Forestry, Rural Education, Sciences, and Social Sciences. The Graduate School was formed in 1962. The Foundation for the Development of Agriculture (FDA) was formally recognized as a PVO in 1991. The ATT Project Educational Advisor had an office at UNALM.

Over 2000 alumni participated in the 90th anniversary "Molinero" Homecoming on the UNALM campus on 26 September 1992.

Early in NCSU's four decades of involvement in agricultural development in Peru, faculty collaborated in ENA teaching and research programs.

Iowa State University (ISU) began its involvement in Peru by collaborating in UNALM and GOP programs in 1962.

## INIAA

Although private experiment stations and the National School of Agriculture (ENA) had previously conducted relevant agricultural research, the first truly national agricultural research program was established as a cooperative venture with the US Cooperative Program of Agricultural Research (PCEA) in the post-WWII era. The PCEA was superseded by SCIPA, a continuing collaborative venture with the USA which added an extension function. In the early 1960s SCIPA became SIPA, the first truly all-Peruvian organization.

During the 1968-1979 military government rule, research and extension personnel were used to implement the GOP National Agrarian Reform programs.

About 1970 SIPA was reorganized to INIA, which was responsible only for research. The extension and promotion functions were administered by separate Ministry of Agriculture offices. This arrangement continued until 1981, when INIPA was organized to once again concentrate all public research and extension activities in a single entity -- an arrangement which was to last only until 1987.

The National Institute for Agricultural and Agroindustrial Research (INIAA) was formed in 1987 as part of a GOP restructuring, whereby the MINAG took over responsibilities for extension services from the National Agricultural Research and Promotion (Extension) Institute (INIPA). At the same time, functions and facilities of the former Forestry and Food Technology research institutes were assumed by the new INIAA.

The ATT Project TA Research and Extension Advisors were housed in INIAA headquarters, first in a rented downtown location and later at the La Molina Experiment Station.

In late 1992 INIAA will again become INIA (National Agricultural Research Institute).

## ONA

The National Farmers' Organization (ONA) was formed in 1980 as a national network of private sector agricultural producer associations. ONA was built on its predecessor organization which was originally formed in 1969. There are Farmers' Organizations (ODA) in each Department. Altogether there are over 220 ONA affiliated producer associations, representing nearly every crop and livestock activity in the country.

## **FUNDEAGRO**

The Foundation for Agricultural Development (FUNDEAGRO) is a private sector, non-profit organization developed with the assistance of USAID and the government of Canada in 1988, through the ATT Project. A similar foundation, FUNSIPA founded in 1987 was restructured to create FUNDEAGRO as a registered PVO and NGO dedicated to the modernization of Peru's agriculture. FUNDEAGRO has a Board of Directors consisting of representatives of public and private sector entities, and is managed by an Executive Director. FUNDEAGRO seeks funding from other, non-USAID sources and its long range plans include the development of an endowment.

## **BACKGROUND: REALITIES**

Any project or activity of any magnitude will be influenced by various individual and collective circumstances. The ATT Project survived a multitude of situations that often made management very difficult. Some of the political, social and natural realities that impacted implementation activities and product output during the life of the Project are briefly discussed here.

**TERRORISM:** The Maoist revolutionary groups, Sendero Luminoso (Shining Path) and the Revolutionary Movement of Tupac Amaru (MRTA) escalated their destruction and murder throughout Peru during this period. Before their leaders were captured during mid to late 1992, they had assassinated over 25,000 people and were responsible for bombings and other damages estimated to exceed \$25 billion. These activities contributed to social and political unrest, restricted water distribution as well as electrical power generation, destroyed facilities on several agricultural experiment stations, severely restricted Project activities, and resulted in U.S. Embassy-imposed travel restrictions for Technical Assistance Team members and expatriate consultants.

**GOVERNMENT CHANGES:** At the beginning of the Project, Alan Garcia was President of Peru. His difficulties with the international financial community affected the

obligations of funds for the Project. When UNALM Rector, Alberto Fujimori, became President of Peru in 1990, he used his new influence to have the NCSU and MIAC leaders removed from the Project TA Team. President Fujimori enacted long overdue economic policy changes which were initially traumatic, but began to stabilize the economy and life in general. Examples of policies specifically affecting agriculture include the following:

- Regularization of land titles, with new landholding limits:
  - 250 Ha for irrigated coastal land
  - 450 Ha for agro-industrial projects on coastal lands
  - 1000 Ha for regional and national interest projects
- Open doors for new credit sources
- Privatization and de-monopolization of marketing channels
- Removal of foreign exchange controls
- Stimulation of export opportunities
- Austerity in government expenditures
- Reduction of GOP personnel levels
- Reduced inflation levels
- Elimination of input and product substitution

ECONOMIC SANCTIONS AGAINST PERU: Because of the GOP's inability to satisfactorily meet its loan obligations, economic sanctions by the USA constrained the obligation of some of the approved Project funds. Peru's social and political unrest, and its unresolved record of human rights violations, contributed to the situation. The dissolution of Peru's constitutional government and its Supreme Court in April 1992 further reduced hope for removal of sanctions.

**INFLATION:** The value of Peruvian currency deteriorated weekly during the first two years of the Project. Annual rates of inflation during the 1985-92 period are as follows;

1985	163.40%
1986	77.92%
1987	85.84%
1988	666.97%
1989	3,399.02%
1990	59.16%
1991	137.60%
1992	42.70% (Jan.-Sept.)

**EL NINO:** During the 1991-92 summer the negative influence of the El Nino current along the Pacific coast was even greater than in 1982-83. Heavy rainfall along the northern coast interfered with or destroyed crops and heavily damaged roads and other infrastructures. El Nino was at least partially responsible for lower than normal rainfall in the mountains. This resulted in droughts and subsequent crop failures, and electricity rationing due to the depletion of water supplies for the operation of hydroelectric power plants.

**REORGANIZATION OF COOPERATING INSTITUTIONS:** During 1988-92 all cooperating institutions except UNALM underwent significant reorganization. Personnel changes are detailed in Appendix VII.

INIAA reduced its staff from approximately 6,000 to fewer than 1,000 employees in 1990-91. The Project supported personnel were likewise reduced from 300 to 129. In 1992 INIAA began to involve the private sector in the operation of its experiment stations through a process of privatization and the formation of joint public and private sector "associations." By the end of 1992 INIAA was reorganized once again to INIA, the National Agricultural Research Institute (including an extension component). INIAA was headed by three Directors, three Technical Directors, and two ATT Project Managers during this period.

FUNDEAGRO was headed by three different Executive Directors and underwent changes in its Board of Directors, including its Presidency. The ATT Project Manager was replaced in early 1992.

ONA underwent changes in its Board of Directors, including its Presidency. There were two ATT Project Managers.

ABSENCE OF A FORMAL EXTENSION SYSTEM: The formal extension system has not been functional in Peru due to insufficient funds since 1988, following the separation of extension from INIPA in 1987 to form INIAA. Nonetheless, extension activities have continued through many forms, including technical assistance provided by NGOs, producers' associations, commercial agribusinesses, researchers from INIAA experiment stations, and faculty members from UNALM and various regional agricultural universities. Communication for Technology Transfer in Agriculture (CTTA) activities have been operational in Peru since 1986, supporting regional and local extension offices of MINAG.

ATT PROJECT DESIGN: Originally, the Project design was too broad relative to the level of financial commitment and, thus, somewhat patchwork in character in order to avoid certain MINAG influences and to retain the strong focus on INIAA. It was anticipated that the Project would be supported with \$50 million in USAID grants and \$25 million of GOP counterpart funds. However, ultimately it received \$25 million in grants and no counterpart monies.

POLITICIZATION: Even though efforts were made to avoid the political aspects of the cooperating institutions, special interests were often given priority over technical considerations. Since 1990, the Project has become somewhat of a political football.

PROJECT ADMINISTRATION: Initially, activities and programs were administered by the Project Implementation Committee, with a rotating Presidency. In 1990 this was replaced by the present Coordinating Committee, with a permanent Secretariat. Because Project objectives were very broad, not adequately funded, and often not well enunciated, change occurred from the beginning in implementation modes and project scope. Initially, some researchers used Project funds to work on non-Project activities.

TECHNICAL ASSISTANCE TEAM RESTRUCTURING: Seven different expatriate advisors were involved in the Project, with a maximum of five at post at one time. The Extension, Research and Education Advisors were there for the full term of their contracts. The Seed System Advisor was extended from two to four years. Early in the fourth year of the Project the Technical Assistance team was unexpectedly restructured because Drs. Bandy and Mann were requested by the GOP to leave Peru. Drs. Johnson and Cortes served as Acting Chiefs of Party for four months each. Dr. Wilson assumed Chief of Party responsibilities in late October 1991.

TECHNICAL ASSISTANCE TEAM TERMINATION: On 8 August 1992 the State Department declared an Authorized Departure for the Peru Mission and ordered a reduction of personnel. On 11 August, the Technical Assistance component of the ATT Project was selected as one of the several programs for early termination. The office was closed on 9 October and important documents were transferred to NCSU where preparations of the Project Final Report continued for the remainder of the year.

HETEROGENEITY OF PERU: Contrasts enhance the intrigue of a country such as Peru, but also contribute to the complexity of operations here. Peru's extensive coast, high altitude mountains, and massive jungle provide a multitude of challenging ecological and climatic systems with which to contend. Various levels of Incan influence are still strong in these various regions. Virtually any crop or animal can be grown somewhere in Peru.

## LEVEL OF EFFORT

The level of effort (LOE) of the Project Contract is outlined in the table below.

Details of these items are provided in other sections of this report.

### LEVEL OF EFFORT (LOE)

Category	Person Months		
	Original LOP	LOP to date thru 30 Sept 1992	LOP to date thru 31 Dec 1992
1. Long Term Consultants	217.00	205.00	208.00
2. Short Term Consultants	96.00	16.03	16.78†
3. National Advisors	108.00	135.50	135.50
4. Observational Studies	9.00	6.83	6.83
5. Impact Studies	84.00	64.13	64.13
6. Special Studies	0.00	71.00	71.00
7. Participant Trainees‡	21.00	10.00	11.00

† Including 15 days (0.75 mos) for Dr. Joseph Cortes

‡ M.S. and Ph.D. degrees completed

## FINANCIAL STATEMENT

The Cumulative Financial Status Report for the ATT Program from 1 April 1988 through 30 September 1992 is presented in Appendix I.

### SHORT TERM CONSULTANTS, NATIONAL ADVISORS

A summary of short term personnel used under the contract is presented in the above LOE table. Specific information concerning the involvement of all short term personnel is presented in Appendix VIII.

Short term personnel utilized on the project were categorized, in accord with the NCSU contract, as follows:

- Expatriate, U.S.
- Expatriate, Non-U.S.
- Peruvian National Advisors
- Peruvian Special Studies

## PROCUREMENTS MADE BY NCSU UNDER THE ATT PROJECT CONTRACT

The original ATT contract between USAID and NCSU was signed on 24 March 1988. Amendment 2 to this contract, signed 25 April 1990 modified the original contract for the purpose of allowing the contractor, NCSU, to do commodities procurement services for the ATT project.

Section C - Work Statement, B. Scope of Work, states the following:

"North Carolina State University, acting in the capacity of a procurement service agent shall be responsible for the purchase of approximately \$ 1,632,532 CIF of ATT Project commodities, and for arranging shipment of and insurance for such commodities."

Incorporated by reference to this contract are PIO/Ts Nos. 527-0282-3-80141/80184, which provide the description and specifications of the commodities to be purchased.

Original project budgeting for Off-shore Procurements was structured on the basis of normal prices commonly available to purchasing agencies. However, due to favorable pricing levels available to NCSU, the original budgetary provisions for procurements exceeded the ultimate off-shore commodities needs.

The procurement of all commodities was essentially completed prior to the termination of the Technical Assistance Team's participation in activities in Peru. Replacement parts for Project vehicles purchased under the contract were unavailable in the United States due to vehicle specification differences. Therefore these items were purchased in Lima through the

competitive bidding process.

The communication system for ONA was ordered through Alcatel, an American company, which went into bankruptcy and could not deliver the specified system. It was ultimately determined that none of the alternate American suppliers could satisfactorily provide our needs within the time frame of the contract. Clearance was received from USAID/Peru to solicit competitive bids for this system in Peru. Ultimately, an American manufactured system was procured at a substantially reduced cost in Peru in October 1992, and installed before the end of the year.

Details of all procurements under the ATT contract are presented in Appendix X.

#### **DONATIONS OF EQUIPMENT PROCURED UNDER THE ATT PROJECT CONTRACT**

The donation of all off-shore commodities procured by NCSU under the contract were coordinated with USAID/Peru and followed the Agency's established guidelines and regulations. The disposition of all procurements is presented as an entry in the tables in Appendix XI.

The donations of all other equipment and supplies at the end of the project were done in accordance with USAID's established guidelines and regulations. A summary of these donations to the participating institutions is presented in Appendix XI.

## ATT PROJECT WORK STATEMENT

The information in this section is that which was presented in the original NCSU ATT Project Contract.

### **Project Strategy:**

The Agricultural Technology Transformation (ATT) Project strategy is to utilize lessons learned from prior experience to assist in development of an effective and dynamic agricultural technology generator and transfer (ATG&T) system by supporting the following activities: a) consolidate and enhance the capacity of the public sector research organization National Agricultural and Agro-Industrial Research Institute (INIAA) to generate appropriate productivity increasing technology and to develop internal capacity to make research results available in useable form to those who may be involved in transferring technology to the farmer; b) enhance the capacity of National Agrarian University (UNA) and regional universities to produce suitably qualified technical and professional personnel for staffing both public and private agricultural technology transformation operations; and c) design and test innovative methods for involving the private sector in research generation, technical information production and technology transfer processes, and for strengthening linkages among private and public sector sources and users of technology.

### **Project Description:**

The USAID and Government of Peru (GOP) goal to which this Project contributes is to increase agricultural incomes, rural employment and on-farm capital formation in Peru, while increasing agricultural output for domestic consumption and exports. In order to achieve the Project purpose of expanding the scope and improving the quality and relevance of agricultural technology being generated for Peruvian agriculture and of technology transfer services being produced to Peruvian farmers, the Project incorporates three closely interrelated components, as follows:

- a. Technology Generation Component which relates to the function of carrying out applied and adaptive agricultural research in accord with accepted scientific research methods;
- b. Technology Transfer Component which relates to the function of converting research outputs into communicable form for technology transfer purposes, as well as its actual dissemination and communication to those involved in technology transfer, and to the end user, the farmer; and
- c. Human Resources Development Component which relates to the training and education function for preparing technical and managerial talent required to operate, expand and improve the ATG&T.

**Project Objectives:**

- To address "mentorship" constraints
- To further consolidate and integrate national research and support programs
- To create a corps of extension specialists
- To design and implement strategies for strengthening and integrating private sector transfer institutions
- To develop programs with producer associations that would involve joint actions in adaptive research, technology transfer and training
- To establish a private sector seed production and distribution system for selected crops
- To develop a system for implementing and evaluating competitive grants program
- To develop, implement and evaluate plans for all external degree and non-degree training programs
- To assist UNA and INIAA in administrative management
- To continue development of a national agricultural library/information system
- To focus on linkages between UNA, INIAA and FUNDEAGRO with selected regional institutions
- To continue actions to encourage Peruvian patrons and other external donors to become participants in the integrated technology system

## ANALYSIS AND INTERPRETATION OF PROJECT COMPONENTS

The original Project Design Summary of the Logical Framework is presented in Appendix II. Detailed summary information on component by component accomplishments in relation to Log Frame goals through September 1992 are presented also in Appendix II. The tabular information presented in this section relates directly to the original Log Frame. Omissions of information reported in the latter indicate no activity. Technology Diffusion and Rural Woman activities under component 3B are not related to the original Log Frame.

### Overall General Analysis:

- Design parameters, as determined by USAID and GOP, were recognized early during LOP to be unrealistic in view of deteriorating economic and security conditions.
- The very high rate of inflation early in the project, along with administrative delays in exchange of dollars to local currency, resulted in an excessive loss of value of project funds. Infrequent adjustment of salary and student stipend levels further eroded their value, causing serious morale problems among project personnel and many student drop-outs for economic reasons.
- The Log Frame for the ATT Project was developed on the assumption that \$ 27-28 million of PL-480 and PL-416 funds would be available. Because this anticipated source of support funds was not realized, many planned activities had to be reduced or eliminated.
- Some Log Frame activities reported on were not a part of the original Log-frame. However, because of approval of additional PL-480 funds for the private sector and/or the approved reassignment of appropriated funds, these activities were initiated late in the life of the project; the Technology Diffusion Activity of 3B, the Rural Woman Activity of 3B and the Partial Scholarship Program of 3C.

## **COMPONENT 1: TECHNOLOGY GENERATION**

### **ACTIVITY A: Consolidation and integration of INIAA Research and Research Support Programs. (Implementing Institution: INIAA)**

#### **Log Frame Outputs: (Tables 1 and 2)**

1. INIAA's 18 National Research (NR) and 3 Research Support (NRS) programs will have achieved high standards of quality and cost-effectiveness in their services to target clientele.
2. INIAA's NRS Programs will have reached planned minimum levels of staffing and operation.
3. Flow of improved technologies from INIAA's NR Programs will be sufficient in quantity, quality, relevance and range of applicability to elicit tangible support from client groups.
4. INIAA's NR Programs will have in place strong, active linkages with other important research institutions (national and international), educational institutions, and entities that provide technical assistance and support services to target producer groups, and will be providing leadership for inter-institutional cooperation.
5. The National Programs of INIAA will have achieved a sufficient degree of maturity to be assured of continued political and financial support adequate to sustain the LOE existing at the conclusion of the ATT Project.

#### **General Analysis:**

- Due to several factors, INIAA's Log Frame goals were not achieved in their entirety. On the other hand, some of these same factors have helped to downsize and streamline the organization so that it is now better positioned to meet Peru's applied agricultural research needs for the rest of the decade. Of special note were the extensive staff and program revisions and reductions during the LOP; from 36 to fewer than 15 experiment stations; from approximately 6000 to fewer than 1000 employees. Also noteworthy was the considerable progress made toward transfer of some EEs to new Regional governments, and privatization

of others. On the negative side, voluntary retirements have deprived INIAA of some of their most capable and experienced research leaders. Training at least to the M.S. level is a continued need for INIAA's research personnel.

Only a fraction of programmed RP annual meetings were held, and the agreed-upon schedule for internal and external reviews of RP's was interrupted. Both of these valuable activities should be resumed on a regular basis (internal review every two years; external review every 4-5 years, for each program) as INIAA recovers a more adequate operating budget.

Personnel requirements initially proposed for RPs in the Project Log Frame were probably excessive and unrealistic in relation to support budget realities. On the other hand, the current numbers of researchers assigned to the NRS programs are insufficient.

- Privatization of some of INIAA's experiment stations on the coast, late in the LOP of the Project, is an independent, unrelated action which has, nonetheless, begun to influence related activities; e.g., 1A, 1B, 1C, 2A, 2B, 2C, and 3B.

- Of the nine initial NR programs, four (potatoes, grain legumes, tropical crops and Andean crops) advanced significantly, while others (rice, corn, cereals, oilseeds and live-stock) made limited advances. New programs added include fruit crops, forestry and food technology. In general, those programs which progressed the most during ATT LOP were those which had benefitted from a strong start during the previous REE project, an observation which underlines the payoff to long-term consistency in programs designed to strengthen the agricultural technology generation and transfer system.

- With regard to production of basic and foundation seed, it does not appear that Log Frame goals can be met by the end of the project. Legumes and cereals are exceptions, having already substantially exceeded goals.

Project design goals for breeder and basic seed production for certain crops (e.g. rice) were unrealistic, perhaps due to a blurring of the distinction between basic seed (expected to be released only for multiplication) and certified seed (for release to commercial producers).

In some cases, basic seed was released to farmers who planted it for production of grain, rather than seeds.

Data presented in Table 1 are, accordingly, relatively deficient in relation to Log Frame goals. Foundation seed production is generally adequate on the coast, but deficient in the jungle and highland areas.

- With regard to the development of improved agronomic practices, EOP Log Frame goals have been exceeded by a factor of two to six fold. Although agronomic practices developed by INIAA exceeded Log Frame goals by 300%, many of these practices do not necessarily respond to farmers' needs. Log Frame goals for the development of improved livestock management practices are ahead of target.
- In spite of limited success in including producers in the decision-making process for INIAA's research programs, the prevailing economic and socio-politic climate has prevented all of them from reaching the goal of sufficient client support to ensure that the EOP LOE will be maintained. For INIAA to continue a program of even limited significance in the short run, the operating support which has been provided by the ATT project will need to be replaced from an alternative source.
- A detailed analysis of each National Research (NR) and Research Support Program (NRS) follows.

#### **Analysis of NR Programs:**

##### **Rice:**

- Having produced two of the planned 5-10 new varieties of rice, the INIAA rice breeding program is deficient. Consolidation of rice research, with excellent private sector support and participation, has occurred only on the Coast. INIAA's rice research should be focused on jungle sites in the future, giving emphasis to variety development for improved yields and disease resistance, and sustainable management practices for acid soils. Stronger international linkages will be important for continued success.

**Corn (Maize):**

- One new maize variety was produced by INIAA, or 50% of the Log Frame Goal. INIAA's research on maize variety development (synthetics) should now focus on the jungle and highland areas, letting the private sector continue to meet needs for new hybrids for the Coast. It is essential that strong linkages be maintained with CIMMYT's regional network.

**Potatoes:**

- Thirty percent of the Log Frame goal, virus-free foundation seed, was produced. They also produced 367% of the new varieties, and 200% of agronomic practices. Some progress was made in linking with private sector leaders. Good linkages continue with CIP, but strong national leadership is necessary to be able to take full advantage of CIP's regional Andean network (based in Bogota).

**Grain Legumes:**

- The Log Frame goals of variety development and improved agronomic practices were somewhat satisfactory. However, only 17% of the breeders seed was produced. The program suffers from trying to attend to too many crops, some of which should be left to regional programs (e.g., lima beans and cowpeas). Strong linkages with CIAT need to be maintained.

This program is unique in its successful linkage with an NGO for backyard production of commercial seed.

**Cereals:**

- Overall 50% and 250% of the Log Frame goals for variety development and improved agronomic practices, respectively, were met. This program should concentrate only on wheat, with strong linkages with CIMMYT. Other cereals such as barley, oats, and triticale should be the responsibility of regional EEs.

### **Oil Seed Crops:**

- Unlike the above NR programs, all of which were implemented during or before the REE project, this was initiated at the start of ATT Project and has not had similar opportunities to mature. Fewer opportunities exist for linkage with regional and international networks. It is recommended that Oil Seed Crops be deactivated as a national program. Individual crops, such as peanuts, sunflower, soybeans, sesame, and African Oil Palm should be the responsibility of regional programs in the areas of their respective local potential, and with strong support from the private sector.

### **Tropical Crops:**

- This program has registered solid progress toward implementing a relevant research program for the Amazon region, with emphasis on agro-forestry and management of acid soils. It has achieved 560% of the Log Frame goals for agronomic practices. The majority of the crops included in this program are perennial, and multiple cropping research strategies are employed. Impact is necessarily long term, but extremely important for future resource management in the Amazon region.

This program should consolidate its linkages with other Amazon region national programs, particularly those of Brazil. PROCITROPICOS is the best vehicle for such linkages. Banana and plantain research efforts in northern coastal areas should be linked with those of INIBAP, the International Network for the Improvement of Banana and Plantain.

### **Andean Crops:**

- This program has allowed INIAA to gain unique international recognition. For instance, quinoa germplasm has been requested internationally, including institutions in the USA. Quinoa variety development has exceeded Log Frame goals by 225%. However, variety development and the production of foundation seed of other Andean crops has been minimal. Agronomic practices have met Log Frame goals.

Andean root crop research efforts will be reinforced by the new CIP programs in these areas. Responsibilities for some of the crops now included in this national program might best be transferred to regional EEs.

**Livestock:**

- Improved livestock nutrition management practices are ahead of Log Frame goals. This program has tried to cover too many species on a national basis. Strong accomplishments have been registered with guinea pigs; INIAA germplasm has been distributed to many other countries. New tropical forage varieties have been released, thanks to long term strong linkages with CIAT's Tropical Pastures regional network.

Emphasis in the future should be on promoting on-farm testing and adoption of new guinea pig production practices, seed production for proven forage varieties, and producer-driven projects to improve cattle, sheep and alpaca management .

**Silviculture and Forest Management**

- This non-Log Frame activity received limited Project support because of its new priority status resulting from the 1988 merger of the former Forestry Research Institute with INIA to form INIAA. It has formed excellent linkages with the private sector in the Northern Andean region. It deserves special emphasis in selected parts of the highlands and jungle, due to its potential contribution to erosion control, resource management, and biodiversity conservation.

**Food Processing and Technology:**

- This non-Log Frame activity received limited Project support because of its new priority status resulting from the 1988 merger of the former Food Technology Research Institute with INIA to form INIAA. Unfortunately, it has made little progress since. This program has failed to take advantage of opportunities to merge with private sector interests, especially to develop new export options. It has excellent facilities available for active joint ventures, but needs support funding for maintenance and upgrading.

**Fruit Crops:**

- This non-Log Frame program was created late during the LOP, with much publicity about involving private sector leaders. Unfortunately, INIAA leadership was a bottleneck, and the program has made little progress. A successful INIAA fruit crops research program

will require close collaboration with producers, along with their material support. Individual efforts with the grape industry have demonstrated how this can be accomplished.

#### **Analysis of NRS Programs:**

##### **Germplasm:**

- The Genetic Resources Program has been implemented and is functional. The National Germplasm Bank at Puno and the National Network of Germplasm Banks have been implemented. All accessions have been catalogued and a large percentage have been described.

Because of the increasing global interest in biodiversity and conservation, with proper leadership, this program has the potential of attracting significant international financial support.

##### **Computer Services:**

- Computers and software packages were installed at most sites, but the National Network of Computerized Information Services has not yet been installed. For statistical services, individual researchers and EEs have had to rely on their own resources for more than the most elementary analyses. This is an area of priority need for the immediate future.

##### **Laboratory Services:**

- At the current rate of analyses of soil, water and plants, less than 20% of Log Frame goal will be achieved by the EOP, and most of these are probably soil analyses. It is highly unlikely that consolidation of fully equipped laboratories at 17 sites will be achieved by EOP. This is a service function which needs to be moved to private sponsorship if it is to be revitalized. Plant Protection (insect, disease and weed identification) and Animal Health (diagnostic services) likewise need rejuvenation. Laboratory management should ultimately be provided by private sector entities such as regional producer organizations.

### **Agroeconomics-Economic Research:**

- Studies to determine the priority agro-ecological zones, and economic evaluation of new technologies have been completed. However, the various recommended special studies have not been initiated. A major problem has been the inability of INIAA to retain the cadre of competent, well-trained economists that were working for this program at the beginning of the Project.

A possible solution would be to develop working linkages with national universities and private firms through a granting or contracting mechanism. This type of effort could provide such needed services as training of INIAA research staff in basic techniques of economic analyses.

### **Integrated Pest Management:**

- The Integrated Pest Management program (IPM) has been implemented in five priority experiment stations. At each of these locations, appropriate linkages have been developed with university specialists. This program has suffered greatly from the INIAA early retirement incentives, and will need considerable rebuilding as INIAA moves to train new, young research staff. Strong linkages with UNALM and regional universities will be helpful. More research should be conducted on farms, through cooperative agreements with producers' associations.

### **Soils and Water Research:**

- This program was implemented late in the LOP to consolidate projects that were scattered throughout other programs, and to provide new emphasis to irrigation technology. Unfortunately, there has not been adequate leadership to fully take advantage of opportunities available to the program. This program is potentially important for all applied commodity research within INIAA, but must link closely with the MINAG, universities, and producer associations in order to have significant impact.

Table 1. Log Frame Outputs and Project Accomplishments of Component 1A in Relation to Original Project Design Summary and Logical Framework

National Commodity and Region Research (NR) Programs

Outputs: Crop/Program	Verifiable Indicators	Accomplishments	
		No.	%
National Research (NR) Programs	9	7	78
Rice	5-10 New varieties	2	40
	Breeder seed: 224 MT	0	0
	Foundation seed: 11,540 MT	II	II
	5 Agronomic practices	12	200
	Research consolidated at 16 sites	3	20
	Personnel: 25 researchers	NI	
	11 seed prod. specialists	NI	
	11 rice ext. specialists	NI	
	20 technical support	NI	
Corn	2-4 New varieties/hybrids for Selva	1	50
	Breeder seed: 250-300 MT	>1	0
	5 Agronomic practices	10	200
	Personnel: 32 researchers	NI	
	17 seed prod. specialists	NI	
	18 ext. specialists	NI	
	26 technical support	NI	
Potatoes	Virus-free foundation seed: 5,000 MT	1,680	30
	2-3 New varieties	11	367
	20,000 Units for storage for 40,000 MT	NI	
	5 Agronomic practices	11	200
	Personnel: 21 researchers	NI	
	17 seed prod. specialists	NI	
	13 ext. specialists	NI	
	16 technical support	NI	
Grain Legumes	15 New varieties	12	80
	5 Agronomic practices	19	400
	Breeder seed: 33 MT	16	17
	Personnel: 41 researchers	NI	
	25 seed prod. specialists	NI	
	25 ext. specialists	NI	
	33 technical support	NI	

Outputs: Crop/Program	Verifiable Indicators	Accomplishments	
		No.	%
Cereals	6 New varieties in Wheat	4	67
	2 New varieties in Barley	0	0
	5 Agronomic practices	13	250
	Breeder seed: 158 MT	1	0
	Personnel: 25 researchers	NI	
	16 seed production specialists	NI	
	15 extension specialists	NI	
	19 technical support	NI	
Oilseed	4 New varieties in Soybean	0	0
	2 New varieties in Sunflower	0	0
	3 New varieties in Peanuts	0	0
	Foundation 2175 MT	0	0
	Personnel: 16 researchers	NI	
	10 seed production specialists	NI	
	9 extension specialists	NI	
	13 technical support	NI	
Tropical Crops	Soil and Water Technology for:		
	Annuals Crops: 60,000 Ha.	NI	
	Perennial Crops: 10,000 Ha.	NI	
	Pastures: 10,000 Ha.	NI	
	Agriculture Practices for:		
	Coffee: 60,000 Ha.	NI	
	Cacao: 13,000 Ha.	NI	
	Avocado: 13,000	NI	
	Papaya: 1,000 Ha.	NI	
	5 Agronomic Technology Packages for: Pijuayo, Camu-camu, Araza and Castina	28	560
	Personnel: 36 researchers	NI	
	8 seed production specialists	NI	
	10 extension specialists	NI	
32 technical support	NI		
Agronomic Practices for Yuca, Banana and Coffee	NI		
Andean Crops	4 New varieties of Quinua	9	225
	4 New varieties of Kiwicha	1	25
	2 New varieties of Canihua	0	0
	4 New varieties of Tarwi	1	25
	3 New varieties of Oca	1	33
	3 New varieties of Mashua	1	33
	Foundation seed: 335 MT	120	37
	Several agronomic practices	16	100

Outputs: <u>Crop/Program</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	
		<u>No.</u>	<u>%</u>
Livestock (Animal Nutrition)	Improved management practices in: Coast: alfalfa and corn fodder Highlands: pasture management Jungle: grazing intensification Improved supplemental feeding Utilization of agricultural and industrial by-products in Jungle and Highland	15	125
(Genetic Improvement)	Improved artificial insemination for cattle and sheep	II	
(Health Management)	Practices for increased fertility, weight gains, and reduced incidence of illness and death rates Personnel: 59 researchers 45 technical support	II  NI NI	

Table 2. Log Frame Outputs and Project Accomplishments of Component 1A in Relation to Original Project Design Summary and Logical Framework

National Research Support (NRS) Program Outputs

<u>Outputs: Crop/Program</u>	<u>Verifiable Indicators</u>	<u>Accomplishments No.</u>	<u>%</u>
National Research Support (NRS) Program	6	6	100
<b>1. SENAGREN-Germplasm Services</b>			
Germplasm Bank	25,000 accessions of 95 species	bank established 10,000 accessions	100 40
Network of Germplasm Banks	7 sites Personnel: 43 researchers 43 technical support	7 NI NI	100
<b>2. SEMAC-Computer Services</b>			
Computer Network	All sites (9)	0	0
Local Computers		several functioning	
Scientific Analysis	74 sites	II on precise numbers	
Software Packages	74 sites Personnel: 11 professionals 11 technical support	II on precise numbers II II	
<b>3. SENALAB-Laboratory Services</b>			
Laboratory Services			
Additional Regional Labs	3	II	
Analysis Services	400,000	59,000	11
Fully Equipped Lab	Research support: 7 sites Routine analysis: 10 sites Personnel: 65 professionals 65 technical support	II II NI NI	
<b>4. AGROECONOMICS-Economic Research</b>			
Agro-Econ Studies by zone	11	11	100
Economic Evaluation	2	2	100
Special studies	3	0	0
Maintain data bank of new technology	- Personnel: 46 professionals 9 technical support	II NI NI	

Outputs: <u>Crop/Program</u>	<u>Verifiable Indicators</u>	<u>Accomplishment</u>	
		<u>No.</u>	<u>%</u>
<b>5. SENAPIC-Integrated Pest Management</b>			
IPM programs	5	5	100
Research within community program	37 sites Personnel 93 professionals	II NI	
<b>6. SOILS AND WATER RESEARCH</b>			
Water and Soil Management Research	31 Personnel: 12 professionals 2 technical support	14 NI NI	44

**COMPONENT 1: TECHNOLOGY GENERATION**

**ACTIVITY B: Strengthening INIAA administration and management. (Implementing institution: INIAA)**

**Log Frame Outputs: (Table 3)**

1. Implement mechanisms to improve planning, administration, supervision and evaluation of the programs of research and of research support.
2. Provincial research facilities will be integrated into the INIAA, NR and NRS programs.
3. Functional systems of personnel evaluation system and merit compensation will be in place.
4. The private sector and the universities will be actively integrated into the programs of research and research support of INIAA.

**General Analysis:**

- During 1991-92, INIAA and the GOP have attempted to divest themselves of some of the management and financial responsibilities related to several EEs (under the privatization concept, whereby associations are being formed). These EEs are all on the coast, where stronger private leadership and more favorable economic conditions exist. The modified Project Log Frame summary of accomplishments in Appendix II evidently accounts for these actions. In reality, EEs continue to be under the control of La Molina Central. The Hualtaco EE is an exception, as its public-private sector association has been implemented.

Previous reductions from 36 to about 20 EEs were implemented as part of Regionalization and consolidation. Objective criteria based on national network requirements for each major commodity program were used in deciding which EEs to maintain in the national system and which to transfer to governments.

All such exercises in consolidation and improved management need to take into account the need to maintain national networks, and linkages with international networks, for commodities that are important across regional boundaries.

## Associations Information

### Experiment Station

### Department

Viru

La Libertad

Hualtaco

Piura

El Chira

Piura

Vista Florida

Lambayeque

Chincha

Lima

Sta. Rita de Sigvas

Arequipa

San Camilo

Arequipa

Moquegua

Moquegua

- 
- Reduced working hours at all INIAA facilities negatively affected personnel output in terms of quantity and quality. Frequent work stoppages dictated by the union leadership and membership were disruptive factors throughout most of the LOP. Frequent power outages and rationing, the result of terrorist attacks on power transmission lines, also reduced productivity.
  
  - All NRs and NRSs have been positively affected to some degree in terms of planning, managing, evaluation and monitoring. A self-monitoring system was implemented, whereby NR Program Leaders could rate their respective programs objectively on the basis of accepted indicators of program maturity.
  
  - An external evaluation mechanism was implemented for the more "mature" programs (corn, potatoes, grain legumes, livestock, integrated pest management). In each case the evaluation team consisted of one international expert, one national expert external to INIAA, and one producer representative. Additional planned evaluations were canceled due to INIAA's reorganization and personnel reductions.
  
  - Research program leaders created new linkages with private producer groups and universities, and improved their program planning, evaluation and implementation. New

international linkages were created and those formed previously were facilitated by Project supported international travel early in the LOP.

- Personnel evaluation systems based on productivity and merit were devised, but not implemented due to lack of political and financial support. Nonetheless, promotions and salary adjustments should be based on peer reviews of productivity, and all top administrative posts at EEs and in the national headquarters should be filled by experienced researchers. Progress has been made toward the latter goal.
- Mechanisms developed early in the Project for monitoring and evaluating INIAA's administration and management should be resumed as soon as conditions permit.
- Keeping in mind that the Project has 11 more months to PACD, results reported here could improve.

**Output Analysis:**

- A seed multiplication, distribution and certification program plan has been completed.
- Studies of laboratory services and machinery services have been completed.
- Additional information on analysis of seed multiplication, distribution and certification program is presented in the analysis of 2C.

Table 3. Log Frame Outputs and Project Accomplishments of Component 1B in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Planning Unit, annual evaluations and improved mechanism for managing and monitoring NRs and NRS programs will be in place.	9 NR and 6 NRS Programs will be positively affected in: a) Quality improvement b) Personnel stability c) Research output	Quality improvement positive Personnel stability negative Research output positive	25 0 40
Regional Research Facilities transferred and operating as well designed research programs.	24 CIPAs (Experiment Stations) affected	Affected: 7 Implemented: 1	33
Personnel evaluation and merit-based compensation system will be in place	Administrative and technical leadership positions with graduate degrees will increase	Personnel evaluation system: II. Merit-based compensation system: 0	- 0
A seed multiplication, distribution and certification program will have been completed and INIAA's role defined.	3 feasibility studies completed and one in process of implementation	Seed program planned and well underway. Studies of services completed and role of INIAA defined	100 100

**COMPONENT 1: TECHNOLOGY GENERATION**

**ACTIVITY C: Expanding research opportunities. (Implementing institution, FUNDEAGRO)**

**Log Frame Output: (Table 4)**

1. Number of researchers working on agricultural technology problems will increase. Quality and volume of research will increase and research relevant to practical farm problems will improve.
2. Quality of graduates will improve because of improved teaching by faculty with research experience and because of involvement of students in practical problems.
3. Faculty morale and ability of the university to retain higher quality faculty will improve. Entrepreneurship of faculty in research grant competition will increase.
4. Effective research programs will be underway at UNALM in farm management, transportation and marketing economics, irrigation and drainage, and agricultural mechanization.

**General Analysis:**

- UNALM Project goals will not be attained in general, due to their delayed initial involvement in the Project. Graduate degree faculty turnover was also influenced by this delay.
  
- Research programs are underway in the appropriate departments of UNALM in Farm Management, Transportation and Marketing Economics, Irrigation and Drainage, and Agricultural Mechanization, involving 24 faculty in 57 projects.

**Output Analysis:**

- The Research Projects Evaluation Group (GREPI), made up of representatives from each of the participating institutions plus the Technical Assistance team, has met quarterly for the LOP and evaluated nearly 800 proposals. Of the 250 research projects programmed for

approval under this activity, 176 have been approved and funded (14 initiated in 1992), of which 92 are completed with reports, and 81 will be finalized by August 1993. This activity is performing on schedule and will approach fully achieving its Log Frame goals by the EOP. Especially during the last year, GREPI was directed to re-orient research priorities toward projects of interest for agro-industry and agro-exports. GREPI has also been directed to evaluate all research results in anticipation of preparing technology diffusion packages for use by technology transfer personnel and farmers. Each research project has involved several researchers, including the project leader, collaborators, and students. A few leading researchers have been awarded more than one project grant.

- Of the annual research conferences scheduled for the LOP, three were conducted; none during the last two years, due to a decision to redirect limited funds to research and publication awards.
- All eleven of the agro-ecological zones of Peru have been covered by this activity. Regional conferences covering all zones were held wherein private, public and university sector leaders collectively determined priority commodities and actions for the respective zones. Recommendations were published and followed by the GREPI in prioritization of research proposals.
- UNALM faculty were projected to develop at least 13 effective research programs in farm management, irrigation and drainage, transportation economics and agriculture mechanization. Within these four disciplines, a total of 57 individual projects have been implemented.
- FUNDEAGRO established an awards program to encourage the production of high quality publications such as extension bulletins, journal papers, and student theses, and to promote travel to in-country scientific meetings; all on a competitive, peer reviewed basis.

- FUNDEAGRO was encouraged to seek private sector funding for its research grants program as a mechanism for broader participation in high priority investigations.

Table 4. Log Frame Outputs and Project Accomplishments of Component 1C in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Number of researchers will increase quality and quantity of research to resolve practical problems.	250 GREPI research projects completed	176 approved	70
Quality of graduates will improve.	Significant improvement	II	-
Retention of higher quality faculty will improve and matching grants institutionalized.	Turnover of graduate degree faculty halved	See General Analysis	-
Effective Research Programs in UNA Farm Management, Transportation and Market Economy, Irrigation and Drainage and Agricultural Mechanization underway on a sustainable basis.	Farm Mgmt - 4 faculty Transport Econ - 1 faculty Market Economist - 1 faculty Irr. and Drain. - 5 faculty Ag Mechaniz. 2 faculty	Farm Mgmt - 5 faculty Transport Econ - 1 faculty Market Economist - 4 faculty Irr. and Drain. - 6 faculty Ag. Mechaniz. 8 faculty	175

**COMPONENT 2: TECHNOLOGY TRANSFER**

**ACTIVITY A: Establishing the technology transfer specialist program.** (implementing institution: INIAA)

**Log Frame Output: (Table 5)**

1. Rate of technology adoption will increase by 10 to 20%.
2. The technology adoption cycle will be reduced from 8-10 years to 6-8 years.
3. At least 55 specialists will be trained and actively incorporated into the corps.
4. Cooperative arrangements will be in place between the Ministry of Agriculture and with Associations of Producers to increase the sense of participation of the farmers and the private sector in the programs of research and technology transfer and to aid in retaining key specialists.
5. Relationships among researchers, specialists, and producers will be broadened and strengthened.

**Output Analysis:**

- In consideration of the prevailing conditions, it is unlikely that the full adoption cycle for technology transfer was significantly reduced. However, several INIAA NR programs became more active in the on-farm phase of technology testing, including field days, thereby facilitating adoption by cooperating farmers and neighbors.
  
- The development of the corps of Technology Transfer Specialists was programmed at 55 in the original Log Frame. However, about half of the 50 that were trained accepted INIAA incentives to resign as a part of the reduction of the size of the GOP.
  
- An agreement was signed and implemented in 1989 between INIAA and the National Rice Committee, but for various reasons was prematurely discontinued in early 1991.

- In consideration of prevailing conditions, it is unlikely that researcher-specialist-producer clientele relationships were broadened or strengthened. However, some progress was made as NR programs became aware of the necessity for producer input during the research planning process and the evaluation of the applicability of new technologies.

Table 5. Log Frame Outputs and Project Accomplishments of Component 2A in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Technology Transfer (TT) program will result in application of improved technology on larger proportion of land.	Rate of technology will increase by 10-20%	NI	-
Linkages with producers associations will increase technology adoption and private sector motivated to sustain TT efforts and provide mechanisms to attract research and TT specialists.	Recruitment of post-graduate professionals increase significantly	0 See 3B	0
A corps of TT specialists established and functioning in INIAA.	55 specialists	25	45
Cooperative arrangements with producer associations to provide collaboration in research and TT.	Arrangements with 2 national commodity committees	1, canceled	0
Process of utilization of research results will be accelerated.	Adoption cycle reduced to 6-8 years	II	-
Researcher-specialist-producer clientele relationships broadened and strengthened.	9 NR program activities	II	-

**COMPONENT 2: TECHNOLOGY TRANSFER**

**ACTIVITY B: Stimulating private sector technology transfer enterprises. (Implementing institutions: FUNDEAGRO, ONA)**

**Log Frame Output: (Table 6)**

1. Establish and support at least ten technology transfer enterprises.
2. Train the pilot enterprises in techniques of technology transfer and in business management. (Two courses per enterprise)
3. Establish inter-institutional agreements with International Research Centers. (One to four agreements)
4. Establish agreements between enterprises and investigators for the transfer of technology. (One to three agreements)
5. Train one technician per enterprise, up to 10 technicians.
6. The ONA Statistical and Economic Analysis Center (CEAE) will be carrying out its functions on a self-sustained basis.
7. ONA will become a strong viable organization furthering and supporting technology transfer.

**Output Analysis:**

- Nine technology transfer enterprise (TTE) agreements were established by FUNDEAGRO. Six of these were discontinued because they were unsuccessful. The three that have been sustained are functioning well.
- Three TTE (Hualtaco, Santa Rita de Sigwas and Moquegua) have been implemented and are identifying and prioritizing specific technology needs and specific research and/or extension programs.
- None of the TTEs have been effectively incorporated into the networks of the IARCs (International Agriculture Research Centers), which would enable them to directly import new technologies.

- The TTE at Hualtaco has established a linkage with APHIS to improve the flow of technology to Peru. The TTE at Huaral will also be able to take advantage of this technology.
- Sixteen technical reports of problems potentially addressable through development and adaptation of new agricultural technology have been prepared by ONA, representing slightly over 50% of the Log Frame goal.
- Six working relationships and agreements with national and international researchers have been established with inputs being fed into the local research and extension system for evaluation, representing 200% of the Log Frame goal.
- Three formal agreements with national and international researchers were programmed, but six were formalized; doubling the Log Frame goal for LOP.
- Analysis of primary production problems is continuing and profitable technology and commercial use elsewhere is being sought for solution of these problems.
- Insufficient information is available to determine if technology has been introduced, tested, adapted and followed up on in terms of related research.
- Six professional employees were trained to extend technology and follow up on related research; two of whom are still active in TTE activities.
- Neither FUNDEAGRO nor any of the TTEs have established linkages with UNALM or regional universities, or other research organizations to carry out research on problems not solvable with introduced technology.
- Because the involvement of the private sector in research station activities was only initiated during 1992, no measurable improvements have yet been apparent in the efficiency

of the use of the public sector research and extension resources which should ultimately reduce the public sector cost per hectare adopting new technology.

- The Statistical and Economic Analysis Center of ONA has provided at least ten forms of information and assistance. These are detailed on pages 6-7 of the modified Log Frame in Appendix III. This subscription information has been made available to various institutions and firms on a fairly continuous basis. On the average, approximately 75% of the 100 firms required in the Log Frame have been provided with information.
- The institutional strengthening of ONA, in terms of organizational structure and system of personnel management is progressing well. Log Frame goals will probably be achieved before the EOP.

Table 6. Log Frame Outputs and Project Accomplishments of Component 2B in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
ATT resources flow to institutions most able to contribute to new technology development and transfer.	At least 10 agreements in place (FUNDEAGRO)	3 sustained 6 canceled	30
TTEs will identify and prioritize specific technology needs and specific research and/or extension programs.	At least 10 enterprises assisted to perform this function (FUNDEAGRO)	3	30
TTEs will promote direct importation of new technology from IARCs.	At least 3 enterprises assisted to perform this function (FUNDEAGRO)	0	0
TTEs will establish linkages with international organizations and groups to improve flow of technology to Peru.	At least 4 enterprises assisted for this function (FUNDEAGRO)	1-2	25
Technical reports of problems potentially addressable through development and adoption of new agricultural technology.	At least 6 reports per year (ONA) Total = 30	16	50
Working relationships & agreements with national & international researchers established & inputs fed into local Research & Ext. system for evaluation.	At least 3 agreements	6	200
Analysis of production problems, on-going and technology sought elsewhere for their solution.	Continuing	N/C	-
Technology introduced, tested, adapted on related research.	Sustained flow	NI	-

Table 6 (continued)

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Professional employees trained to extend technology and follow-up on related research.	At least 10 persons (FUNDEAGRO)	2 sustained 4 discontinued	20
Linkages established with Agricultural Universities to carry out research on problems not solvable with introduced technology.	At least 10 linkages (FUNDEAGRO)	0	0
Measurable improvement in public sector research and extension efficiency brought about by private sector complimentary inputs.	Cost per ha. of public sector research and extension by 50%	0	0
CEAC of ONA provide production economics, farm records, price analysis and market new to established TTEs Center will be self-sustaining.	Subscription information to at least 100 firms and institutions (ONA)	See Output Analysis	75

**COMPONENT 2: TECHNOLOGY TRANSFER**

**ACTIVITY C: Stimulate the production and distribution of improved seed and expand seed certification programs. (Implementing institution: FUNDEAGRO)**

**Log Frame Output: (Table 7)**

1. Encourage formation of new seed companies with increased conditioning capacity and capable of moving a volume of certified seed sufficient to permit economic viability on a self-sustaining basis.
2. Improve mechanisms of quality control and seed certification services on national and regional level.
3. Stimulate the organization of national and regional seed growers' associations.

**Output Analysis:**

- A national association of Peruvian seed enterprises was formed in accordance with Log Frame requirements which also called for this association to be affiliated with ONA. Although ONA affiliation might be useful and achievable by EOP, initially, it was deemed more important to secure association representation in the National Seed Commission (two seats secured) and in the Latin American Federation of Seed Associations - FELAS (also occurred in Sept. 1992).
- The formation and establishment of three local seed associations and three local seed certification services were blended functionally into the responsibilities of the Departmental Seed Committees (CODESEs). While the original goal was three, in time it became necessary to increase this number to eight due to movements of seed stocks within and among Peru's departments by the various seed enterprises. For example, one enterprise produced rice seed in La Libertad, Lambayeque and Piura, processed it in Piura and sold it in La Libertad, Lambayeque, Piura and Arequipa. This obviously required quality control in all four departments. The corn and cotton situations were similar.

- The Log Frame goal for tripled investment of private sector as compared to previous period, is considered to be achieved. Although seed enterprises prefer not to divulge confidential financial information, the goal is considered to be achieved based on the increase in the number of seed enterprises from the original six to 26 in Sept. 1992, and still growing.

- The Log Frame goal of a significant increase in certified seed use by farmers is difficult to quantify. As explained in the General Analysis of 1A, the quantities of foundation seed were overestimated and no significant quantities were provided for certified seed. Seed production outputs for 1988 (start of Project) are compared with 1992 seed production outputs for rice, corn, potato, cotton, beans and small grains. In all crops except corn there was an increase ranging from 37 to 1520%. Due to the 1992 drought, many north coastal farmers decided to plant corn rather than rice, which depleted the corn seed stocks of all seed enterprises. Additional demand for corn seed stock went unfulfilled. Otherwise, there would have been increased volumes of corn seed sold, rather than appearing as a 30% decrease in the use of certified seed.

One should avoid concluding from these analyses that more seed of all crops is not required. Undoubtedly, jungle and highlands areas can increase yields by the use of high quality seed of improved varieties and/or hybrids. However, such increases must be on the basis of creating demand and producing improved seed in accord with demand, and assisting local seed enterprises to develop their own markets. As conditions improve in these areas seed enterprises should develop naturally.

- One of the Log Frame assumptions to attain the goals of the seed component was that "INIAA and UNALM would divest themselves of certified seed production activities". This was accomplished in the case of INIAA, but not at UNALM. More important, however, was the divestiture of seed production activities of the ECASA and ENCI parastatal organizations. Furthermore, the transfer of all seed infrastructure and equipment to farmers' associations was a major accomplishment of this component.

- Another Log Frame assumption was that "regulatory changes would be forthcoming to

encourage self-regulating private sector certification programs:". With the advent of a new, pragmatic government in 1990, decrees were issued delegating seed certification activities to the CODESEs, restructuring the National Seed Commission to allow for equal private sector participation in acknowledgement of their role of promoting a national seed system with private sector responsibilities; a major accomplishment of the seed component of the Project.

- It is important to recognize the significant impact of having achieved the Log Frame assumptions. Had these not been achieved, it would have been virtually impossible to meet the seed component goals.

Table 7. Log Frame Outputs and Project Accomplishments of Component 2C in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Local seed programs will have coalesced into a national seed growers association.	1 National Assoc.	1	100
Formation of local seed association that assist members in management and technical skills.	3 established	8	266
Local seed certification services established.	3 services established	8	266
Significant increased investment in seed enterprise moving volume of certified seed to permit self-sustainability.	Investment at least triple as compared to previous period	Originally: 6 enterp. Currently: 26 enterp.	100
Significant increased use of certified seed by farmers.	Initial seed production outputs vs. 1992 seed production (Quantities of certified seed not shown in 1A)	•	(30) to 1,520

• Comparison of Certified Seed Production in Project

<u>Crop</u>	<u>MT</u>		<u>% Increase</u>
	<u>Initial 1988</u>	<u>1992</u>	
Rice	5,400	7,978	48
Cotton	4,450	6,095	37
Corn	2,456	1,701	(30)
Beans	24	122	408
Potato	II	1,295	NQ
S. Grains	15	243	1,520

### COMPONENT 3: HUMAN RESOURCE DEVELOPMENT

Activities that were supported under this component were directed at improving the quality of graduate level agricultural education and graduate level professional support for the ATG&T system.

**Activity A: Strengthening UNALM administration and teaching programs:** Expertise in ways to increase UNALM's participation in research opportunities; in preparation of teaching and research materials; in library management and in institutional strengthening of the UNALM foundation.

#### **Log Frame Outputs: (Table 8)**

1. Improvement in quality of UNALM students.
2. Improved planning, resource allocation and control by UNALM.
3. Strengthened leadership role of Rector's office.
4. Established incentives program for individual excellence and performance.
5. Revised curricula.
6. Creation of broad consensus concerning national agriculture research priorities in Peru.

#### **General Analysis:**

- UNALM formally entered the ATT project on 31 October 1989. Activities during the period November 1989 - September 1992 included the preparation, revision and final approval by USAID/Peru, in December 1989, of the LOP Plan and the Operational Plan for 1990. In the absence of a signed agreement between INIAA and UNALM for use of PL480 funds for Component 3, Project activities were further delayed.

- Although the log frame outputs for Activity 3A are essentially unquantifiable, certain activities serve as signals and evidence that the objectives have been reached. Several are of great importance and significance. Accomplishments in Table 8 are designated in percentage of qualitative improvements.

- All committees and commissions were named and ratified by the University Council.
- The Base Line Study of graduate student characteristics and quality (Estrada, 1990) was distributed to deans, curriculum committees, and program coordinators. The base line study desegregated all data by gender and serves as a base for further analysis for the participation of women in the agricultural sciences.

**Output Analysis:**

- Although there has been considerable improvement in leadership awards programs, curriculum improvement, and a broader consensus among faculty on agricultural priorities, these have not yet affected the overall improvement of quality instruction and the quality of UNALM students.
- Strengthening the leadership role of the Rector's Office is a key objective of the ATT Project. The Rector has begun using the communication media to better advantage to bring the message of the University to the attention of the community. Almost weekly features and news stories have appeared ranging from articles on the dairy to a feature on biotechnology, to analyses of current agricultural policies. Internal communications have been strengthened by the publication of periodic campus bulletins.
- The University's ability to plan is demonstrated by a variety of products and activities including a major document on projects and proposals for the future and a five year plan for the development of the library.
- A regulation establishing norms for awarding prizes and incentives to faculty and students for academic excellence has been written, reviewed, revised and approved by the University Council. Full implementation began in 1992 with the awarding of prizes for noteworthy accomplishments, including outstanding research.

- The major achievement in reforming the curriculum has been the establishment of a process for change that will eventually lead to modification of the curriculum and, if all goes well, provide the machinery for continual monitoring and improvement of instruction. A Steering Committee for Curriculum Revision has been formed consisting mostly of Deans - an appropriate responsibility for a Dean. At least a fourth of the faculty is involved in reviewing the old and defining the new.
- A study of student performance in the Basic Sciences (Estrada, 1991) has been made that is serving as a guidepost in reviewing the University Core Curriculum (Curriculum Rigido).
- One School, Food Technology, has appointed an outside Visiting Committee of industrialists and businessmen with interests in the work of the School. This may serve as a model to stimulate the formation of similar committees for all the faculties. Given feedback from outside groups, the faculties are much more likely to make the changes necessary in research and instruction to meet the needs of the employers of their graduates and the needs of the country.
- The Graduate School has developed some outstanding plans for strengthening its organization and structure. The plans for the Graduate School include reducing the number of degree programs and adding multidisciplinary programs and multidisciplinary contributions to existing degrees. Also in the planning stage is a new degree, Master of Agriculture, (MA), that does not require a research thesis. This degree is designed for the student who needs advanced professional training but does not have interest in a research career.

Table 8. Log Frame Outputs and Project Accomplishments of Component 3A in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Overall improvement in quality of instruction of UNALM students.	Significant qualitative improvements	(See Log Frame Summary) Improved	10
Increase in effective use of resources.	Significant qualitative improvements	Minimal	5
Improved leadership of the office of the Rector.	Significant qualitative improvements	Improved	70
Awards program on basis of merit in teaching, research and curricular improvements.	Significant qualitative improvements	Implemented	100
Significant curricular revision.	Significant qualitative improvements	Improved	50
Creation of broader consensus among faculty on national priorities in agriculture.	Significant qualitative	Improved	60

### COMPONENT 3: HUMAN RESOURCE DEVELOPMENT

**ACTIVITY B: Improving research, teaching and extension materials:** Specialists in audiovisuals, research publications development, teaching materials development, and extension training methods and materials.

#### **Log Frame Outputs: (Table 9)**

1. Improved library staff, operations, collections. Use of modern library technology to provide higher use level by all agricultural institutions.
2. A peer reviewed scientific journal with international distribution published regularly.
3. Establishment of an effective procedure for obtaining, transferring and publishing research recommendations including an improved flow of information to farm magazines, radio and other mass media, etc.

#### **Output Analysis:**

- The major highlight of this activity has been the establishment of a computerized information network (SNIDA) permitting access to much of the material in the National Agricultural Library of UNALM, a good part of which had been essentially inaccessible. The network is accessible by phone for on-line search from anywhere in the country. Funds from the ATT Project have trained scores of people throughout the country to use and contribute to the computerized data bases. The system is working.
- The feasibility of publishing a self sustaining national scientific journal in the agricultural sciences was studied. It was recommended that the new journal be based on the existing UNALM journal, Anales Cientificas. Due to lack of a basic agreement with UNALM and insufficient funding this publication has not been implemented.
- While it is expected that three organizations (FUNDEAGRO, ONA and INIAA) will produce fee-based publications, only Revista INIAA is so published currently. Funding for these publications is provided by the new Technology Diffusion activity of 3B. Publication of

Revista INIAA has been published with some regularity. Enlace, the FUNDEAGRO publication on ATT project activities has been published regularly.

- All four institutions are providing technological information, although mostly in their own publications and programs.
- An ambitious proposal for establishing AGROPRESS was developed. However, due to insufficient funds and the need to prioritized allocation of same, this publication was not approved. FUNDEAGRO's agricultural supplement, Revista Del Agro, should fulfill several of the anticipated needs for AGROPRESS, at a somewhat reduced budgetary level.

Table 9. Log Frame Outputs and Project Accomplishments of Component 3B in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Professional UNALM library staff. Updated Process for eliminating obsolete material and higher use level.	3 librarians trained 20 journals updated	5 11	167 -
Agric. Sciences Journal published with peer review.	1 journal publication for 4 years and continuing	0	0
Effective method for transforming research into published articles.	At least 3 organizations will have fee-based public series	1	33
Better technology information flowing to magazines, news, broadcasts, aimed at consumers, farmers and TT agents.	At least 1 organization	improved	100

### COMPONENT 3: HUMAN RESOURCE DEVELOPMENT

#### ACTIVITY B: Technology Diffusion Activity (Implementing Institution: ONA)

NOTE: This activity was not included as a part of the original Log Frame of the Project.

A new specific technology diffusion activity was made possible through the commitment of two million dollars of PL-480 funds. In the last quarter of 1991 the work plans submitted by the participating institutions were incorporated into an integrated strategy the implementation of which was initiated in mid 1992. The objectives of this activity were dedicated to filling the current technology transfer gap and to set the stage for a proposed USAID follow-on project, Agricultural Technology Dissemination. The ATT project TA team lead the effort to insure that this would be a technically solid, science-based experiment in extension. ONA was selected as the lead entity because of its nationwide network of private sector producer associations.

Technology Diffusion Centers (TDCs) were established in six locations; Piura (Tumbes as sub-location), Lambayeque (Trujillo as sub-location), San Martin, Central Coast/Lima (Huaral as sub-location), Arequipa, and Cusco. Although affiliated with local experiment stations and regional universities, each TDC is actually based in an ONA-affiliated producer association office. Furniture and telephone lines are provided by ONA, but the TDCs provide FAX equipment.

Each TDC is staffed by three Technology Transfer Specialists selected for their expertise in crops and animals important in that region. The Specialist with the most technology transfer experience was named leader of each TDC. Each TDC also has a secretary and a part time Communicator. Transportation for Specialists is made possible through an agreement with INIAA to borrow (and repair) vehicles to use for the life of this activity.

All staff members have been employed on limited personal services contracts due to the temporary, experimental nature of the effort. A large number of well qualified and

experienced Ingenieros Agronomos were available at this time because of the weak economic and political situation in Peru.

Because of the lack of technical information for farmers, a major emphasis of this activity is to produce appropriate technical publications and distribute them through the TDCs and their programs. Professionals in INIAA, FUNDEAGRO and UNALM have been contracted to write most of the publications. Technology generated through ATT-supported research programs of INIAA are being evaluated for possible incorporation into technology packages for farmers. Publication assignments are as follows;

<u>Institution</u>	<u>Manuals</u>	<u>Bulletins</u>	<u>Budget (\$US)</u>
FUNDEAGRO	14	46	167,000
INIAA	8	30	128,000
UNALM	8	20	77,000
Total:	<u>30</u>	<u>96</u>	<u>372,000</u>

INIAA is in the process of privatizing some of its experiment stations. These will become research and extension centers, governed jointly by representatives of public and private sector entities. Funding will be provided by producer associations, the government of Peru, and other national and international donors. The concepts of integrated activities and coordinated efforts of agricultural entities promoted by this Technology Diffusion activity will complement the objectives and goals of the restructured INIAA operations.

As a means of more fully utilizing their expertise and experience, UNALM faculty are being involved in extension experience activities. This is an innovative approach for Peru which involves six professors who will spend several days at one of the TDCs with 3-4 of their students. They will become involved in TDC activities along with their local university counterparts and TDC Specialists.

Specialists have implemented their TDCs and initiated their designated activities.  
Activities at each TDC include the following;

- Survey: Identification of technological necessities
- Farmer training;
  - Technical courses
  - On-farm tests/demonstrations
  - Field days
  - Seminars/Workshops
- Radio programs
- Distribution of technical publications
- Rural professionalization for recent graduates
- Youth agricultural clubs
- University (UNALM) extension program

**COMPONENT 3: HUMAN RESOURCE DEVELOPMENT**

**ACTIVITY B: Rural Woman Program:** Participation of rural women in the process of technology transfer. (Implementing Institution: ONA)

**NOTE:** This activity was not included as a part of the original Log Frame of the Project.

The rural woman program has been developed as an activity of the human resources development component with additional PL-480 funds provided starting in 1992. The overall objective of this activity is to promote the organization and/or reinforcement and consolidation of existing women's organization in the rural environment. This activity focuses on the efficiency and increasing participation of women in the process of the transformation of agricultural technology as a means of improving the incomes of rural families. This is to be accomplished by increasing their agricultural productivity and increasing the overall value of production, while improving their eating habits.

Specifically, this activity is intended to fortify the farm family income by improving the qualifications and technical growth of the women that are involved. Technology transformation and marketing organizations are being formed within producer organizations in order to provide competitive advantages for the sales of their products. Another focus is to improve the agricultural technological knowledge generated by the research centers in order to convert local women into effective agents for the diffusion of technological innovations, and promote the adoption of same by way of a system of theoretical-practical training.

At the time of this report several of the rural woman programs have been implemented as a part of local TDCs. Ultimately, it is intended to organize eight women's producer associations, and to develop a national association of women agricultural producers. This is being accomplished partly through seminars and workshops for women on agricultural technology, marketing, agricultural industry, business management and leadership. In addition to improving rural family incomes this activity is intended to generate employment and improve the quality of lives of rural families.

**Analysis:**

This activity has gotten off to a good start, but it is too early to identify much progress. Examples of accomplishments at this stage include training in the areas of:

- Agri-industrial modules of Apiary nuclei
- Food conservation facilities
- Marmalade and jelly processing schemes
- Dried potato processing
- Installation of courtyard gardens
- Installation of small livestock facilities
- Installations of seed production facilities
- Promotion of craft industries

Peru's population in 1992 was approximately 22 million, half of whom were women. It is important to note that about one-third of the national population lives in rural areas. It is also noteworthy that rural women in Peru are involved in about 45% of the important activities. Since rural women are such an important segment of Peru's population this activity should be supported to the extent possible, both now, and in the future. This is an activity which proposes to establish an appropriate mechanism for increasing the participation of women in a realistic and effective manner.

**COMPONENT 3: HUMAN RESOURCES DEVELOPMENT**

**ACTIVITY C: Competitive graduate study scholarships and participant training**  
(Implementing Institution: FUNDEAGRO)

**Log Frame Outputs: (Table 10)**

1. Establish a private sector mechanism for awarding academic scholarships on a competitive basis.
2. Upgrade to M.S. level at UNA and other Peruvian universities approximately 120 ATG&T professionals.
3. Upgrade to M.S. and Ph.D. level at off-shore universities approximately 16 AT&G professionals.

**Output Analysis:**

- The mechanism for awarding fellowships and scholarships was established, but did not function according to Log Frame. Of the 20 Log Frame designated candidates for UNALM, two were selected. Likewise, of the 17 Log Frame designated INIAA candidates, eight were selected. Of the 37 designated program participants, 27 were non-ATT personnel.
- Awards of four postdoctoral and sabbatical fellowships are identified under "Impact Studies", and credited to this category by virtue of the scholarly leave nature of their activity.
- Of the 12 off-shore M.S. trainees selected three were from INIAA and none from UNALM, whereas five and three were designated, respectively, in the Log Frame.
- Of the nine off-shore Ph.D. trainees selected, four were from INIAA and two from UNALM, whereas six and seven were designated, respectively, in the Log Frame.

- Of the 200 Log Frame designated M.S. graduates to be trained in Peru, 32 have completed the requirements for their degrees, 11 have submitted their theses and had them approved, and 89 are in progress. By EOP, 132 people will have completed their M.S. degrees, all under the Partial Scholarship Program initiated in 1991-92. Had this creative program not been implemented, even the 65% accomplishment level would not have been realized.

Table 10. Log Frame Outputs and Project Accomplishments of Component 3C in Relation to Original Project Design Summary and Logical Framework

<u>Output</u>	<u>Verifiable Indicators</u>	<u>Accomplishments</u>	<u>%</u>
Private sector mech. for awarding scholarship on competitive basis for ATT system personnel.	1 mechanism	1	100
Off-shore post-docs awarded to ATT personnel.	UNA: 10 fellows INIAA: 6 fellows Total: 8 person-yrs.	UNA: 0 INIAA: 1 Others: 3 Total: 3.5 person-yrs	0 16 300 40
Off-shore M.S. training completed & participants reincorporated.	UNA: 3 INIAA: 6 Total: 16 person-yrs.	UNA: 0 INIAA: 3 Others: 9	0 60 900
Off-shore Ph.D. training completed and participants reincorporated (except 4).	UNA: 7 INIAA: 6 Total: 52	UNA: 2 INIAA: 4 Others: 3	30 66 300
UNA M.S. scholarship training for ATT personnel.	200 M.S. in 12 disciplines	32	16

**COMPONENT 3: HUMAN RESOURCE DEVELOPMENT**

**ACTIVITY C: Partial Scholarship Program: Students earning M.S. degrees at UNALM with the support of ATT PROJECT funds.**

NOTE: This activity was not included as a part of the original Log Frame of the Project.

**The Partial Scholarship Program**

A system of partial scholarships, established in 1991 to permit students who have completed course work, but not the thesis, to complete their degrees, was partially implemented. An advertisement placed in various newspapers resulted in almost 200 applications for partial scholarships. Partial scholarships were offered to 149 candidates. As of 30 September 1992 the status of partial scholarship recipients was as detailed in Table 11.

Table 11. Status of Partial Scholarship Program as of 30 September 1992

Recipients	Number
Partial Scholarship Recipients	149
Did Not Accept the Scholarship	7
Currently Outside the Country	1
Abandoned Scholarship do to Illness	1
Abandoned Scholarship Without Reason	2
Awaiting Employer Permission for Leave	6
Awarded and Accepted Scholarship	132
Graduated	32
Thesis Submitted and Approved	11
Degree Program in Progress	89

Table 12. Partial Scholarship Program in the UNALM Graduate School  
Budget as of 30 September 1992

Item	US \$
<b>General Budget</b>	
Income	182,118.10
Expenditures	105,404.01
Student Disbursements	101,854.01
UNALM Overhead	3,550.00
<b>REMAINING BUDGET</b>	<b>76,714.09</b>
<b>Budget Commitments</b>	
Assigned for Approved Disbursements	43,281.23
Reserved for Scholarship Recipients	7,196.76
Reserved for UNALM Expenses	10,829.15
<b>TOTAL COMMITTED</b>	<b>61,307.17</b>
<b>Balance Available for New Scholarships</b>	
Remaining Budget	76,714.09
Committed Budget	61,307.17
<b>TOTAL AVAILABLE</b>	<b>15,406.92</b>

Funds remaining as of 30 September 1992 are being used to support additional, qualified M.S. candidates. It is proposed that some of these candidates be encouraged to participate in a pilot project in genetic resources; a joint effort between UNALM, CIP and NCSU.

COMPONENT 3: HUMAN RESOURCES DEVELOPMENT

ACTIVITY C: Trainees supported by ATT Project funds

Participant Training

Twenty one highly qualified candidates were selected for graduate degree training outside Peru. Ten have completed their degrees and returned to Peru. Ten are still pursuing their degree programs and will all complete their degree requirements by the PACD of the Project. One M.S. candidate was considered by his advisory committee to be well qualified to initiate a Ph.D. program and was, therefore, transferred to the Tropical Soils CRSP. This has been a very valuable component of the Project because it has enhanced the human capital development of Peru in the agricultural sciences. Complete information on each participant trainee is presented in Appendix V.

Table 13. Origins of Peruvian ATT Project-Supported Trainees

City/Province	Number of Trainees
Arequipa	2
Carjamarca	1
Cuzco	1
Iquitos	1
Junin	1
Lima	12
Puira	1
Puno	2
TOTAL	21

Table 14. Institutions at which Peruvian ATT Project-Supported Trainees Earned (are Earning) Graduate Degrees

Institution/Location	Number of Trainees:
Iowa State Univ. (Iowa, USA)	2
Univ of Puerto Rico (Mayaguez, Puerto Rico)	1
North Carolina State Univ. (North Carolina, USA)	6
Univ. of Sao Paulo (Sao Paulo, Brazil)	2
Colorado State Univ. (Colorado, USA)	1
Post-Graduate School at Chapingo (Chapingo, Mexico)	3
Austral Univ. (Austral, Chile)	1
Kansas State Univ. (Kansas, USA)	1
Univ. of Missouri (Missouri, USA)	1
Utah State Univ. (Utah, USA)	2
Oregon State Univ. (Oregon, USA)	1
<b>TOTAL</b>	<b>21</b>

Table 15. Institutions Sponsoring Peruvian ATT Project-Supported Trainees

<u>M.S.</u>		<u>Ph.D.</u>	
INIAA:	4	INIAA:	4
UNALM:	0	UNA:	2
Others:	9	Others:	3
<b>Total:</b>	<b>12</b>	<b>Total:</b>	<b>9</b>

## ATT PROJECT CONCLUSIONS AND RECOMMENDATIONS

These conclusions and recommendations represent the collective views of the Technical Assistance Team and many of Peru's agricultural leaders with whom we collaborated over the life of the ATT Project (Appendix VII). Our conclusions and recommendations also take into consideration the Project background realities described on pages 7-11 of this report. The Project touched the lives of a large number of people, all of whom would have their own opinion about the specific parts of the Project in which they were involved. We have, however, tried to listen carefully and take into account the viewpoints of those most directly involved in Project activities -- especially those who have worked on coordination committees, Project review, and the development of Project policies.

Of all the lessons learned about development, it is clear that projects defined and carried out with the active participation of the people they are intended to benefit, have the highest probability of producing the expected results. In fact, when Technical Assistance Team involvement in the Project was prematurely terminated, the manner in which Peruvian counterparts assumed ownership and leadership of ongoing activities was gratifying. In the midst of chaotic social and economic conditions, it was refreshingly surprising that the ATT Project had accomplished so much in four and one half years.

From the beginning of time Peru has been known for the diversity of its agriculture as well as its rich biodiversity. Present and future goals for success in agriculture in Peru should build on this diversification, modernizing and making it more efficient.

**ATT PROJECT DESIGN:** Because it focuses on science-based agriculture, and because of its effective integration of research, extension and teaching, the Land Grant Institution model is a good starting place for an agricultural development project of this nature. The ATT Project design effectively incorporated these parameters in its Logical Framework. Furthermore, integrating public and private sector agricultural institutions into Project activities was important to the overall effectiveness of Project efforts -- recognizing that no

single public organization had the capacity to carry out all the activities necessary to successfully complete the Project. For example, UNALM was needed to provide training, INIAA was needed as a source of technology and agricultural research capabilities, ONA was needed because it represented a wide range of private farmers, and FUNDEAGRO was needed for coordination, a source of change, and new ideas.

Some felt that the ambitious and inadequately funded Project focused on the easiest areas to produce productivity responses. This approach may have, in fact, amplified the differences in productivity between the best and the poorest areas and producers in the country.

**PROJECT IMPLEMENTATION ENVIRONMENT:** There was a certain synergy to the Project. Working together, the organizations accomplished far more than they could have individually. Thus, the success (or failure) of the Project depended heavily upon Peru's political and economic situation. If the organizations involved in the Project were to pursue different political agendas, or if the nation's economic situation deteriorated to the point where the organizations were highly dependent on ATT funding, the Project would become increasingly difficult to implement. For example, many of the early UNALM Project objectives were not achieved because the political objectives of the university shifted between the time of the Project's design and its implementation (Similar situations existed later in the Project as well). As a result, the priorities of the UNALM administration were very different from those of the Project during the first two years. USAID/Peru and FUNDEAGRO were correct in not yielding to UNALM's demands for funding for non-Project activities. The alternative was to focus Project efforts on longer term objectives related to UNALM which did not require substantial ATT funding.

INIAA's problems were closely tied to Peru's economic situation. Peru's mid 1980s decision not to repay international loans reduced its ability to borrow internationally, discouraged foreign investment, and reduced tax receipts. Its only alternative was to increase the money supply which resulted in higher rates of inflation. In the process, it became

increasingly difficult for INIAA to fund its research activities. Project funds were focused on priority national programs but, without counterpart funds, these efforts were inadequate.

ONA was a relatively new institution facing basic management issues which the Project sought to assist in resolving. Formed in 1988, FUNDEAGRO was also confronted with the challenges facing any new entity. However, with Project assistance, FUNDEAGRO moved expeditiously to initiate a broad spectrum of activities -- Project promotion and coordination; human capital development; private initiatives in extension, publication and research, as well as efforts toward financial sustainability.

The rapid rate of inflation in Peru caused a serious loss of real value of ATT Project resources. Although Project grant fund budgets were in US dollars, disbursements to implementing institutions were in local currency. Significant loss of purchasing power of the dollar budget was experienced due to the time spread between the date of fixing the exchange rate by USAID/Peru for grant fund advance requests and the actual receipt of local currency funds by the implementing institutions. Further inflation losses occurred by the time of actual disbursement, which was particularly damaging in the case of scholarships.

Political and institutional instability were other important implementation issues because terrorists' activities made it extremely difficult to work in many parts of the highlands. This tended to promote the initiation of more Project activities on coastal agriculture where farmers are more progressive, seekers of technology, promoters of EE activities, etc. Implementation of many highland-centered activities will not be feasible (Cajamarca, Cusco and parts of Puno are exceptions) until there is a much greater degree of political stability in these regions.

Institutional instability, resulting from budget constraints, leadership changes and a history of a lack of institutional cooperation, significantly constrained FUNDEAGRO's efforts to serve as the promotor and catalyzer of coordinated activities.

Based on changing budget realities, annual adjustments in the form of Work Plans enhanced the utility and productivity of Project components and activities. Ultimately, four or five major commodity programs received 80-90% of the support.

Lack of continuity and consistency in USAID oversight of the Project further contributed to its problems. During the life of the Project there were three project managers and two mission directors. The Project was conceived in the first years of the Garcia presidency, started in the hyperinflation years, modified by a new government with dramatically different policies, and operated in a country under U.S. Congressional sanctions. It is something of a miracle that the Project has succeeded at all.

**PROJECT COORDINATION:** The Project Coordination Committee, established in 1990, and chaired permanently by the Secretariat, was more effective than the original Project Advisory Committee, chaired alternately by the heads of the participating institutions. In fact, some feel that this change in coordination was essential to making the project effective. Integration of the participating institutions started to become a reality in 1991, and was enhanced by the implementation in 1992 of the Technology Diffusion activity of Component 3-B. The Secretariat and his staff received and processed information about Project activities, and provided feedback to Project Executive Directors. This mechanism provided effective representation and the delegation of more authority to the Project Executive Directors of the participating institutions.

**PROJECT PERSONNEL:** All short term and long term Project personnel should continue to be contracted based on established terms of reference and open, competitive selection of candidates for each position.

**ATT PROJECT IMAGE = NOT PERMANENT:** Receptiveness to some aspects of Project activities was somewhat passive due to the attitude that its influence was minimal and would vanish when the Project terminated; e.g. Technology Transfer Enterprises. Even FUNDEAGRO, created as the private institution to overcome some of the constraints in the

modernization of Peru's agriculture, was too closely identified with the Project to be viewed as independent and permanent.

**TECHNOLOGY GENERATION:** Even though a degree of focus prevailed throughout the Project, it was still felt that research efforts were disperse, and, in some cases, insufficiently responsive to producers needs. It would have been better to focus from the beginning on key elements identified by producers through diagnostic and baseline surveys and interactive discussions.

The national program concept is still valid and should be maintained as a mechanism for the prioritization of crop needs and resources in future project designs. National programs have proven their ability to link successfully with regional and international programs, such as those of the CGIAR network. National programs of the future should become much more inter-institutional in nature, attracting the best research and extension professionals from universities, farmer associations, regional EEs, NGOs and INIAA.

**TECHNOLOGY TRANSFER:** It was difficult to perform and promote technology transfer in an environment where the formal Extension System was immobilized. Efforts by INIAA and FUNDEAGRO were largely unsuccessful in that improved technologies did not reach wide groups of farmers through the activities of this project.

The Technology Diffusion (3 B) activity was a good USAID initiated alternative, but should have been acted upon when recommended in the mid-term Project evaluation. Farmers, already somewhat organized through their producer associations, should be fairly receptive to the more locally managed Technology Diffusion Center concept.

New Technology Diffusion needs and opportunities are being identified and incorporated into individual Specialists' work plans as time and resources permit. This extension experiment will probably continue as long as the ATT Project exists. Hopefully, the lessons

learned can be incorporated into new agricultural extension strategies and programs for Peru, such as those being contemplated by USAID, the Inter-American Development Bank, and the World Bank.

Technologies can be transferred to farmers without a formal extension system, as evidenced by the successes of the CTTA model in Peru and other developing countries. Whatever technology transfer strategies are employed in the future, field level extension personnel should be trained in whole farm macroeconomics within the concept of farmers realities. They will be able to promote the adoption of new technologies by farmers best if they can relate them to management, markets, etc. Efforts should continue to be made to assist farmers to think as private entrepreneurs, and to integrate the public and private sectors, preferably by building on established relationships with producer organizations (more so than crop committees). Permanent feedback mechanisms, such as on-farm testing and validation of technologies and post-adoption evaluations, need to be established soon.

INIAA did not inherit the technology transfer component of INIPA, but the gap was filled somewhat by employing CTTA concepts and programs. The Technology Diffusion activity of the Project complements the local emphasis strategy of CTTA and could help to expand its influence and benefits to rural families. For instance, encouraging researchers to expand their work directly with farmers will effectively contribute to the development of appropriate extension programs for Peru. Local and regional universities should also be involved in joint venture technology transfer efforts.

The concept of Private Technology Transfer Companies is good and will probably work best in coastal areas, where farmers should be more able and willing to pay for extension services. Such efforts will be most effective if they directly involve producer associations and take full advantage of knowledge and expertise available at local or regional experiment stations.

Whether or not a formal extension system is recommendable for Peru is debatable and should be very carefully considered in view of other alternative strategies. The Cooperative Extension Service model of American Land Grant Institutions has evolved over the past century. Its origins were based on serving the needs of farm families and rural communities. Perhaps the optimum model for Peru should be primarily locally focused with mechanisms for networking and communicating between the individual Technology Diffusion Centers.

**PRIVATIZATION OF INIAA's EXPERIMENT STATIONS:** Privatization is a good concept if private sector entities share managerial and financial responsibilities with their public sector counterparts, and work together toward an equilibrium between both sectors, rather than total privatization. These new "associations" should be the integrating instrument for the various participating sectors, and should be governed by representatives from; (a) producer associations, (b) agricultural industries, (c) universities and technical institutions, (d) non-agricultural entities (e.g. mining companies), (e) the GOP, and possibly (f) national and/or international donor agencies.

These new associations should be integrated centers incorporating research programs with technology transfer efforts. They should be viewed by their local clientele, the farmers and their families, as full service centers in which they have a vested interest.

In many privatization efforts there is an under-investment in agricultural research and an increase in efforts to transfer resources from research to providing local technical services. If efforts to privatize the EEs are to be successful, the GOP will need to fund those activities whose value extends beyond the region (primarily research networking and administrative coordination activities) and the private sector will need to fund the technical services of value to local communities. Most long term research, such as genetic improvement, will require public funding. Regional and international linkages should continue to be encouraged in order to assure continuous input of new germplasm and cultural practices. In the process, the EEs would be transformed into Technology Development and Transfer Centers, incorporating some of the Technology Diffusion Center concepts.

**AGRICULTURAL CREDIT IN RELATION TO THE PROMOTION OF IMPROVED TECHNOLOGIES:** Many of the technologies generated by an agricultural development project of this nature will require additional financial inputs for farmers to adopt them and incorporate them into their production schemes. *If feasible, therefore, it would be advisable to make provisions for agricultural credit linkages with technologies being promoted with adequate safeguards to ensure that loans are payable.* Local savings and loan associations ("Cajas Rurales") should be encouraged to participate in such linkages, and provide local control of operations.

**IMPROVED SEED MANAGEMENT:** This component of the Project was highly successful because a need was properly identified, an activity was designed to utilize globally accepted technology, and a team with the right talents was charged with getting the job done. The seed management system that has been developed integrates public and private sector entities in the common goal of making superior quality seed available to producers of several of Peru's important crops.

**PERU'S SEED SYSTEM:** The significant advances made through the Project must be sustained through public and private sector commitments. Alternative recommendations for a proposed second phase seed improvement project should be implemented as soon as possible. That which has been accomplished to date should not be viewed as an end, but rather serve as the starting point for continuing to raise the level of seed technology in Peru.

**THE UNALM GRADUATE PROGRAM:** The deficiencies of this program have been well documented, and attempts to overcome them have been described in this report, e.g., the partial scholarship program. However, in all fairness to those who had (have) not completed the requirements for their M.S. degrees, these people have been working at more productive levels over the past few years than they would have been had they not at least partially completed their degrees. The partial scholarship program should be maintained and expanded as possible. An example of a modification of the original partial scholarship concept has

been to select several applicants to participate in a pilot program in genetic resources; a joint effort between UNALM, CIP and NCSU.

Fledgling M.S. programs at certain other universities merit support; e.g. those at the universities of Piura and Puno, and the Veterinary faculty of San Marcos University.

**INSTITUTIONAL STRENGTHENING OF UNIVERSITIES:** The strength of Peru's academic and technical institutions will determine its long term capability to sustain advances made by this or any other agricultural development project. Therefore, improvement of the teaching capabilities of national and regional universities and colleges should continue to be a high priority. Human capital development through graduate scholarships for qualified Peruvian agricultural scientists should continue to be a component of future projects. However, the continuing self-improvement needs of the faculty at national and regional universities should be considered by making provisions for them to take sabbaticals or at least special professional updating courses.

Among the successful technical institutions an excellent model is Valle Grande, near Canete.

**PARTICIPANT TRAINING:** Excellent candidates were selected, including five women. Generally, all trainees performed at or above the level of their peers at their respective universities. Half of the trainees have returned to Peru where they have assumed positions of greater responsibility.

Extensions have been granted to some trainees to permit them to fulfill their degree requirements. However, the need for such extensions could be reduced by having better information in advance about the anticipated length of time required for M.S. and Ph.D. degree programs at the respective institutions selected by the trainees. Because individual departments within an institution may vary, average time for degree programs should be determined on the basis of departmental history, not just the institution.

Contractors and country mission Training Officers should continue assure that scholarship awardees are fully aware of the terms of their contracts in advance, as detailed in USAID Handbook 10.

Future participant training selection committees should continue to have balanced representation of participating institutions in order to make unbiased choices. Those associated with scholarship programs in Peru should study and adopt the selection and screening process utilized by the ATT Project. The depoliticization of training decisions can make significant contributions to the forming of human capital in Peru.

All participant training (including degree programs and non-degree travel grants) will be a necessary central feature of new development projects for at least another decade.

**THE NCSU AND ISU LEGACIES, FUTURE ROLES:** The significant footprints left in Peru by NCSU and ISU have been described elsewhere in this report: NCSU contributed to the origins of CIP, the Tropical Soils sustainable agriculture and agroforestry research at Yurimaguas, the National Commodity Research Programs of INIAA and a revitalized university system at UNALM with its flexible curriculum and credit system. ISU contributed significantly to Economics and Statistics programs at UNALM and in the GOP. Whether or not NCSU or ISU are involved in Peru in the future will depend on many factors, especially the mutually beneficial results projected to be derived from such interactions. One future role that has already been defined is the continuing positive relationship between both NCSU and ISU, and UNALM. For instance, there are over 200 NCSU and over 150 ISU alumni in Peru, many of whom are on the faculty of UNALM. In addition, there are more than two dozen Peruvian students currently enrolled in degree programs at NCSU and more than 10 at ISU, reinforcing this tradition of collaboration.

#### LOOKING TO THE FUTURE

As the ATT project ends, GOP and donor agencies must recognize that key institutions of the agricultural technology generation and transfer system need continued support for the

short and medium term if they are to survive through the period of economic and political recovery. At the same time, the private sector should be given a more prominent role in determining goals and strategies for agricultural development, including a more active role in policy-making for public institutions such as INIAA.

Training is one of the continued needs. A continued investment in training agricultural leaders, including applied research workers and technology transfer specialists, must be given a high priority. Likewise, to retain these and other qualified professionals in Peru, it will be important to make competitive salary levels a high priority.

Recovery of competitive salary levels is also important if well-trained people with experience are to be kept in their jobs.