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AGRICULTURE RESEARCH AND EXTENSION
PROJECT COMPLETION REPORT
669-0135
1980-1985

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Introduction and Summary

Prior to the initiation of the project, Liberia's agricultural research organization consisted of a moribund Central Agricultural Experiment Station (CAES). Its staff comprised 30 members of whom 23 had had post secondary technical training, seven had earned the M.S. degree and one the Ph.D. degree. Its physical plant was old, and poorly equipped and aside from a disparate collection of old reports, it had no library. Its operational budget was inadequate and controlled by the MOA in Monrovia which approved even petty cash expenditures. What research activities were undertaken were poorly conducted and documented thus, few, if any, reliable research results were being generated.

The purpose of the Agricultural Research and Extension Project, was to foster the development of an agricultural research system so structured and operated as to: 1) conduct adaptive and applied research on the food and cash crops of Liberia; 2) cooperate with the extension service and other appropriate agencies in developing economically applicable technology for improving crop production in Liberia; 3) establish and maintain effective linkages with regional and international agricultural research institutions.

The project was conceived as the first phase of a long term program. It was authorized in January 1980 for a period of 45 months with a life of project funding of \$4,209,000. which was increased to \$4,997,000 in September 1982. Due to considerable delays in initiating project implementation which resulted from the overthrow of the government in April 1980, and to insure a smooth transition from Phase I and Phase II, the PACD was extended first to September 1984 and again to September 1985.

The project was designed in collaboration with a Title XII University, Louisiana State University which also served as AID contractor for project implementation. It called for 1) the restructuring of CAES into a semi-autonomous Central Agricultural Research Institute under the overall supervision of MOA; 2) the establishment of a National Research Council which would set research policy and 3) the creation of a Technical Research Committee to review and approve research proposals and as appropriate suggest lines of inquiry.

Table I presents the AID financed inputs and their costs as planned in the Project Paper and as actually delivered. Actual costs shown are not final, since final invoices have not yet been received for all goods and services.

Technical Assistance: The contractor provided 201 person months of long-term TA and 20 PM of short-term TA compared to planned levels of 210 PM and 18 PM respectively. Actual costs, including on-campus personnel costs, were \$2,016,000 thus exceeding planned costs of \$1,834,000 by \$182,000 or 10%.

Participant Training: A total of 477 PM, including 420 PM of long-term training and 57 PM of short-term training was planned. Actually, 306 PM and 29 PM (70%) of long-term and short-term training respectively were provided for a total of 335 PM. Total training costs amounted to \$314,000 or 40% of the \$795,000 budgeted in the Project Paper.

Planned training targets were not met due to the unavailability of qualified candidates for long-term training and the lack of GOL travel funds for short-term training. Several long-term participants were still in training when the PACD was reached but were allowed to continue their studies under the Phase II project.

Commodities: A total of \$619,000 of commodities were procured from U.S. sources against a planned level of \$565,000. Scientific and field equipment comprised most of this amount. Also included were vehicles and household furnishings for the TA team.

GOL Inputs: The GOL provided \$8.37 million in counterpart funds, approximately 67 percent of total project costs. Personnel was the largest expenditure item followed by supplies (including fuel) and construction of new laboratories.

Project Outputs: Project outputs included eleven CARI staff with post graduate degrees (although 7 had not completed degree training before the PACD and were shifted to Phase II funding), equipped laboratories and a field service unit, research administration systems and a semi-antonomous status for the research institution. Active research programs were ongoing in crop and animal science and soils.

Project Description

The purpose of the project was to foster the development of an effectively structured and functioning agricultural research system in Liberia which would do the following:

- Interface with regional and international research institutions.
- Conduct applied and adaptive research on appropriate food and cash crops.

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- Cooperate effectively with extension and other development program efforts in developing viable production technology packages for improving food and cash crop production in Liberia.

This project was viewed as the first 4-year phase of a total 12-15 year effort that would be required to fully accomplish the purpose. A combination of technical assistance, training (primarily at the post graduate level) and commodities were incorporated as means to accomplish the purpose. Project implementation was through the collaborative assistance mode with a Title XII University contractor, Louisiana State University, which was responsible for designing the project, providing technical assistance, training and ordering of commodities. The project called for a realignment of the old Central Agriculture Experiment Station (CAES) to a reformed, semi-antonomous Central Agriculture Research Institute (CARI). The CARI Director was to have complete control over the budget and staff and clear lines of responsibility drawn. A National Research Council was to set research policy and review results and a Technical Committee was to review research proposals and suggest lines of inquiry.

The approach taken by the project to establish a functioning research institute was to provide a specified quantity of inputs consisting of technical assistance, training of local staff and a complement of commodities to equip the laboratories and establish a pool of field equipment. Louisiana State University was responsible for providing the inputs. At the beginning of the project there were seven CARI staff members with MS degrees and one PhD. There was a total of 23 Liberian staff with post high school education. The operational budget for the Institute was controlled by the MOA and even petty cash purchases had to be approved in Monrovia. Very few if any reliable research results were being generated and the research that was being conducted was not documented. There was no research library aside from a collection of old reports and the laboratories were old and ill-equipped. In short, the basic requirements of a research institute- trained research staff, facilities and the administrative support structure- were inadequate to carry out an applied and adaptive research program.

AID-Financed Inputs

Table 1 provides details of the quantity and cost of AID-financed inputs that were projected at the project paper stage and the actual quantity and cost of each input. Note that actual costs are preliminary figures as final payments had not been made at the time this report was prepared. The project was originally authorized for a period of 45 months in January 1980 in the amount of \$4,209,000. An additional

\$788,000 was authorized in September 1982 to bring the total authorized life of project funding to \$4,997,000. Because of initial delays in signing a technical assistance contract and the desire to have an overlap between the Phase I and Phase II projects, the PACD was extended for an additional two years originally to September 1984 and finally to September 1985.

Louisiana State University provided most of the inputs through a direct AID contract. The contract with LSU was not signed until June 1981 or nearly one and one half years after the project was authorized. This delay resulted from the disruptions caused by the 1980 coup and associated difficulties in recruiting a technical assistance team. The LSU contract funded 210 person months of technical assistance over three years. The actual quantity provided was 201 person months over 4 years. Participant training was estimated at 477 person months of both long-term and short-term training. The actual amount of training provided was approximately 335 person months at the time the contract expired. Several participants were still in training as the project terminated and were switched to Phase II funding. The long-term training target was not reached because there were insufficient numbers of qualified candidates for training and few students were placed early enough in the project to complete their plans of study before the PACD. Short-term training was restricted because of the lack of GOL travel funds.

Essential commodities to equip the laboratories and to establish a complement of field equipment were procured. Housing was constructed for the expatriate advisors and a propagation building was constructed for multiplication of plant material. Additionally, 24 acres of lowland swamp were developed into experimental rice paddies. A guest house was completed to house official visitors to CARI.

Table 1. AID-Financed Inputs

Input	Quantity Programmed	Quantity Actual	Projected Cost (\$000)	Actual ¹ / Cost \$ (000)
Technical Assistance				
Long-Term	210 pm	201 pm	1,632	
Research Coord.	36 "	49 "		
Extension	36 "	24 "		
Socio-Econ.	36 "	29 "		
Agronomy	36 "	36 "		
App. Tech.	30 "	27 "		
Chemistry	36 "	36 "		
Campus Backstop			88	
Short-Term	18 "	20 "	114	
Subtotal			1,834	2,016 ² /

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Table 1 AID-Financed Inputs

Input	Quantity Programmed	Quantity Actual	Projected Cost (\$000)	Actual ^{1/} Cost (\$000)
Training				
Long-Term	420 pm	306 "	638	
Short-Term	57 "	29 "	156	
Subtotal	477	335 "	795	374
Commodities			565	619
Construction			375	492
Other Costs			230	523 ^{3/}
Total			3798	4024

^{1/} Not final figures

^{2/} Includes on-campus personnel costs, long and short-term assistance.

^{3/} Includes \$197,000 from LSU contract and \$326,000 other local costs.

GOL and Other Donor Inputs

Table 2 provides a breakdown of GOL expenditures over the life of project. Total GOL expenditures exceeded \$8 million or approximately 67 percent of total project costs. The GOL expenditure level projected in the PP was 55 percent of project costs. Approximately 60 percent of GOL expenditures were for salaries and 18 percent on supplies. A large proportion of the supply budget item was expended on fuel for the station generator and vehicles. The CARI physical plant provided all electrical service and water for the station. The campus includes laboratories, workshops and 23 staff residences that are served by the physical plant. The third largest expenditure item was construction of four new laboratories and a new maintenance building. These buildings were not completed by the end of the project.

Two other donors provided direct assistance to CARI over the project period. The UNDP/FAO provided technical assistance, training and a modest amount of scientific commodities. The IDRC funded technical assistance and support costs for the root and tubers project.

Table 2 Central Agricultural Research Institute
Phase I Five Year Expenditure Report.

(OCT-DEC)	1980	1981	1982	1983	1984	1985	TOTAL
PERSONNEL	243,665.78	1,011,130.09	1,079,505.61	988,761.18	911,833.52	896,616.37	5,131,512.55
EQUIPMENT	20,836.45	102,349.87	29,255.82	166,872.45	30,388.00	59,633.15	409,335.74
SUPPLIES	33,481.12	216,612.41	239,233.27	318,673.93	324,681.88	348,914.02	1,481,596.63
SERVICES	16,304.63	73,024.85	78,881.18	155,278.76	71,475.91	127,628.03	522,593.36
CONSTRUCTION	-0-	-0-	-0-	310,427.94	469,745.49	55,382.44	835,555.87
OTHER (DEBT RETIREMENT)	-0-	6,000.00	-0-	-0-	-0-	-0-	6,000.00
TOTAL	314,287.98	1,409,117.22	1,426,875.88	1,940,014.26	1,808,124.80	1,488,174.01	8,386,594.15

DEFINITIONS:

- PERSONNEL - Salaries
- EQUIPMENT - Vehicles, Motorbikes, Bicycles, Agricultural Equipment, Furniture
- SUPPLIES - Misc. Materials, Gas, Oil, Lubricants, Uniforms, Small Tools, Books & Periodicals, Agricultural Materials, Construction Materials, Stationery, Scientific Materials
- SERVICES - Printing, Utilities, Demonstration/Training, Auto Repair, Equipment Repair, Local Per Diem, Entertainment, Foreign Per Diem
- CONSTRUCTION - Erection of four new Laboratory Buildings and one Maintenance Building.

NOTE: Approximately \$225,000.00 due Government of Liberia for accrued taxes is included in the salary disbursement figure. Also \$9,998.03 is retained in Bank Account as fines imposed on employees over the period. This amount should be deducted from the total salary expense figure.

Project Outputs and End of Project Status

This section outlines the planned project outputs and compares the objectively verifiable indicators in the Project Paper with the observed outcome at the PACD.

1. Administrative Structure for Research: Operational administration in place and in control of research program.

This output was technically achieved. Soon after signing the Project Agreement, the GOL issued an Executive Order giving CARI semi-antonomous status. CARI now has control over its budget, property and personnel within the limits of GOL regulations and guidelines. The research program is nearly completely under the control of the CARI staff with only minimal input from the Technical Committee. A procedure for reviewing and approving research proposals has been adopted. Systems for inventory control, procurement, payroll and other administrative functions have been developed. The overall administrative system needs much more strengthening but it has improved from a status of nearly no capacity for administration to a minimally functioning system.

2. Equipment for research: Research equipment in use in
 - 1) Analytical laboratory, 2) engineering workshop,
 - 3) field work.

Over one-half million dollars worth of laboratory and field equipment was procured and put into service. The basic equipment needed to run a research station is in place although the property control system remains weak. The GOL also provided equipment in the form of vehicles for staff, maintenance supplies for the physical plant and related items. The agricultural engineering workshop was not set up, however, because there was only one counterpart that was trained in agricultural engineering and only at the BS level and late in the project. This component was delayed until Phase II.

3. Staff Development. Post graduate degrees for the following Liberian personnel:
 - A. Agricultural Engineering (2): Only one person was trained to the BS level.
 - b. Agricultural Economics (2): No staff were trained in agricultural economics. One staff with a MS in agricultural economics was recruited and placed into training as a Ph.D. student in agriculture extension.

- c. Agronomy (4): Three staff were trained to the MS level in agronomy, however only one completed the degree requirement before the PACD. The other two participants were shifted to Phase II funding.
- d. Animal Nutrition (1): No staff were trained in this discipline.
- e. Biochemistry (1): One student received a MS degree in agronomy with a biochemistry emphasis.
- f. Extension (1): Two staff are in process of completing degrees in extension, both at the Ph.D. level. One switched programs from soils to ag education.
- g. Fishery (1): One staff received a MS degree in fisheries and aquaculture and another completed a one-year non-academic training program in aquaculture.
- h. Rural Sociology (2): No staff were trained in this discipline.
- i. Soils (1): One person received a Ph.D. in soil science.
- j. Library Science (1): No one was trained at the academic level in this area. A consultant from the neighboring Cuttington College was hired to train the CARI library staff.

In addition to the expected staff training projected above, the following academic training was initiated:

- A. Entomology: One student at the MS level did not complete training before the PACD and was shifted to Phase II.
- B. Plant Pathology: One student at MS level did not complete training before the PACD and was shifted to Phase II.

Short-term training was provided in personnel management, research administration, tropical animal diseases, aquaculture, agriculture extension and horticultural crops research. A total of 29 person months of short-term training were completed by CARI staff.

4. Standard procedures for getting research results to the field: Leaflets and other notifications were to be prepared on research projects. This area remains very weak. The extension advisor position was not filled after the original team member's tour expired. The Liberian counterparts in extension were on long-term training during most of the project. An extension plan was drafted by an LSU consultant and the MOA held meetings to discuss the integration of research and extension but the action plan was not implemented primarily because of a change in Minister of Agriculture. The major publication of research results were the annual research reports published for years 81-82, 82-83 and 83-84.

Table 3. Comparison of planned and actual long-term training by discipline.

Discipline	Number Planned	Number Actual	Degree Program	Actual ^{1/} Person/Months
Agricultural Engineer	2	1	BS	26
Agricultural Economics	2	0	MS	0
Agronomy (Plant Breeding)	1	1	MS	41
Agronomy (General)	3	2	MS	48
Biochemistry	1	1	MS	37
Soils	1	1	Ph.D.	17
Animal Nutrition	1	0	MS	0
Extension/Ag Education	1	2	Ph.D.	68
Fisheries	1	1	MS	25
Rural Sociology	2	0	MS	0
Library Science	1	0	MS	0
Entomology	0	1	MS	19
Plant Pathology	0	1	MS	25
Totals	16	11		306

^{1/} Figures represent person months financed by the Phase I project. In some cases, students began training using other funds and were switched to Project funding when it became available and in seven cases, participants did not complete their programs before the PACD and were switched to Phase II funding.

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5. Rice Production Research: Field tests and demonstrations on varietal selections and cultural practices. A fairly well organized varietal screening and selection program was initiated with the collaboration of WARDA and IRRI. Several promising lines of both upland and lowland rice were identified and promoted through the screening process. The final testing stage, the multilocational trials, were postponed because of lack of manpower as the rice agronomists were absent on long-term training.
6. Root and Tuber Crop Research: Results obtained on varietal selections and cultural practices. Three high yielding varieties of cassava were screened and released. Methods of planting cassava vegetative material, time of planting and associated cultural practices were evaluated. Effects of harvesting leaves on production of cassava tubers was also evaluated. The off-station testing of root crops occurred in several geographic locations. The root crops program made good progress.
7. Plant Protection Research: Results obtained on pest control problems of rice, root and tuber crops and other major crops. The AID project contributed to this area only in participant training. An FAO project furnished three advisors over the project period in plant protection. A lack of staff hampered the program as the Department Head was made Acting CARI Director and two other staff were sent for long-term training.
8. Socio-Economic Research: Results obtained on social and economic problems affecting food and cash crops and livestock production: Very little actual socio-economic research was conducted during the project. There was only one Liberian Socio-Economics officer and one advisor. Most of their efforts were toward research in zero-tillage farming. Two papers were written on social and economic factors affecting agricultural production however these papers were based on literature review and observation rather than formal objective inquiry. Additionally a rapid reconnaissance survey was conducted on the farming systems in three Liberian counties and a paper published.
9. Engineering Research: Results obtained on appropriate technology research for rice, root and tubers and other crops. Very little research was done as a trained Liberian counterpart was only available near the end of the project. However, applied research was conducted on the development of lowland swamps for rice production in conjunction with a 24-acre swamp

development project. Most of the advisor's efforts were concentrated on improving the CARI physical plant and rolling stock maintenance procedures, inventory control and equipment needs assessment.

10. Animal Production: Results obtained on disease control and livestock production practices. An animal traction project using N'dama cattle was initiated and demonstrated to be technically feasible for tillage operations in both upland and lowland ecologies. A complete animal feed using indigenous ingredients was developed. Improvement in cattle performance was noted through mass selection breeding techniques. Frequency of disease incidence in livestock in the immediate geographical area was recorded.
11. Research Library: Collection of periodicals, journals and research reports developed. The research library was greatly expanded with the addition of several hundred volumes of reference books and subscription to 25 professional journals. Research reports from the IARC network and other sources were added to the collection. A local consultant was hired on a part-time basis to catalogue and organize the collection and train the existing staff.
12. Extension Information and Training Component: Training courses developed for extension and development workers. This component did not fully develop. While CARI staff participated as resource people for training programs of various extension programs, the Peace Corps, the military agriculture battallion and others, a formal training program and extension publication series did not develop at CARI.

The conditions that would indicate that the purpose has been achieved were given in the log frame as follows:

1. Staff capable of administering the agriculture research system and producing valid, reliable research results.
2. Sound and appropriate food, cash crop and livestock production technology packages being infused into extension and development programs.
3. Appropriate research results from regional and international research centers being utilized in the Liberian program.

The conditions as enunciated in the log frame above have not been met and it appears they are more applicable for the full 15-year project than the first 5-year phase. Important progress has been made in many of these areas, however. The institute has working relationships with many of the IARC's. A well trained, if inexperienced staff in several disciplines is in place and the basic facilities and equipment have been acquired. The administration and direction of the research program is emerging although the program is not yet focused.

Project Evaluations

Two project evaluations were conducted. The first was an internal evaluation conducted in December, 1982 jointly by the Ministries of Agriculture and Planning and Economic Affairs and USAID. The second was an external evaluation conducted by independent scientists in September, 1983.

The first evaluation was undertaken one year after the TA team had arrived to determine progress to date and if any changes were necessary. The internal evaluation report noted that several conditions had changed since the project was authorized in 1980. The coup of April 1980 had precipitated a large loss of staff and only the "bare bones" of staff were available after sending participants for training. Also, the seriously declining economic conditions of the country had affected the GOL budget allocations to CARI. The report acknowledged that these conditions would slow down project implementation but that the basic approach was valid and should be maintained.

The external evaluation concluded that good progress was being made in creating a viable research organization and cited the strong staff training program, construction of laboratories and the newly established semi-autonomous status of CARI with associated budget and personnel control as positive examples of institutional development. The report also noted constraints including irregular budget allocations, lack of a permanent director, poor linkage to the extension service and lack of a focused research strategy and workplan as hindering the development of the program. Unfortunately, these problems were not resolved by the end of the project and must be overcome during Phase II.

The external evaluation strongly endorsed the AID support of CARI over a longer, Phase II period. Highest priority recommendation for Phase II was the continued recruitment and training of high quality research scientists with major research emphasis built around rice, cassava and legumes. The report emphasized that an interdisciplinary farming systems-oriented research program should be developed, the extension liaison function be strengthened and that CARI's physical plant be renovated.

USAID and the GOL subsequently designed a Phase II project, incorporating most of the recommendations of the evaluation report. The project was authorized in August, 1984 which allowed one year of overlap with the Phase I project. This overlap allowed contracting procedures for the Phase II project to proceed so that there was continuity in technical assistance and general project support between Phase I and Phase II. Those participants that had not finished their programs at the completion of Phase I were then shifted to Phase II funding.

G L O S S A R Y

CAES	Central Agriculture Experiment Station
CARI	Central Agriculture Research Institute
FAO	Food and Agriculture Organization
GOL	Government of Liberia
IDRC	International Development Research Center
MOA	Ministry of Agriculture
PACD	Project Assistance Completion Date
UNDP	United Nations Development Program