

5 YEARS OF ACTIVITIES 1954 - 1959

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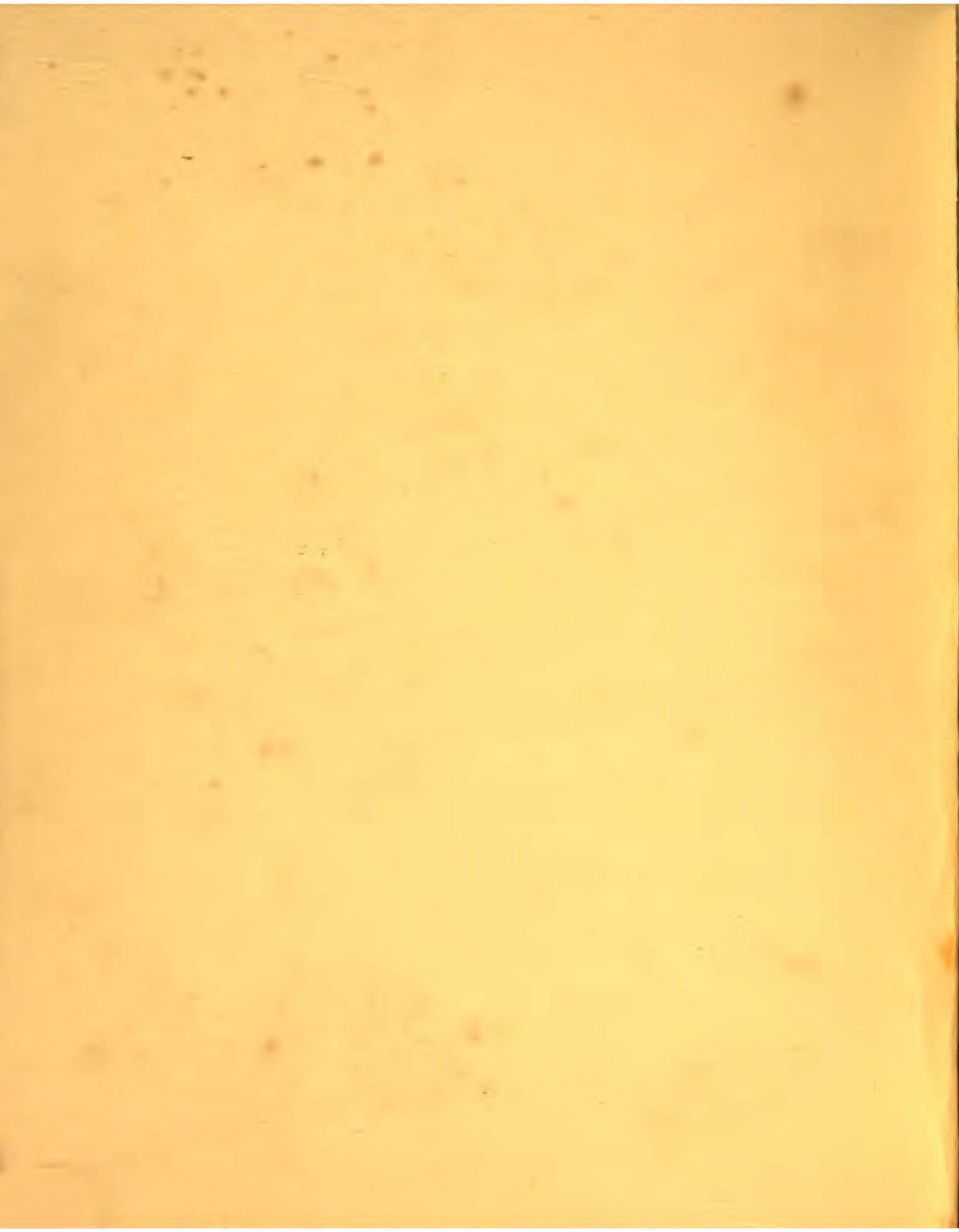
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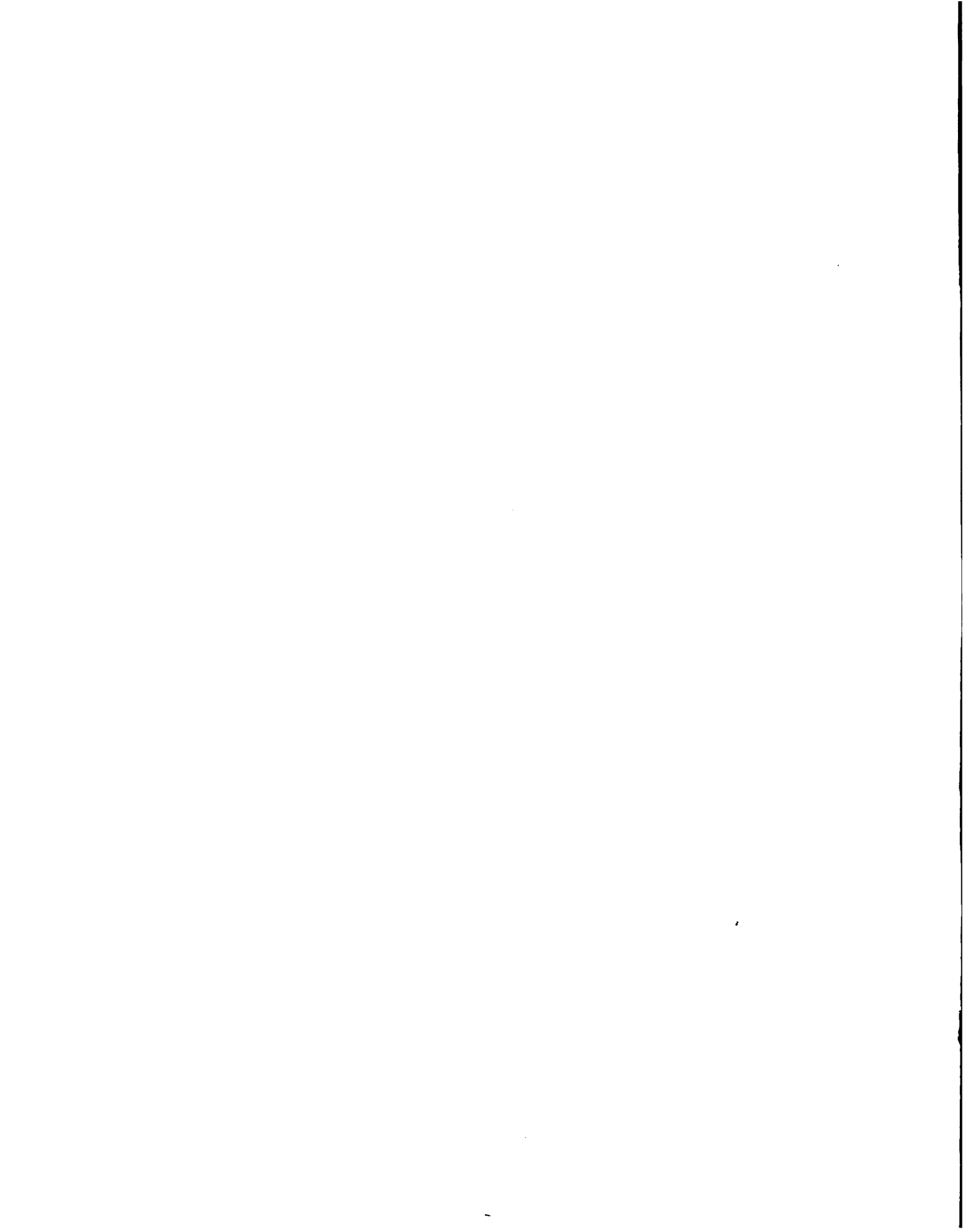
**YEARS OF ACTIVITIES
1954 - 1959**

**INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES OF THE O.A.S.
Turrialba, Costa Rica.**



C O N T E N T S

	Page
STAFF MEMBERS	i
ADVISORY BOARDS	v
INTRODUCTION	ix
ADMINISTRATIVE SERVICES	1
PLANT INDUSTRY DEPARTMENT	3
ANIMAL INDUSTRY DEPARTMENT	14
DEPARTMENT OF ECONOMICS AND RURAL LIFE	22
RENEWABLE RESOURCES DEPARTMENT	28
LIBRARY	35
SCIENTIFIC COMMUNICATIONS SERVICE	38
REGIONAL SERVICES	47
REGISTRAR'S OFFICE	49
LATIN AMERICA AND HIGHER EDUCATION	63
PROJECT 39	65
LIST OF GRADUATE AND SPECIAL STUDENTS	Annex #1
PUBLICATIONS	annex #2



STAFF MEMBERS

June 30, 1959

Allee, Ralph H. (U.S.A.)	Director of the Institute
Stoetzer, Carlos (Argentine)	Acting Secretary (Washington)
Rothrock, John B. (U.S.A.)	Treasurer (Washington)
Volio, Claudio A. (Costa Rica)	Director, Project 39, T.C.P.
De Alba, Jorge (Mexico)	Acting Director of Research and Training
Samper, Armando (Colombia)	Director of Regional Services
Shurtleff, Don Lowell (U.S.A.)	Executive Officer
Laprade, Henry G. (Costa Rica)	Comptroller
Sanger, Warren A. (U.S.A.)	Farm Manager

PLANT INDUSTRY DEPARTMENT

León, Jorge (Costa Rica)	Botanist and Head of Department
Carballo, Alfredo (Costa Rica)	Coordinator C.A. Corn Program
De Gialluly, Max (French)	Chemist
García, Francisco (Colombia)	Junior Geneticist
Gutiérrez, Lucy de (U.S.A.)	Plant Pathologist
Gutiérrez, Mario (Costa Rica)	Geneticist
Jiménez, Eduardo (Costa Rica)	Junior Horticulturist
Montoya, Luis A. (Perú)	Junior Horticulturist
Müller, Ludwig (Germany)	Plant Physiologist

Atomic Energy Program

Boroughs, Howard (U.S.A.)	Physiologist and Head of Program
Cuany, Robin L. (U.K.)	Cytogeneticist
Díaz-Romeu, Roberto (Guatemala)	Junior Soils Scientist
Moh, Carl C. (U.S.A.)	Cytogeneticist
Orbegoso, Guillermo (Peru)	Junior Cytogeneticist
Sáiz del Río, José (Spain)	Soils Scientist
Sybenga, Jacob (Holland)	Cytogeneticist

Cacao Center

Havord, Gordon (U.K.)	Soils Scientist and Head of the Center
Hansen, A. Juergen (Germany)	Pathologist
Helfenberger, André (Switzerland)	ACRI Representative
Machicado, Marcial (Bolivia)	Junior Horticulturist
Paredes, Luis Alfredo (Ecuador)	Farm Manager (La Lela)

Siller, Luis R. (Mexico) Junior Plant Pathologist
Soria, Jorge (Ecuador) Geneticist

Coffee, Cacao and Rubber Regional Services

Hunter, J. Robert (U.S.A.) Physiologist and Head of
Service
Camacho, Edilberto (Costa Rica) Junior Horticulturist
Hardy, Frederick (U.K.) Soils Scientist
Hutchins, Lee M. (U.S.A.) Pathologist
Sylvain, Pierre G. (Haiti) Horticulturist

ANIMAL INDUSTRY DEPARTMENT

De Alba, Jorge (Mexico) Animal Husbandman and Head of
Department
Bateman, John V. (U.S.A.) Animal Nutritionist
Carrera, Candelario (Mexico) Junior Animal Husbandman
Semple, Arthur T. (U.S.A.) Pastures Specialist

DEPARTMENT OF ECONOMICS AND RURAL LIFE

Alers-Montalvo, Manuel (U.S.A.-Puerto Rico) Sociologist and Head of
Department
Arce, Antonio (Costa Rica) Sociologist
Del Río, Fernando (U.S.A.-Puerto Rico) Extensionist
Di Franco, Joseph (U.S.A.) Extensionist
Valerio, Juvenal (Costa Rica) Assoc. Rural Educationist

RENEWABLE RESOURCES DEPARTMENT

Budowski, Gerardo (Venezuela) Forester and Acting Head of
Department
Holdridge, Leslie R. (U.S.A.) Forester and Ecologist
Stein, Hyndman A. (U.K.) Forester (FAO)

SCIENTIFIC COMMUNICATIONS SERVICE

Coto, Rogelio (Costa Rica) Communications Specialist and
Head of Service
Anderson, Calvert (U.S.A.) Chief Editor of Extension
Information
Bradt, Schuyler H. (U.S.A.) Director Popular Information
Program
Bolandi, Stanley (Costa Rica) Radio Editor
Combariza, Guillermo (Colombia) Graphic Editor

★ Cruz, Luis Carlos (Colombia)	Extension Editor
Daell, Luis (Costa Rica)	Assistant Graphic Editor
Díaz-Bordenave, Juan (Paraguay)	ADECO Editor
Díaz-León, Adelaida (Paraguay)	Bibliographer
Díaz, Ana Lauretta (Guatemala)	Home Economics Information Specialist
Ferrara, Miguelangel (Paraguay)	Extension Editor Assistant
Gómez, Porfirio (Panama)	Coordinator Training in Communications
Granados, Hernán (Costa Rica)	Photocopy & Offset Technician
Gutiérrez, Mario (Costa Rica)	Technical Editor
Sánchez, Enrique (Bolivia)	Visual Aids Editor
Zúñiga, Evenor (Costa Rica)	Translator

LIBRARY

Martinez, Angelina (U.S.A.-Puerto Rico) ...	Librarian and Head of Library
James, Catherine Noël (U.K.)	Assistant Librarian
García, Cecilia de (Costa Rica)	Library Assistant
Montoya, Ghislaine P. de (Haiti)	Library Assistant

REGISTRAR'S OFFICE

Naranjo, Gerardo (Ecuador)	Registrar
----------------------------------	-----------

OFFICE OF DIRECTOR OF REGIONAL SERVICES

Semper, Armando (Colombia)	Director of Regional Services
Franco, Alberto (Colombia)	Technical Assistant

PROJECT 39 OF THE ORGANIZATION OF AMERICAN STATES

Central Office (Apartado 4359, San José, Costa Rica, C.A.)

Volio, Claudio A. (Costa Rica)	Director of the Project 39
Beltrán, Luis Ramiro (Bolivia)	Information Specialist
★ Casseres, Ernesto H. (Costa Rica)	Horticulturist
Holdridge, Leslie R. (U.S.A.)	Forester and Ecologist
Laprade, Henry G. (Costa Rica)	Comptroller

Northern Zone (Apartado 7061, Habana, Cuba)

Leonard, Olen E. (U.S.A.)	Director Zone
Camacho, Jorge (Cuba)	Agricultural Engineer

★ On leave of absence

Clifford, Roy A. (U.S.A.) Rural Sociologist
Laboy, María Justina (U.S.A.-Puerto Rico) . Home Economist
Olivencia, Pedro J. (U.S.A.-Puerto Rico) . . . Agricultural Extensionist

Andean Zone (Apartado 478, Lima, Peru)

Madrid, Carlos (Colombia) Director Zone
Alvim, Paulo de Tarso (Brazil) Physiologist
Blair, Enrique (Colombia) Agricultural Engineer
Paz, Luis J. (Peru) Assistant to the Agricultural
Economist
Ramsay, Jorge (Chile) Agricultural Extensionist
Ramsay, Inés Acosta de (Chile) Home Economist
Tosi, Joseph A. (U.S.A.) Forester

Southern Zone (Casilla 1217, Montevideo, Uruguay)

Elgueta, Manuel (Chile) Director Zone
Ansorena, Ignacio (Uruguay) Agricultural Extensionist
Bello, Eduardo (Uruguay) Assistant to Pasture Specialist
MacLean, Alejandro (Peru) Information Specialist
Marull, José (Chile) Agricultural Economist
Peterson, Carmen S. de (U.S.A.-Pto. Rico) . Home Economist
Peterson, Roald A. (U.S.A.) Pasture Specialist

A D V I S O R Y B O A R D S

ADMINISTRATIVE COMMITTEE★

Expiration Date

Ing. Adolfo Alarcón (México) Member Jefe, Oficina Regional de FAO	June 25, 1960
Lic. Jorge Borbón Castro (Costa Rica) Member Ministro de Agricultura e Industrias	November 12, 1962
Ing. Camilo Cabal Cabal (Colombia) Member Ex-Ministro de Agricultura	June 3, 1959
Dr. J. George Harrar (U.S.A.) Member Director of Agriculture The Rockefeller Foundation	December 18, 1961
Dr. Robert W. Hodgson (U.S.A.) Member Dean College of Agriculture University of California	April 26, 1959
Dr. Waldemar Raythe de Queiroz e Silva Member (Brazil) Director de Kilómetro 47, Río de Janeiro	February 5, 1961
Dr. Ralph H. Allee (Costa Rica) Ex Officio Director of the Institute	
Mr. Carlos Stoetzer (U.S.A.) Ex Officio Acting Secretary of the Institute	

ADVISORY COUNCIL OF S.I.C.★★

(Scientific Communications Service)

Mr. Stanley Andrews
Executive Director, Agricultural
Communications Project
Michigan State University

Dr. Ralph Shaw
Professor of Library Science
Rutgers University

Sr. José González Saldaña
Editor de Extensión
Servicio de Extensión
Río Piedras, Puerto Rico

Mr. Lyle Webster
Head, Information Officer
U.S. Department of Agriculture

Ing. Galo Plaza
Ex-Presidente del Ecuador

★ Appointed by the Board of Directors to advise on the scope and organization of the program.

★★ Appointed by the Director to advise on the development of information and publications activities.

TECHNICAL ADVISORY COUNCIL^{*}

Chairman : Dr. Ralph H. Allee
Director, IAIAS

Permanent Representatives

- Colombia: Dr. Canuto Cardona
Director del Departamento de Investigaciones
Agrícolas
Ministerio de Agricultura y Ganadería
Bogotá
- Costa Rica: Dr. Lino Vicarioli
Director General de Agricultura e Industrias
Ministerio de Agricultura e Industrias
San José
- Cuba: Ing. Regino Denis Rodríguez
Subsecretario Técnico
Ministerio de Agricultura
La Habana
- Chile: Ing. Mario Astorga
Director de Agricultura
Ministerio de Agricultura
Santiago
- Dominican Republic: Sr. Manuel de Jesús Viñas Cáceres
Director General de Agricultura
Secretaría de Estado de Agricultura
Ciudad Trujillo
- Ecuador: Ing. Nelson Vallejo Charles
Director de Agricultura
Ministerio del Fomento de la Producción
Quito
- Excmo. Sr.
César Coloma Silva
Embajador de Ecuador en Costa Rica
Embajada de Ecuador en Costa Rica
San José
(Alternate)

* Appointed by Member Governments to cooperate with the Director on agricultural matters of a technical nature.

El Salvador: Dr. Mario Lewy van Séveren
Co-Director Ejecutivo
Servicio Cooperativo Agrícola Salvadoreño-
Americano
San Salvador

Guatemala: Dr. Carlos Enrique Fernández
Jefe del Departamento de Café
Servicio Cooperativo Interamericano de
Agricultura
Guatemala

Haití: Ing. Louis Blanchet
Director General de Agricultura, Recursos
Renovables y Desarrollo Rural
Ministerio de Agricultura, Recursos
Renovables y Desarrollo Rural
Puerto Príncipe

Honduras: Ing. Salomón Ordóñez
Subsecretario de Recursos Naturales
Ministerio de Recursos Naturales
Tegucigalpa

México: Ing. José Rodríguez Vallejo
Jefe, Departamento de Semillas
Secretaría de Agricultura y Ganadería
México

Nicaragua: Ing. J. Antonio Mora
Subjefe, Departamento de Agronomía
Ministerio de Agricultura y Ganadería
Managua

Panamá: Dr. Alfonso Tejeira
Vice-Ministro de Agricultura
Ministerio de Agricultura, Comercio e Industrias
Panamá

United States: Dr. Byron T. Shaw
Administrator, Agricultural Research Service
U.S. Department of Agriculture
Washington, D. C.

Mr. Claud L. Horn
Technical Specialist, Plant Industry Station
Beltsville, Maryland
(Alternate)

Venezuela: Ing. José J. Cabrera Malo
Coordinador de Zonas
Ministerio de Agricultura y Cría
Caracas

Observers

- Argentina: Ing. Arturo Ragonese
Director del Instituto de Botánica
Ministerio de Agricultura y Ganadería
Buenos Aires
- Bolivia: Ing. Raúl Pérez Alcalá
Ex-Director General de Agricultura
Ministerio de Agricultura, Ganadería y
Colonización
La Paz
- Brazil: Dr. Waldemar Raythe de Queiroz e Silva
Director de Enseñanza e Investigación
Ministerio de Agricultura
Río de Janeiro
- Perú: Ing. Enrique Labarthe
Ex-Ministro de Agricultura
Lima
- Uruguay: Sr. Alfredo Weiss
Director de Agronomía
Ministerio de Ganadería y Agricultura
Montevideo
- FAO: Ing. Adolfo Alarcón
Representante Regional de la FAO para México,
Centro América y El Caribe
Organización de las Naciones Unidas para la
Agricultura y la Alimentación
México, México.-



RALPH H. ALLEE

Director of the Institute since 1946

Director Allee was born in California, United States of America, in 1905. He graduated from Pomona College and received later the degree of Master of Science in Agricultural Education from Cornell University. In 1948 the University of Florida awarded him an honorary D.Sc. degree. He worked in rural development programs in Turkey, Albany and Greece. In 1939 he joined the Office of Foreign Agriculture of the United States Department of Agriculture, where he served as Head of the Western Hemisphere Division and Assistant Director. In 1946 he left this job when he was elected as the Second Director of the Inter-American Institute of Agricultural Sciences.

**Students chatting
at the main entrance
of the Inter-American
Institute of
Agricultural Sciences,
Turrialba, Costa Rica.**



**Group of
students
attending
a class at
the Institute
in Turrialba.**



Dr. J. R. Orsenigo,
of the Institute's
technical staff
discussing problems on
cacao cultivation
with a group
of students.



Prof. Lucy de Gutiérrez
and Eleodoro Miranda,
a graduate student
from Ecuador,
inspecting a rice variety
at the Turrialba Institute.

**Max de Gialluly,
of the Institute's
technical staff,
and Alvaro Guevara,
a Costa Rican student,
working at
the laboratory.**



**Candelario Carrera,
of the Animal
Industry Department's
technical staff,
with Criollo bull
"Limeño".**

Angelina Martínez (right),
Institute Librarian,
giving training to
Fabiola Montero,
a Library Science student
from Ecuador.



Visual-Aids specialist
Enrique Sánchez Narváez,
of the Institute's
technical staff,
teaching silk screen methods
to Manuel Cáceres,
a student from Honduras.



Extension students
under scholarships from the
Northern Zone of Project 39
actively participating
in workshop on
Information Methods.

Students sponsored
by the Andean Zone
of Project 39
conducting
field practices on
a physiological method
to diagnose lack of
water in a crop.



Students sponsored by
the Southern Zone
of Project 39
carry out measurement and
test trials on grasses,
as a part of an international
course on pastures.



INTRODUCTION

The Inter-American Institute of Agricultural Sciences will complete its fifteenth year as a specialized agency of the Organization of American States in November, 1959. The five years covered by this report have witnessed significant changes in the economies of the American countries coupled with widespread concern that rates of growth are insufficient to meet the legitimate aspirations of the American peoples. This concern has resulted in a series of decisions. Significant to this report, there has been specific recognition that agriculture, and hence the Inter-American Agricultural Program, presents strategic issues for the future.

In the years after 1945 the economies of the Latin American countries expanded at an unprecedented rate. However, by 1954 this rate of growth had levelled off alarmingly. It appears that "post-war-plans" resulted in the realization of certain easily achieved developments. We then entered a period where further growth is increasingly handicapped by the inefficiency of agriculture, our basic industry.

In general in the areas with less mature economies of the Americas, an agricultural worker produces about one fifth as much as in areas where technology has been more widely applied to the factors of agricultural production and marketing. The spread between the least and the most effective is greater than ten fold. In this variation exists the difference between an economy that can expand rapidly and one that remains relatively static. Thus, to a considerable extent, all development awaits the freeing of man-power, the increase in local market capacity, the food and raw material supply, and the contribution to foreign exchange positions which must come about through the technification of farming. Let us bear in mind that the "Industrial Revolution" was preceded by the "Scientific Revolution" and was accompanied by an essential revolution in agricultural practices wherever industrialization has become a predominant factor in raising economic levels. The Americas will not escape these requirements. We must be concerned with the "industry of discovery", our supply of technical man-power, the rational development and use of our renewable resources, the level of culture and effectiveness of rural communities. In short we will find it necessary to apply ourselves more effectively and more consistently to the micro-economy of the farm and rural community and to see more clearly the relationship of such changes to the micro-economy of all national and regional development.

Areas in which the economy is relatively mature are moving toward articulation of production, distribution and consumption - including financing, market preparation and handling, and market promotion - a kind of "automation" in agricultural production where decisions are in a sense forced on the farmer if he is to survive.

We see this already in our industrial or export crops. Will we meet the need? When will a similar situation prevail in relation to consumption needs of our populations? Are we ready to understand what kinds of farm practices will be most suitable as the domestic, regional and world trade perspectives change?

The handful of really professional agricultural economists in American countries have been mainly concerned with the traditional research lines of farm management, land use and land problems, marketing and prices, production credit, cooperation. It has been assumed that "Agricultural Economics" is properly based on the study of alternative ways of manipulating land, labor, equipment and supplies in relation to in-puts and out-puts and as influenced by the commercialization and consumption situation outside the farm fence. Are we now to reverse this emphasis and decide what and how much to produce mainly according to a fluctuating but largely uncontrollable demand? If so, and assuming that such predictions are reliably made, can technology and the products of industry as applied to farming make possible a sufficient variation in the iron ring of nature's invariability to permit farm adaptation to such a process?

Looking over these and other basic questions which must be asked and answered if economic progress is to go beyond the mere beginnings, it is obvious that we do not have the data nor the talent available to answer such questions in terms that will guide the farmer, the extension and credit agents, the agricultural professors, the government officials, the international agencies. The problem is perhaps basically socio-economic but its solutions also require an ample development of the technology which derives from the natural sciences and their extensions into horticulture and animal husbandry plus engineering.

Never before in the history of mankind has there been available such an array of techniques for the solution of such problems as exists at present. However, our socio-economic progress will remain below the ceiling of our ignorance unless we equip ourselves with the necessary skilled researchers and teachers and with the institutional support such people need in order to become effective servants of society.

The Inter-American Institute of Agricultural Sciences was created to help solve such problems under the conditions existing in the American countries. It was first proposed in the 1920's when the great agricultural depression had begun. It was initiated at the end of the 1940's when the world had suffered a decade of economic stagnation. It came into being under the aegis of a world war. Now amidst widespread dissatisfaction with the rate of national development and equally great preoccupation concerning impending disintegration of the social structure which makes our Christian civilization possible, the hemisphere assembled had decided to place the Institute on a basis appropriate to its task. Before going into the nature of that decision, its implications and the measures for its implementation, let us review the history of this unique regional institution with emphasis on developments during the past five years.

The Convention of the Inter-American Institute of Agricultural Sciences instructs the institution to assist the American countries to develop the agricultural sciences and related arts and sciences through research, education, and the extension of services. Experience has proven that organizing our common interests in a concerted inter-American program promotes technical specialization, the accomplishment of certain research tasks requiring special facilities, and the stimulation of national programs with a sense of

coordination.

During the period 1954 to 1959, the Institute including its centers in Habana, Lima, and Montevideo supported by the OAS Technical Cooperation Program gave training to 3,595 individuals raising the total trained to 5,036. Consultation services were supplied to all countries. A total of 31 technical publications was prepared. The research journal Turrialba, the Extension journal Extensión en las Américas and the Bulletin Cacao distributed 84,900 copies. The Extension journal was started during the period. A new periodic Bulletin Café was started at the end of the period and a series on other crops was being planned.

Significant new projects were started including services to the American countries through the ICA Missions financed by a contract with that U.S. agency initiated in 1955. The Inter-American Program for the Application of Nuclear Energy to Agriculture was initiated in 1957 financed by funds from the U.S. Atomic Energy Commission. The long time cooperation with the American Cocoa Research Institute was increased and the program strengthened. Assistance was received from the Rockefeller Foundation for improving the teaching program, to study native food products and to initiate a new project to communicate activities and results among research workers. A project was initiated in cooperation with the American International Association to explore and promote the use of the mass media in educational programs. A grant was received from the Kellogg Foundation for the production of text and teaching materials.

In cooperation with FAO, a survey was completed of Higher Education in Agriculture. This was followed by the First Inter-American Conference on Agricultural Education. With another grant from the Rockefeller Foundation a study was made to determine the feasibility of utilizing national institutions and programs as centers for specialized training and the promotion of regional research cooperation. The principles and arrangements derived will be used to guide the development of a special program for the temperate areas. The principle of complementing national institutions and aiding them to supply international services promises to be important in the entire inter-American program. At the close of the period one of these "Núcleos Naturales de Trabajo" was being planned for the establishment of a Center for Research and Training on Agricultural Credit in Mexico with the intention of similar developments in Brazil and Chile. This Center managed by the Institute is to be cooperative among OAS, CEMLA, the Agricultural Banks, ICA, FAO, and the host countries.

The effectiveness of a technical program is largely determined by the competence of its staff. In 1954 the Institute employed 65 technicians from 15 American and 3 other countries. By 1959 this number had changed to 91 technicians from 19 American and 6 other countries. Also the persistent efforts of the Institute to raise the level of competence in its staff had produced some results. In 1954 half of the technical staff had graduate degrees. In 1959 two thirds of the staff had either masters' degrees or doctorates. In 1954, 12 out of 18 staff members with doctorates were from the United States of America. In 1959 this proportion had changed to 12 from the U.S. out of 28 with doctorates.

One significant measure of the ability of an institution to give service is the budget it has available. In 1954 the total income of the Institute amounted to \$1,133,652 of which 28% was due to the general fund derived mainly from quotas of the 15 contracting States. The remainder came from commercial operations, donations, and contracts the largest of which was with the Technical Cooperation Program of the OAS. In 1959, the total was \$1,584,534 of which 23% came from the general fund. In other words, the program has grown through outside support, but the proportion of its funds which can be varied in use to meet the specific needs of the American countries has reduced. The program expansion which has been recommended would increase support from quota contributions to 45% thereby protecting the continuity of the program and making possible projects more specifically in line with the growing needs for an effective inter-American agricultural program.

The program expansion referred to above was recommended by the Committee of Presidential Representatives and was confirmed by the Economic Conference of Buenos Aires. It will make possible increased training, consultation, coordination and communications services. A new Sub-center will be established for the Temperate Zone and a Regional Station of the Study of Banana and Cacao Diseases. Eventually it will be necessary and desirable to integrate several of the present grant and contract programs into regular budget structure.

The first step in bringing about the proposed expansion is ratification by the American countries of the revised Convention submitted in November, 1958. The amendment to the Convention makes the Board of Directors appointive by Ministries of Agriculture. It changes quota assessment from a population basis to the system of the OAS which takes into account national income. This more equitable means of distributing costs results in the quotas for most American countries remaining essentially the same even though the budget is increased by over \$600,000.

The President's Committee also recommended the initiation of a building program which is now under way. \$518,000 has been received from three countries. A pledge of \$37,500 is in hand. It is hoped that additional contributions of funds to complete the \$750,000 required will be received.

Ralph H. Allee
Director

ADMINISTRATIVE SERVICES

The development of basic activities and the ever-increasing demand for its services had imposed on the Institute by the beginning of 1954 a financial burden beyond the resources which supported it. Thus, facing a deficit of \$157,320, the Institute was forced to adopt a policy of austerity, and seek outside help in order to carry out its program.

On the opposite page, the sources of funds supporting the Institute over the past five years are clearly indicated. Of the total resources available to the Institute, more than 50% have come from outside grants and cooperation programs, such as the International Cooperation Administration, the Nuclear Energy Program, Project 39 of the Technical Cooperation Program of the Organization of American States, Popular Information Program, and grants from the Inter-American Cacao Center, the Rockefeller and Kellogg Foundations, and others. In the same period, only 25% of the total budgeted funds have been provided by quota payments from the Member States.

When it is considered that special grants and contracts are renewable only if funds are available, and must be appropriated by boards and governments periodically, Institute programs are in a rather weak position financially. Therefore, a modification to the convention has been offered for signature and ratification by the Member States, which proposes that contributions will be calculated on the same basis as payments to the OAS. The impact of the proposed increase in financial contribution from the Member States from 25% to 50% of the total budget is shown in the table for the fiscal year 1960-61. With these additional funds available, it will then be possible to begin to absorb into the regular Institute budget, programs initiated with outside financial help over the past five years, such as Project 39, portions of the Inter-American Cacao Center Program, the International Cooperation Administration program, and the Nuclear Energy Program. Moreover, the Institute will be in a better position to expand its own program.

Planned in the increased budget supported by contributions of Member States for 1960-61 are major programs which will be initiated or strengthened as follows:

	<u>1959-1960</u>	<u>1960-1961</u>
Turrialba Center and Regional Services	364,158	618,858
Program for the Temperate Zone		275,000
Regional Station for Banana & Cacao Diseases		140,000
Board of Directors Secretariat		20,000
	<hr/>	<hr/>
	\$364,158	\$1,053,858

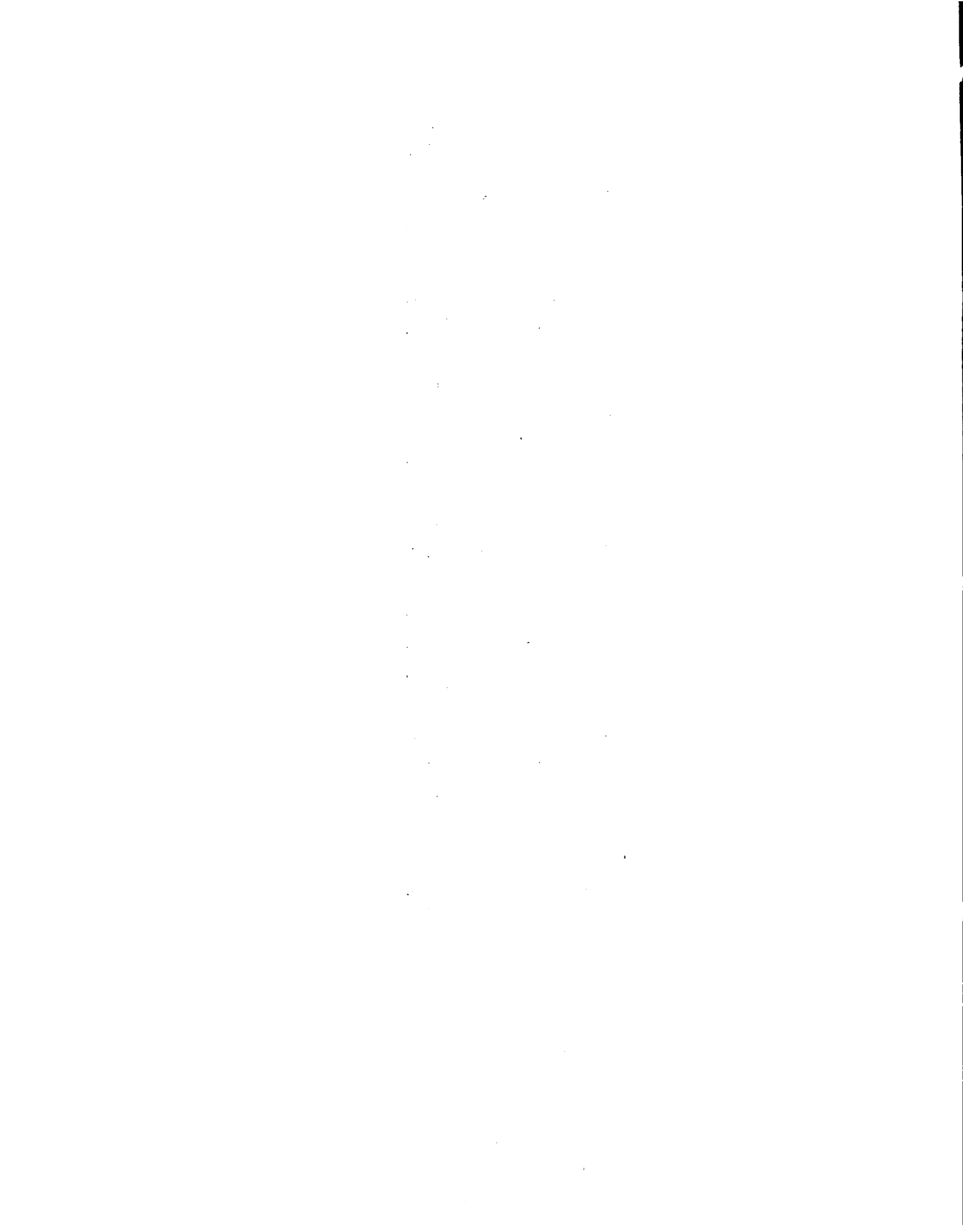
In addition to its regular budgeted operation, the Institute has scheduled a new construction program. This program will be realized in two phases: the first phase includes new facilities for the Scientific Communications Service (now completed) and 12 new staff houses. The second phase of the program will include a new Library Building, Plant Sciences Building, and additional dormitory and staff facilities. Construction for this program is planned for the fiscal year 1959-1960.

The construction program will be financed by special contributions of Member Countries, totaling \$750,000, and will provide facilities, which are now urgently needed. The Institute has now received approximately \$518,000 of this amount with an additional \$37,500 pledged to the program.

It must be pointed out that the proposed budget cannot be realized until the Member States have ratified the proposed Protocol. Therefore, the expansion in work programs and additional services resulting from such programs must remain as a plan and not a reality.

SUMMARY OF EXPENDITURES FOR PROGRAMS, SPECIAL PROJECTS AND CONTRACTS
 During the period July 1, 1954 through June 30, 1959

	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959	Total	Exposition Program 1960-1961
	\$	\$	\$	\$	\$	\$	\$
<u>General Fund</u>	28.40	26.40	26.95	322.287	21.92	1,670.975	25.21
<u>Commercial Operations</u>	190.072	206.762	195.962	235.384	16.00	1,006.266	200.000
<u>Grants and Funds for Special Projects</u>	76.503	61.559	53.296	59.206	78.696	331.260	70.000
<u>Inter-American Cocoa Center</u>	37.603	24.043	41.802	61.772	44.980	241.207	50.000
Other	114.106	117.602	99.098	120.985	8.23	575.467	120.000
	10.07	9.65	8.11	120.985	7.80	375.467	8.68
<u>Programs and Contracts</u>	13.179	154.480	200.774	265.129	274.123	907.685	280.000
<u>International Cooperation Administration</u>	494.500	418.066	396.705	446.093	471.053	2,226.217	900.000
<u>Technical Cooperation Program</u>				80.603	96.972	177.575	100.000
<u>Nuclear Energy Program</u>					52.000	52.000	52.000
<u>Inter-American Popular Information Program</u>	507.479	572.546	597.479	791.825	907.148	3,376.477	945.000
	44.76	46.98	48.90	791.825	53.85	3,376.477	50.93
TOTALS	100.00	1,218.692	1,221.826	1,570.481	1,584.534	6,659.189	100.00
							2,318.898
							100.00



PLANT INDUSTRY DEPARTMENT

A. OBJECTIVES AND FUNCTIONS

Within the organization of the Institute, Plant Industry is concerned with the production, improvement and utilization of cultivated plants. This is a wide and complex field, of primary importance for the Americas, since a large part of its population depends on plant products not only for food and clothing but plants are the main sources of industrial products and cash for international commerce. Productivity levels are unusually low in Latin America, and there are huge deficiencies, as large masses of populations are undernourished and the yields of agricultural products for industrial uses are low and uncertain. The social and economic development of Latin America depends in a large part on its agricultural systems, and the improvement of these systems will require several generations.

The Department is contributing to the solution of these many urgent problems by following these different approaches:

- 1) Through direct services to the countries, as consultation, exchange of information and materials; establishing cooperative programs, and coordinating the existing programs in order to prevent duplication and to obtain a higher efficiency; promoting the organization of international conferences and inter-American societies of agricultural sciences.
- 2) Through training at various levels, in order to improve the scientific and technical background of Latin American students.
- 3) Through fundamental research of wide applicability, on problems for which the Department has adequate facilities.

During the last five years the trend in Plant Industry has been directed towards the strengthening of the cooperative and direct services to the countries, and increased training, while research activities have been restricted to fundamental problems or to support the training program.

Plant Industry is formed by four administrative units, which are inseparable as far as objectives and means are concerned, but which have independent financial support. Two of these units were established in the last three years:

- 1) The nucleus of the Department is maintained at more or less the same number of personnel as when it was started in 1947; it deals mainly with general consultation and assistance, teaching and research.
- 2) The Inter-American Cacao Center, established in 1948 and supported by private sources, with the aim to promote the advance of the cacao industry of the hemisphere through research, training and consultation.

- 3) The technical Services in Cacao, Coffee and Rubber, established as a part of the ICA/Institute contract to serve the U.S. Missions by supplying information, training and materials. This unit was established in 1955.
- 4) The Nuclear Energy Program, for the training of Latin American students in the application of nuclear energy to agricultural problems, particularly in plant irradiation and the use of radioisotopes. This unit was established in 1956, under a contract between the U.S. Atomic Energy Commission and the Institute.

It is necessary to mention here the contributions of private sources in the support of some Department projects, which have helped considerably in the training of graduate students and in the development of research projects. Such funds come from different countries: Chile, Costa Rica, Holland, Switzerland and U.S.A. Among them there is one from the American Cacao Research Institute for the support of the Cacao Center, established twelve years ago; one from the Chilean Nitrate and Iodine Corporation for studies in coffee nutrition; the Maxwell House Division supported for three years a project on studies in the factors that determine the quality of coffee; the Rockefeller Foundation has given several grants for the study of native foods, for assistance to the plant physiology laboratory, the Central American Corn Program, etc.; the Costa Rican Coffee Office has provided funds for the maintenance of the Institute coffee collection, one of the largest in the world. Several other grants have supported different projects in the Department, contributing a considerable amount to the maintenance of technical staff and students.

B. ACCOMPLISHMENTS

Among the various activities of the Department, the following highlights during the past five years have been chosen to be discussed briefly.

I. Central American Corn Program

This program is a cooperative effort of the governments of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, the Rockefeller Foundation and the Institute to improve the production of corn in the Central American countries. Several institutions of Colombia, Cuba, Mexico and Venezuela, also cooperate in this project.

The program consists in the evaluation and study of corn collections for its possible use in local programs, and in uniform trials of adapted and experimental materials to determine its area of adaptation and commercial possibilities.

This program includes also the organization of annual meetings of the corn technicians in the area. The last one has held in Panama City in March 1959, and was attended by 26 technicians from 10 countries. In these meetings plans for future work are discussed, as well as the recent progress in corn breeding and other matters

pertaining to agronomic problems of this crops.

This project also trains local technicians, by in-service training at Colombia, Mexico or Turrialba, and cooperates in the revision of the corn breeding programs of the participating countries. During the last year, for instance, two Institute technicians revised the national programs in Guatemala and Nicaragua.

The Institute participates in the planning of the program and also made available materials and information of its own breeding program. Also provides service of a coordinator who assists the director of the program in counseling the local technicians in the organization of annual meetings and in the preparation of the summaries of the various field experiments.

II. Inter-American Cacao Conferences

One of the main cooperative efforts of the Institute is to organize the Inter-American Cacao Conferences, in cooperation with local entities.

The first of these conferences (Turrialba, 1948) was attended by 27 participants from 10 countries; in this conference the Cacao Center was organized; in the second, also held in Turrialba in 1949, there were 26 technicians from 14 countries; the third conference (Trinidad, 1950) was attended by 33 participants from 8 countries; the fourth, in Guayaquil (1952), was a technical meeting with 73 technicians from 14 countries, and 38 technical papers were read. To the fifth conference (Turrialba 1954) came 77 technicians from 16 countries, 38 papers were presented and special committees were created in breeding, nutrition, processing and extension. The sixth conference was held in Salvador (Bahia) in 1956 with an attendance of 148 delegates from 19 countries who presented more than 60 technical papers. The last conference (Palмира, Colombia, 1958) was attended by 145 delegates from 16 countries and 74 technical papers were discussed.

The Cacao Center has the responsibility for organizing these conferences, which have proved to be the most efficient way of discussing the latest advancements in the cacao production and processing in the Hemisphere. Although originally these conferences were restricted to the American countries, during the last three conferences many scientists from Africa, Europe and Oceania have participated in the discussions.

III. Other International Conferences

- a) In cooperation with FAO an Inter-American Meeting in Soil Fertility and Fertilizers was held in Turrialba, May 6-11, 1957. 31 representatives of 11 countries discussed the status of fertilizer consumption in their countries; the experimental methods used and the results of field trials, and committees were formed to promote the standardization of analysis, particularly of phosphorus.

- b) Also in cooperation with FAO an Inter-American Meeting was organized on Soil Survey and Classification (Turrialba, May 13-18, 1957) attended by 45 technicians. In this meeting was approved the establishment of a regional center for research, training and publication on soil surveys in Latin America, and a committee to prepare a uniform terminology for soil terms in Latin America, were approved at this meeting.
- c) The Technical Services in Cacao and Coffee organized a Coffee Round Table for Central America and the Caribbean, in Turrialba (May 20-23, 1958). The meeting was attended by 21 technicians from 6 countries, and the last advances in coffee culture were discussed, such as new varieties, irrigation, shade, weed control, control of diseases and pests.

IV. Cooperative Trials in Coffee

This program, started in 1958, is a cooperative effort between the coffee institutions in several countries and the Institute, to establish uniform trials in varieties, cultural practices, fertilization, etc. The first set of trials is a variety test, including some 40 plants chosen from the large collection the Institute has established in Turrialba. The uniform trials are being established to date in Guatemala, El Salvador, Nicaragua, Costa Rica, Ecuador, Peru and Venezuela. Among the varieties tested are the most promising commercial types, as well as others that offer a certain degree of resistance to the coffee rust, the world's most serious coffee disease which fortunately has not yet entered in America.

Seeds and field plans are supplied, and the trials are established in cooperation with national, international and private entities.

V. Native Food Crop Project

The purpose of this project is to study and evaluate some native food crops, which are used in large quantities in the Americas, but have not received enough attention from the standpoint of agronomy and dietetics. Some recent surveys have shown that many of these native plants have a higher content of vitamins, minerals and proteins, than do introduced crops.

To initiate this project three Andean tubers of high consumption, "oca", "ulluca" and "isaño" were studied in a cooperative project between the University of Cochabamba, Bolivia, and the Institute. A survey of the different types in cultivation was done in Argentina, Bolivia, Colombia, Ecuador and Peru, and several hundred clones were planted in two localities of Bolivia and one in Costa Rica. A provisional classification of the clones was finished, and a complete study of the oca plant, in its structure, reproduction and variability was completed. At present, work is continuing on the agronomic evaluation of 100 clones of oca, 50 of ulluca and 120 of isaño, and an analysis of their food value is planned for the future. The project was initiated with a Rockefeller Foundation grant.

VI. Cooperative Project in Potatoes

The purpose of this project (which has received Rockefeller Foundation support) is to introduce and test new potato varieties, or to develop new clones, superior in resistance to diseases and in agronomic performance to the varieties planted at present in the Central American countries. Its center of operation is located in Costa Rica, in cooperation with the Ministry of Agriculture of that country, and the cooperative work extends at present to Honduras, Nicaragua and Panama. This project has developed two clones of high resistance to Phytophthora, of which materials have been distributed to most of the potato countries; an active interchange of planting stocks is maintained with U.S. institutions. This project also trains students at the graduate level in the agronomic aspects of the crop. Short courses, for potato specialists have been given in Costa Rica and Peru, and the project technicians have helped in the organization of potato programs in three countries.

VII. Abaca Program

From 1952-1958 a unit of the U.S. Department of Agriculture worked in close cooperation with the Institute in the study of agronomic problems of abaca production. The emphasis of the work was laid on a soil survey of the prospective areas for abaca culture in Tropical Americas; in assisting the experiment stations and companies that are planting abaca; and in the study of some applied problems--viruses, nematodes, fungi, that attack the plants, fertilization, and agronomic practices.

Six graduate students from Bolivia, Ecuador, Guatemala and Peru were trained in soils, entomology and agronomy in this project and a number of valuable scientific reports are available.

VIII. Nuclear Energy Program

By means of a contract between the Atomic Energy Commission of the U.S. and the Institute it has been possible to establish in Turrialba a project to investigate the agricultural applications of nuclear energy to train people from Latin America in the use of radiation and radioisotopes, to supply consultation and to prepare informative material about the use of radiation and radioisotopes in research and teaching.

A radiation field has been established in Turrialba using a 228 curie cobalt 60 source, which is capable of submitting plants such as coffee, cacao and banana, to an intense radiation. The field has a radius of 95 meters around the source. The effects of very high doses of radiation have been studied and already some very interesting morphological effects have been observed. A laboratory for cytological work has been established, as well as greenhouse and fields for growing seedlings.

Work has begun on the application of radioisotopes to different crops. Phosphorus³² and zinc have been used to observe the absorption and translocation of these elements by the plant. A provisional radioisotope laboratory has been equipped, consisting of a working area, a counting room and a dark room for autoradiographs.

Two technicians from the Nuclear Energy Program visited South America to observe installations devoted to radiobiology, and to become acquainted with their work, and to try to arrange cooperative programs.

A lecture course in radioisotopes was given. Two publications on the effects of radiation on plants were prepared, and one on the uses of radioisotopes in agriculture.

IX. General Consultation Services

A very active correspondence is maintained with technicians, farmers or individuals from all over the world interested in plants. Most of the consultation work deals with information on new crops, cultural practices, plant protection, new methods of analysis, or requests for planting materials. There is also continuous communication with institutions and technicians of the American countries whose interests are similar to those of the Department (cacao, coffee, rice, corn, etc.). This type of consultation service handles several hundred requests per year. It is difficult to appreciate as a whole and implies considerable time and effort. It means an extra load on the staff, but it is a direct service and ways have to be found to implement and enlarge it.

Departmental technicians have visited the various Latin American countries at their request, in some instances a number of times, to give on the spot consultation in the various crops, carry out soil surveys, and other forms of technical cooperation.

The number of consultation visits by countries are as follows: Argentine (1), Bolivia (3), Brazil (7), Colombia (6), Costa Rica (several), Cuba (2), Chile (1), Ecuador (10), El Salvador (5), Guatemala (7), Haiti (1), Jamaica (2), Mexico (3), Nicaragua (8), Panama (4), Paraguay (1), Peru (5), Venezuela (1).

X. Seed Interchange

The Department has established large collections of living plants; the total introduction amounts to more than 2,500. Among the collections the most important are coffee (600 introductions); cacao (60 clones), legumes and grasses (140 introductions); fruit trees, mainly tropical (60 species). These living collections have enabled the Department to promote an active interchange of propagation materials, with other institutions, technicians and often directly with farmers. For instance, the introduction of Pangola grass in certain countries like Costa Rica, Ecuador, Mexico and Peru started as

distributions made from Turrialba. The Department keeps an active interchange with the plant introduction services in the United States, Argentine and countries of the old world and with experiment stations in Cuba, Honduras and Peru. To give an idea of the activity of this service it may be pointed out that during the last year 210 shipments were made to 35 countries, with a total weight of around 7,000 lbs.

XI. Some notable progress in research

Research projects in the Department have two purposes, first to study fundamental problems which knowledge is indispensable in applied programs, and second to develop methods in research adapted to the Latin American conditions. They deal with plant improvement based on sound genetic principles; plant nutrition, growth, development; plant protection and allied problems; and preparation of plant products for the market.

The research projects of the Department were reorganized in July 1958 in a series of project lines. The following examples of progress during the period show only a part of the whole work; this is reported in length in the annual reports and other publications of the Department:

a) In Cacao

- 1) The control of the most serious disease in the Continent; pod rot, by high volume sprays is more effective using bordeaux mixture than any other fungicide.
- 2) The development, dispersal and survival of that disease have been thoroughly studied.
- 3) Symptoms of deficiency of minor elements in cacao have been determined and published.
- 4) The use of orchard oil as fungicide indicates that at low volume it is toxic to cacao.
- 5) Work has been done in finding resistant types to pod rot, and some promising results have been obtained.
- 6) A recently discovered disease, cushion gall, is being studied in its distribution and effect in the plants. A survey from Guatemala to Brazil was completed, to evaluate the importance of this disease and its potential danger.
- 7) Insect surveys have shown the high number of insects associated with the cacao trees, as parasites, predators or pollinators. Radioisotopes materials have been used in this study.

- 8) A research project was started two years ago to concilate the nutritional status and foliar analysis, to find a better way for the correct use of fertilizers.
- 9) A classification or catalogue of all the clones planted in Tropical America is being completed.
- 10) A comprehensive series of screening trials of fungicides has shown that some commercial products may be as good as bordeaux mixture and are less difficult to use.
- 11) A breeding program, for the production of superior clones or hybrids of high yield, has been in operation for the last year, and some interesting results have been observed.

b) In Coffee

- 1) A large collection of coffee varieties has been established and includes around 600 introductions. Progenies have been selected for lateness and high yields. Hybrids between species and varieties are being tested.
- 2) The work on mineral deficiencies, particularly of minor elements, has been completed. Work is continuing on the toxicities, due to high applications of fertilizers, and how to recognize them by visual symptoms.
- 3) Studies on the rate of net assimilation in young plants have shown that coffee is a sun plant. This does not mean that it should not be cultivated under shade, as the last is a complex problem.
- 4) Application to gibberelic acid to seedlings and young shoots show a marked elongation in the parts treated.
- 5) The use of mulch has proved to increase yields, even when soil moisture conditions are optimum, probably due to the control of weeds.
- 6) Coffee planted in close rows or hedges, does not produce more than coffee planted at the usual distance.
- 7) Techniques were developed to propagate coffee in a vegetative way.
- 8) Studies on leaf growth and rate of injection have shown the periods when fungicide application gives a better control of foliar diseases.
- 9) Field trials with caturra coffee have shown the superiority of this variety in yield over the common types, and cup tests proved that its quality is very good.

- 10) Bending over young plants by cutting the root system with a shovel, has proved to be detrimental to the plant in growth and yield.
- 11) Coffee quality studies have been made on effect of different systems of processing; on the way altitude, age of trees, fertilization and cultural practices affect the quality.
- 12) For the study of the nitrogen nutrition of the coffee tree a new type of micro-Kjeldahl was developed, very superior in efficiency and economy to the standard installations.

c) In Corn

- 1) A breeding program is aimed at developing fundamental information in problems of interest to Latin America.
- 2) A large number of crosses between varieties have proven over a three year period to be equal in yield performance to the best double crosses available at present in Central America.
- 3) The best inter-varietal crosses are being used as sources of lines and testers in a program of reciprocal recurrent selection.
- 4) Single-crosses between a number of promising lines selected on the basis of top-cross performance are being produced this year.

d) In Rice

- 1) More than 3,000 varieties have been under study in Turrialba and on the west coast of Costa Rica for resistance to Helminthosporium and Piricularia and to the hoja blanca disease.
- 2) A close correlation has been found to exist between low infection and high yield.
- 3) Many of the selections have yielded 3 times as much as the present commercial varieties. A few of these also have satisfactory agronomic characteristics.

e) In Other Crops

- 1) Work was continued in the improvement of the Turrialba tomato; certain hybrids using these variety as a parent proved to have superior qualities.
- 2) Cassava improvement work has been established recently. Polyploid sectors have been obtained, and a hybridization program is in operation.

XII. Training

The Plant Industry Department has trained during the period 34 graduate students from 10 countries; 142 students from 20 countries in intensive short courses, and 15 special students from 10 countries. Personnel of the Department cooperated in the organization of courses in Brazil, Colombia, Cuba, Guatemala and Nicaragua.

C. PLANS FOR THE FUTURE

- 1) In general the work of the Department will be directed towards increasing and improving direct services to the American countries. For this purpose the Department hopes to fill under the expanded program, some of the gaps in the present staff to strengthen present lines of services. This will include permanent provisions for some of the most important activities now supported by short term contracts with the American Cocoa Research Institute, the International Cooperation Administration and others. Plans should include:
 - a) A special effort to organize or reinforce cooperative programs on a regional basis; consultation services and organization of technical meetings.
 - b) Cooperative work with the schools of agriculture, particularly those at higher level, in the organization of curricula, laboratories or field stations.
 - c) Filling of some of the gaps in the present staff, such as Entomology, to offer consultation service and graduate training.
 - d) In cooperation with other units of the Institute, the Department will render secretarial services to meetings of Latin American plant scientists.
 - e) Study of the possibility of establishing in Turrialba a curriculum for higher courses specialized in Tropical Agriculture.
- 2) Several specific projects on a regional basis merit special consideration:
 - a) The organization of the Center for the Study of Cacao and Banana Diseases in an Equatorial area. This project includes the study of the main diseases and means of control, genetic improvement to find resistant or more productive types; and new agronomic systems more adapted to the disease control methods. This will also serve as a training center for graduate work and short courses; it will promote a net of regional trials and the interchange of plant materials among the American countries and outside the hemisphere.

- b) With the establishment of the proposed Sub-center in Southern South America a new program of research, training and services to countries covering temperate zone crops will be initiated.

A recommendation to establish (a) and (b) was approved by the Inter-American Committee of Presidential Representatives, and included in the plans for the expansion of the Institute.

- c) Strengthening and expansion of the Regional Corn Program.
- d) The regional trials in cacao, already started, will be expanded to include trials of hybrids and new clones, fungicides and insecticides, fertilizers, etc.
- e) Expansion of the regional projects on coffee, with new variety trials, field tests of weed control, pruning systems, production plots, etc. Services also will include technical help in the design of experiments and in new laboratory techniques. The coffee quality studies should be expanded.
- f) Promotion of a more active interchange of plant materials or improved cultivars in fruit trees, grasses, vegetables, and of information of possible new crops for the Americas. It will also be aimed at the establishment of more services of plant introductions and the formation of botanical collections.
- g) Expansion in the study of native food plants, both in the explorations and agronomic aspects as well as in their dietetic value, the latter in cooperation with institutes of nutrition. Work will be continued in the improvement of cassava, in a breeding project already started.

ANIMAL INDUSTRY DEPARTMENT

A. OBJECTIVES

The major objectives of the Department of Animal Industry over the past five years are listed herewith in the order of their initiation during the five years:

- 1) Expansion of a breeding program for criollo dairy cattle in the American Tropics.
- 2) Creation of a Nutrition Laboratory.
- 3) Formation of beef herds of sufficient size and uniformity to permit research in breeding and feeding of beef cattle.
- 4) Training of selected graduate students to take full advantage of the teaching opportunities afforded by the herds, laboratories and research facilities being developed.
- 5) Formation of a strong program in tropical pasture research and training.

Even though the development has been slow, all of these objectives have been fulfilled during the past five years. As the latter two accomplishments were not possible with the normal Institute budget allotted to Animal Industry, outside help was necessary. In the case of training, from six year grant of the Rockefeller Foundation. The pasture program has been partially in operation from the day the Department bought its first cow in 1945, and forages had to be produced. However, adequate personnel to evaluate our advances in pasture production and to direct research and training could not be employed until a contract with ICA of the U.S. Department of State supplied additional funds.

To a certain extent these two programs are weak in that no permanent plan for their support has been developed. This and other situation herein reported illustrate how strategic the proposed expansion of Institute activities will be in assuring adequate service to the livestock industry of the Americas.

B. ACCOMPLISHMENTS

I. Dairy Cattle Breeding

The herds of purebred Jerseys and crossbred Sindhi x Brown Swiss have been maintained and some progress made in the study of their breeding. However, the major accomplishment has been in the development of a Criollo Dairy Breed. Here two major accomplishments can be listed. First, the creation of a sound program for the home herd at Turrialba. Second, the successful establishment of cooperating

herds in Venezuela and Nicaragua plus some relations with and opportunities for cooperation in several other countries.

The establishment of a careful internal management of the herd has been of the utmost importance in acquiring the necessary experience to be able to advise cooperators. Many hours of constant attention to all aspects of feeding, management, diseases control and record keeping have gone into the establishment of standard methods of handling the herd. Also, this constant and close supervision has enabled us to appraise the possibility of the breeding and mating systems practiced here being of use to co-operators.

The dairy herd consisted in 1954 of 100 milking cows, of which 15 were Jerseys. The total inventory (including heifers over 1 year) was 369. In April 1959, the milking herd consisted of 191 cows, of which 32 were Jerseys. The total inventory at present is 461 head of cattle. It should be pointed out that this increase in numbers represents increases in carrying capacity of the pastures, since the area allotted to the Department has remained virtually the same.

Milk production by the Institute herd from 1953 to 1958 is presented in the following table, along with the totals of milk handled by the Institute creamery:

<u>Milk produced by Department's herd</u>		<u>Total processed in dairy plant</u>
1953	71,586	253,072
1954	112,252	273,835
1955	159,246	292,126
1956	173,917	293,806
1957	164,000	239,973
1958	162,286	274,650

The cooperating herds that are successful in furnishing a great deal of information are the private herd of Don Joaquín Reyna in Rivas, Nicaragua, and the herd of the Centro de Investigaciones Agronómicas of the Ministry of Agriculture in Maracay, Venezuela. In the latter herd a system of management and record keeping very similar to the one carried out at Turrialba is in practice. Also a bull testing system which promises to bear great fruit in a few years is well underway at Maracay.

The area of influence of the dairy criollo is likely to spread as more cooperators are found. However, this step cannot be pushed too fast even in countries that have considerable criollo cattle of merit because of the scarcity of trained personnel capable of managing the herds correctly and furthermore, scarcity of permanently directed programs that can maintain the stability of management required in a breeding project. Thus we have seen with painful regret that a test herd started by the government of one country and an outside cooperator after a very promising start under one manager, has deteriorated to the point of disappearance under a change in administration. A very good herd that exists in the hands of another government remains somewhat idle due to lack of trained personnel and permanently directed programs. Perhaps the greatest achievement of the Criollo Dairy cattle project has been in somewhat intangible terms. Namely the firmness of our convictions that animal breeding in the tropics needs leadership of its own and that continued importations of unadapted types is undesirable. Our herd and cooperating herds demonstrate daily to students and other observers the value of this precept and that animal breeding is being built upon a sound basis from records made under the trying conditions of the tropics. We are proving the need for long term objectives in animal breeding and the dependency of breeding projects upon a strong and stable management. Breeding projects therefore, should not be started by institutions until their problems of management and forage production have been solved.

II. Creation of a Nutrition Laboratory

Early in the development of the Department the need for a nutrition laboratory had been an urgent factor particularly since many of the research projects tackled by students were of a nutritional nature. Samples had been sent to various laboratories but results were too slow in returning to be applied to the experiments under way.

Furthermore the need of the laboratory as a training tool for graduate students was deeply felt. The lack of skills in laboratory procedures was evident in all students we were receiving from Latin American Agricultural Colleges. It was apparent that our training though aimed at producing men capable of earning a living as farm managers (should institutions of research and teaching fail to accept them, as has often been the case) needed contact with the fundamental laboratory procedures of nutrition.

The development of this laboratory emphasis has been based on work done with relatively simple equipment. Objectives were drawn for its development starting with dry matter determination, on to proximate analysis of feeds and only recently has the laboratory attempted to work in digestibilities and analysis requiring spectrographic methods.

The laboratory has been housed in limited space available in the Climatological Laboratory. Equipment for the laboratory has been added gradually from our regular budget. While this has meant a rather slow development, it assures that every piece of equipment is going to be used rather intensively. It would have been incongruous to ask for new buildings and considerable equipment when our budget permits only a very slow increase in personnel. However, it is already being felt that as soon as this pioneer phase gets fully underway deeper studies will be required in some aspects of nutrition that will need more personnel and greater facilities.

To this date most of the work in the laboratory has been centered upon teaching a fundamental nutrition course and aiding in the interpretation of feeding trials. Also a long term project has been undertaken to study the variability of composition of three of the major grasses of the tropics, namely: Melinis minutiflora (Molasses grass), Panicum maximum (Guinea grass) and Digitaria decumbens (Pangola grass). Weekly sampling of these grasses in the Turrialba area will be of special importance since these species remain green the year round, though their rates of growth are quite variable.

Some of the feeds that have been studied in comparative feeding trials up to now are the following: Molasses, Sifted bagasse, Cacao Pods, Yuca meal, Quinoa, African Oil Palm meal.

III. Formation of beef herds, and beef production studies

Though the process of establishing beef herds started more than five years ago it is only recently that clear cut objectives in breeding plans have been developed for a systematic study of beef production.

The only herd that was started from a complete importation was the Brahman. A Santa Gertrudis and a Brangus herd were initiated by grading up, using various types of local cows, and in the case of the Santa Gertrudis, a donation of Santa Gertrudis grade cows made by the King Ranch. The Brangus and Santa Gertrudis herds were plagued by low levels of fertility and it was decided to discontinue the Brangus herd. The Santa Gertrudis received a new boost with the donation of two bulls in 1958 by the King Ranch. At this stage it was decided to initiate a study of beef gains in liveweight on pastures as a system of selecting young replacement females. Before that time it had been practically impossible to do much selection of females, due to the need to increase the size of the herds. A female herd of 24 cows is expected to be reached by 1960. At that time a

study of crossbreeding, and the measurement of hybrid vigour obtained with Criollo blood and Brahman or Santa Gertrudis will be initiated.

Discarded dairy cows from the Criollo breeding project will be used as females for the crossbreeding work. The fundamental philosophy behind this study is that the exploitation of hybrid vigour is an extremely valuable means of increasing beef production. The existence of hybrid vigour in crosses of Criollos and Brahmans has been known to be considerable but it has never been measured in comparison with the beef obtained from purebreds, in the tropics of Latin America. This study also intends to answer the questions of possible hybrid vigour available to the man who has Zebu cows and may want to use a Criollo bull to get more vigour than would be obtained from the continued use of purebred Zebu bulls.

This work is also important because it may show the value of discarded Criollo cows as producers of beef. This practice may be of great importance to many developing cattle areas of the American Tropics where milk markets are insecure and shifts from dairying to beef production are likely to be made from time to time. A clear understanding on the part of cattlemen of the value of hybrid vigour, demonstrated by these experiments, will show the possibilities of a system of breeding for occasional beef production from tropical dairy herds, without seriously damaging progress on the latter.

The general schedule of work on beef cattle has been and will be as follows:

1953, 1954, 1955, 1956: Formation of three breeding herds: Brahman, Santa Gertrudis, Brangus.

1957, 1958, 1959: Concentration of effort on Brahman and Santa Gertrudis.

Tests of gaining ability of females as basis for selection.

Tests on gaining ability of sires progenies with particular emphasis on differences of transmitting ability for gains on pasture and gains on dry lot.

1960, 1961, 1962, 1963: Crossbreeding as per following plan:

Each herd uses one set of bulls with 3 different types of cows, thus give 3 types of crossing, or a total of 9 types of beef animals for study.

Bulls	Bulls	Bulls
BRAHMAN	CRIOLLO	SANTA GERTRUDIS
8 Criollo cows	8 Criollo cows	8 Criollo cows
8 Brahman cows	8 Brahman cows	8 Brahman cows
8 Santa Gertrudis cows	8 Santa Gertrudis cows	8 Santa Gertrudis cows

The cows will be rotated between bulls from year to year, and at least three bulls of each breed will be used, so that the results obtained will tend to represent an average performance of the breed, instead of the results of individual bulls.

Work published to date utilizing the existing herds has dealt mainly with control of Dermatobia hominis (Nuche or torsalo). This work carried out mostly on the Santa Gertrudis herd, has dealt with tests of various insecticides. Beef animals of these herds have been used in feeding trials on sugar cane molasses and bagasse, and in testing the value for fattening of cacao pods. Most of this work has appeared first in the form of theses of graduate students. A thesis is also being written on gaining ability of sire progenies of beef bulls.

IV. Training of selected graduate students

Training of graduate students has been a major concern of the Department over the last five years. The program was greatly accelerated by a grant from the Rockefeller Foundation in the amount of \$58,000 to be spent over a period of six years. This grant is used primarily as a direct aid in financing one-year assistantships in Animal Industry. Students are selected very carefully mainly on evidence of their genuine interest in animal production and previous contacts with practical animal husbandry. A great deal of emphasis is given to training in some fundamental aspects of animal management so that they may appreciate the practical importance of such field techniques before tackling the more refined work of animal experimentation. It is felt that without their familiarity with management the graduate student might become a theorizer lacking a sound practical basis for his thinking.

V. Formation of a Tropical Pasture Unit

This is the latest accomplishment in the Department, and has been possible only through the use of ICA contract funds. It has permitted the drawing up into a unified effort of all previous work on pasture improvement at the Turrialta premises and utilization of this experience for teaching and for the implementation of some fundamental research.

The time of a specialist dedicated exclusively to pasture problems is invaluable in terms of capacity of the Department to plan research on forages, consultation services to the countries, and in general orientation to the graduate students in Animal Industry.

To date this Unit has been able to stage, less than a year after its initiation, a Pasture Short Course for the Caribbean area. Also some headway has been made in evaluating types of annual crops adequate for silage making and in the study of native legumes; many of the latter found to be of importance in tropical pasturage, have never been studied, or even identified.

C. PLANS FOR THE FUTURE

The primary factor to be kept in mind in this connection is that some of the accomplishments of the past five years have been made under extreme budgetary difficulties. First of all in planning for the future the Department of Animal Industry would like to ensure that some of what has been done on a meager budget be made more permanent and sounder by more adequate provisions mainly of personnel and in funds for providing teaching. For instance, the work on nutrition has been done on a part time basis as far as direction goes since the head of that project has also responsibilities in general management and the maintenance of the creamery. It is obvious that we need to correct this situation as soon as possible; the work on beef cattle has been carried out on a part time basis by both the Head of the Department and the Junior Animal Husbandman. As data accumulates both from the past and as it will likely increase in the future, additional personnel will be needed to ensure time for the analysis of such data.

The training program also necessitates attention in the future. The help received from the Rockefeller Foundation is of a temporary nature and based upon the belief that at the end of six years more students would be sent by governments and institutions. While there has been a slight tendency in this direction and we should aim at getting all the outside help possible for financing training, it is believed that a much sounder program could be built if a portion of the assistantships for graduate students could be handled each year from departmental funds. Some of this research aid is obtained in older-countries from the agricultural industries. No doubt in Latin America this help will be forthcoming, but not in the very immediate future.

It would seem therefore, that the first requirement for an increased program would be in the consolidation of the present accomplishments to ensure their permanent contributions to training and research.

Once the present program is solidified advances into other areas of investigation should be made. In this respect, the position of the Institute as a guide for Animal Husbandry development in the whole hemisphere should receive special attention. The teaching of Animal Husbandry throughout the hemisphere is in a rather weak position. Most of the curricula are out of date and the number of courses offered is either insufficient or the courses are inadequate, impractical or built with little contact with the Animal Industry of the various countries. The influence of the Institute upon these matters is being felt very slowly at various colleges through the medium of former graduate students filling teaching positions. But these students need further guidance in teaching procedures and in building up courses adapted to their environments. It would be ideal if we could spare some of our experienced technicians to visit former students in their local positions and help them to do a better job; furthermore this expansion could contemplate giving semester courses in colleges from which we have not had graduate students, in order to make contacts and explore possibilities of finding good prospective graduate students in the colleges themselves.

As a final aim for the future, the Department should contemplate moving

into areas of investigation in which it is not currently working. These are poultry and swine husbandry. Particular importance of moving into these areas is found in the fact that these species afford wonderful opportunities for theses making, and that many breeding techniques can be explored and taught in swine and poultry much faster and with more striking results than can be obtained with a slow reproducing species like cattle.

DEPARTMENT OF ECONOMICS AND RURAL LIFE

A. OBJECTIVES

Agriculture, in its broadest sense, is conceived as the interplay, under specific ecological conditions, of several factors: plants, animals, and MAN. Man is important to agriculture, therefore, because he is one of its components. The possibilities for a progressive agriculture to flourish increase to the extent that Man is healthy, quick of mind, and receptive to new technology. Man is related to progressive agriculture in another indirect way: agriculture is considered socially useful to the extent that it produces capital which can be translated into "better living" for larger groups of people.

The Department of Economics and Rural Life has had Man as its focus of interest. Since Man lives in groups or communities, the RURAL COMMUNITY has been a major concern to the Department. Two of its over-all objectives, which guided much of its earlier work starting in 1947, have been to find out: (1) how a rural community develops, and (2) how best to stimulate this development through educational means. It was assumed that such knowledge would be necessary to promote agricultural development. In relation to the first objective, several intensive community studies were made; in relation to the second, much emphasis was placed on the teacher as a stimulator of change. Gradually, as knowledge was gained on the over-all process of development, emphasis was shifted to a specific aspect of this process. Thus, by 1953-54, most of the sociological and economic research that was being done was in connection with the diffusion and adoption of farm technology, a factor which contributes so heavily to the development of agriculture and rural life. Also, starting in 1954, more emphasis was put on the agricultural extension agent as a stimulator of change, less so on the rural teacher. Concern with the teacher of vocational agriculture was maintained.

To guide its work, the Department has at the present time two more restrictive, though still general, objectives: (1) in relation to processes in the diffusion and adoption of agricultural and rural development technology, the discovery of new knowledge, the adaptation of suitable existing knowledge to regional environments of the Americas, and the transmission of all this information to the American countries; (2) in relation to the processes involved in the efficient management of the farm, the discovery of new knowledge, the adaptation of suitable existing knowledge to regional environments of the Americas, and the transmission of all this information to the American countries.

During the period comprised in this report, a major part of the Department's resources has been spent in the organization and administration, through the Graduate School, of a formal training program in Agricultural Extension, a process in the diffusion of agricultural and home-making technology.

B. ACCOMPLISHMENTS

I. Research

a) Studies in Rural Sociology

Specific research in the general area of the social and cultural factors associated with the diffusion and adoption of agricultural practices was commenced in 1953, with a study dealing with "why small farmers accept and reject practices in agriculture and home-making technology".

Studies have been completed on the adoption of new agricultural practices among large coffee and sugar-cane farmers, on the rational introduction of technology on a coffee-growing hacienda and its sociological implications, and on a highland Peruvian community (1954-55) in which intensive agricultural and rural development was occurring.

b) Studies in Agricultural Extension

In 1955 a study was begun on the professional training needs of extension workers and how they were being met; this study was completed in 1957. Another, initiated in 1955, on the usefulness of study circles in community development and in extension, has been partially completed.

Within the over-all extension research, beginning late in 1958, a sub-project was initiated which specifically focuses the problem of the diffusion of agricultural practices through the extension agent. The planning of field work is in process. Through the use of specific methods, specific practices will be introduced both in experimental and in control rural communities, to determine relative effectiveness of extension methods.

c) Studies in vocational agriculture: program for the development of skills in rural life

The program is primarily designed as a means to establish low-cost vocational education in agriculture and other aspects of rural life, to persons who for various reasons are unable to take advantage of higher education. It is also a method of "extending" agricultural practices to the farm population. During the period comprised in this report, most of the research has been of a special kind and has been done in cooperation with several governments. These activities will be reported under COOPERATIVE ACTIVITIES.

d) Studies in Agricultural Economics

These have included the "Economic Study of Coffee Farms", (undertaken previously and practically completed), an intensive

study on the economic implications of the adoption of new agricultural practices, and as a follow-up to the previous study, on the introduction of key agricultural practices on medium-sized and small coffee farms.

e) Studies in relation to rural schools

Research has now been ended on this subject; in 1954 and 1955, there was included material on 23 cases dealing with different aspects of community development within the area of Turrialba. (Not yet published).

II. Training

a) The Graduate School and other types of formal training

Training offered included a course on statistical methods and one on the Use and Development of Agricultural Resources.

During the year 1954-55, a Graduate School training program in agricultural extension was organized. It was inaugurated in 1956, and is continuing at the present time. It is designed primarily for leaders or prospective leaders in the field of Extension or related areas. It is a one-year course, comprising a core of courses in Extension and the social and economic sciences, and also requiring an original piece of research for a thesis. The Department has received 23 graduate and special and 43 short course students from Argentina, Bolivia, Colombia, Costa Rica, Haiti, Honduras, Mexico, Panama, Paraguay and the United States.

b) New services in extension education training (ICA-sponsored)

Within the appointment of another extensionist, plans are under way to offer new training opportunities to extension agents, home demonstration agents and rural youth voluntary and professional leaders by means of national and international short courses, on-the-job, and in-service training, as well as seminars and workshops for extension directors, administrators and supervisors. A home economist and a rural youth specialist are being recruited for this unit.

c) Training in cooperation with other Institute units

Members of the Department have collaborated in the Extension and social science phases of ICA-sponsored coffee and cacao technology and communications courses.

During the period 1958-59, the Department has actively cooperated with the Scientific Communications Service in the planning of the ADECO (Train the Trainer) program. The entire staff has participated in the planning meetings, and two of the

Department's members went to the United States for one month to receive special training in relation to the Program; the staff is also participating actively in adapting the translation of the English materials, and its members have been designated as professors in the Program.

III. Cooperative Activities

- a) During the period, five members of the staff cooperated in courses on agricultural economics (Mexico), extension (Nicaragua, Costa Rica), home economics (Costa Rica), rural sociology (El Salvador). The staff cooperated with other Institute units on evaluation of programs, including a general study of Institute objectives.
- b) Interplay between the Institute and the host country institutions offers many opportunities for research and training of benefit to all countries. A research project on the role of the rural school in development culminated in a series of short courses for Costa Ricans, and others, the last of which was offered in 1955 for 43 rural teachers. A rural education center was established in a community near Turrialba with Institute cooperation. A cooperative agreement was established with the Costa Rican Extension Service, providing research and teaching opportunities for graduate students, training and assistance for the Extension Service.
- c) The cooperative resettlement project with the Government of Bolivia which had been initiated late in 1953, and which dealt with the "Trasplante de Poblaciones de los Valles de Cochabamba a la Zona de Montero, Santa Cruz, Bolivia", is now being reviewed and Institute participation determined for the future. It is hoped that some reliable principles applicable to such projects can be published.

C. PLANS FOR THE FUTURE

I. Agricultural Economics

Farm management studies, in abeyance at present due to lack of funds, will be continued. With added capacity from the proposed expansion of Institute activities, research, training, and consultation will be developed also in Social Economics, Marketing, and Credit.

II. Rural Sociology

Conversations have begun with other Institute (Project 39) sociologists with a view to obtaining closer cooperation from them and setting up an Institute graduate training program in Rural Sociology.

III. Vocational Agriculture

It is expected to expand activities in the field of vocational agriculture. There is a great need for finding out the present status of the practical schools of agriculture in Latin America and what possibilities they have for contributing significantly to the agricultural development of the American countries. With the cooperation of outside organizations the Department expects to do further explorations in the field. It hopes also to be of assistance in the training of personnel to work in these schools.

The Department can help the countries, in a significant way, by strengthening its teaching functions. The actual goals for its training programs should be preparation of present and future professors of agricultural colleges and schools of practical agriculture, and of key persons in ministries of agriculture, extension services, credit programs, and other rural development activities.

IV. Planning and analysis of agricultural and rural development programs

It is recognized that agricultural development is intimately related to other areas of rural development and that the chances for a greater efficiency in operation increase with a more careful consideration of these other areas.

With an increase in staff and funds, the Department expects to provide assistance, upon request of interested organizations, in three main types of activities:

a) Program Planning

Assistance in the planning and operation of some programs related to agricultural development and rural life. The aim would be to increase the efficiency of the programs so that their impact on the life of the people would be greater and more lasting.

b) Analysis or Self-Evaluation

Assistance in determining to what extent the organization's program is attaining its goals, what its accomplishments have been, and which of these accomplishments were planned originally and which came about indirectly.

c) Training

Special attention would be given to training members of local staffs in the process of self-evaluation, so that eventually they would themselves undertake the job of self-evaluation.

These services would be of value to organizations which have programs in such fields as rural credit, agricultural development, agricultural extension, community development, home improvement and vocational education.

V. Cooperation with national and international institutions

As a matter of principle, the Department has a keen interest in the development of those social sciences which are of strategic importance to agriculture and rural life. Therefore, it envisions closer cooperation with national and international institutions in strengthening and coordinating work in these subject matter areas.

RENEWABLE RESOURCES DEPARTMENT

A. OBJECTIVES

The Renewable Resources Service of the Institute was created in 1950 with the aim of promoting the conservation and rational use of the forests, water, soil and wild life of Latin America. These were and still are considered the basic and renewable resources indispensable for any program of agricultural improvement or for national prosperity and well being on a permanent basis.

As a means towards the fulfilment of this aim post graduate training was commenced by this Service in 1950-51. Paucity of staff and funds made it necessary to limit the training offered to forestry but up to and including 1953-54, six forestry graduate assistants received training, and almost all now occupy important forestry positions in Latin America.

During the period under report, the Renewable Resources Service evolved significantly towards fuller status, and in November 1957 became the Renewable Resources Department of the Institute.

An important factor in this development phase was the introduction in June 1955 of a joint FAO/IAIAS forestry education and training project. This was in operation through the remainder of the period and made possible participation of the FAO in the post graduate forestry training offered at the Institute.

The activities of the Renewable Resources Department over this period continued therefore to be directed mainly towards forests. They will have to be expanded to other renewable resources: water, soil and wild life, in order to serve fully the objectives of the Department. Such expansion will depend largely on the availability of personnel and funds in the future.

B. ACCOMPLISHMENTS

I. Education and Training

Forestry students received graduate training at the Institute, both in its classrooms and forests, on short local excursions in Costa Rica and during summer camps in other countries.

In 1956-57 and subsequent years lecture courses on various forestry subjects were given according to a definite program distributed over the first three trimestres of each academic year. In 1956-57, 11 courses were given to which photogrammetry and tropical meteorology were added in 1957-58. The subjects of the 13 courses given in 1957-58 and 1958-59 were as follows: Tropical Dendrology (tree identification in the field), Forest Protection, Forest Mensuration, Wood Technology, Plant Ecology, Tropical Silviculture, Forest Management, Forestry Policy, Forest Engineering, Forest Products Utilization, Forest

Administration, Photogrammetry, Tropical Meteorology.

Summer camps, of 3 to 5 weeks in duration, usually in April, to enable forestry graduate assistants to carry out practical forestry studies were undertaken in the following countries: Honduras and Guatemala (1956 and 1957), Venezuela and Trinidad (1958), Mexico (1959).

Seventeen forestry graduate assistants from 11 countries were admitted for training during the period.

Nine forestry graduate assistants, though they completed training, have still to complete and present a thesis to qualify for the degree of the Institute.

Eleven graduate assistants of other Departments of the Institute also took certain of the courses primarily intended for forestry graduate assistants in 1957-58.

Forestry education and training at intermediate levels were effected through participation of the personnel as instructors in the International Courses in Tropical Forestry sponsored by the Technical Cooperation Program (Project 39 of the Organization of American States) as follows: Mexico (1954 - 24 students from 13 countries), Costa Rica (1955 - 28 students from 11 countries), Colombia (1956 - 21 students from 5 countries). The FAO forester participated with ICA Tropical Forestry Center, Puerto Rico in 1956, 1957, and 1958.

II. Research

Research activities were related mainly with silviculture, management and utilization and were undertaken in the outdoor laboratories represented by the forests and woodlands of the Institute, and of private owners, with their collaboration.

Stand improvement consisting of cutting of climbers and undesirable trees, often those of the understory, was done in tropical and subtropical humid forests and indicate that this is a very effective measure for natural regeneration and for building up a more valuable growing stock for the future. In order to assess the results of various cultural treatments, permanent sample plots were laid out in La Florencia forest of the Institute and in a forest of Pinus pseudostrobus near Tegucigalpa.

Since 1957 a considerable amount of research has been carried out at the Institute in the artificial regeneration of laurel (Cordia alliodora), a very promising timber species, to ascertain the most successful and economic method. Casualties have been very few and growth has been promising. In 1958-59 a much larger number of laurel plants have been raised in the nurseries at the Institute for planting out in 1959.

Trials have been made with many other species, local or foreign, in order to ascertain their suitability under local conditions. Experimental sowings of pine and other Central American conifers whose seeds had been obtained during summer camps were made at high altitudes in Costa Rica with the collaboration of interested private owners. At the Institute seedlings were raised experimentally to stock the arboretum with interesting species and to stimulate public interest in tree planting. Seed of local species such as jaul (Alnus jorullensis) and laurel (Cordia alliodora) was collected for supply to other countries for trial.

Annual measurements of a sample plot of natural laurel at the Institute continued and indicate a very rapid volume production by this species at the age of 7-9 years (for details see Scientific Communications N° 35. 1-2-8 published by the Scientific Communications Service).

The three permanent sample plots laid out in February 1959 in La Florencia forest will be used also for the collection of increment data with reference to the 10 most valuable species of the locality.

A portable metallic kiln, Magnein type, contributed in 1957 by the Food and Agriculture Organization as an item of training equipment, rendered it possible to carry out demonstrations of charcoal making. The results have shown the advantages of such kilns under local conditions, namely the weather is no longer an important consideration, the rate of production is much faster and the quality of the charcoal produced is much superior as compared with the indigenous trench kiln method.

In accordance with the recommendations resulting from the study made in August 1958 by Prof. J. A. Rigney, University of North Carolina, and Research Consultant to the Institute, the research activities of the Renewable Resources Department have been reorganized into 6 line projects of research as follows:

- a) Research on forest vegetation in relation to the climate, soil and biotic agents. (Ecology).
- b) Research on identification of tree species. (Dendrology).
- c) Research on silvicultural systems, regeneration and intermediate cuts. (Silviculture).
- d) Research on forest mensuration, development and structure of stands, inventory, preparation of forest maps. (Management).
- e) Research on forest products and their utilization. (Utilization).
- f) Research on harmful agencies to trees and their control. (Protection).

III. Services

The services lent directly or indirectly by the personnel of the Renewable Resources Department to all Latin American countries may be grouped as follows: collaboration in training; supply of information, seeds, meteorological data; consultation and direct assistance; publications, reviews, participation in conferences.

The Renewable Resources Department has become a well known center for supply of information on specific technical questions raised by Governments, other public bodies, private individuals and other departments of the Institute. This activity developed particularly in the last three years of the period and the questions received have covered a wide range, for example, information has been supplied on matters such as the following:

- a) The conifer distribution in Central America to assist prospective seed collectors.
- b) The possibilities of establishing pulp mills in tropical America with plantations of eucalyptus and pinus.
- c) Silvicultural data on tree species of tropical America to be used for reforestation in Venezuela.
- d) Ecological descriptions of certain regions of Colombia.

In 1957, with the instruments already existing and with others made available by the Meteorological Service of Costa Rica, the meteorological observation station was improved at the Institute, the supervision, recording and tabulation of data becoming the responsibility of the Renewable Resources Department. Summaries of data collected have been mimeographed and sent monthly to more than 80 persons interested in receiving them.

Advice was given in 1956-57 regarding plans for a future match factory in Panama. Active assistance was given in the same year to the Costa Rican Extension Service in the form of tree identification demonstrations at the Conference of 4-S Clubs. Together with the Project 39 Forester and Ecologist, advice and active assistance were given in 1957-58 to the Instituto de Fomento Económico de Panamá, Government of Panama to establish the possibilities of a pulp industry. In February 1958 the Acting Head of the Renewable Resources Department attended the First Symposium of Natural Resources in Cuba, acted as special adviser to the Forestry Section of the Symposium and presented three papers. During the summer camp of 1958 advice was given to the Government of Venezuela regarding the framing of forest policy. Advice has been given to the Government of Costa Rica on a number of subjects such as protection, establishment of national parks, possibility of installation of a plywood factory, formulating a campaign to improve soil and water conservation, reforestation, management, revision of the regulations relating to the grant of concessions for

timber exploitation in public lands.

The more important publications during the period, apart from the completed theses of forestry graduate assistants included 14 articles printed in various places and widely distributed.

In addition, reviews of four books and abstracts of over 80 leading forest articles were prepared for the Institute's publication Turrialba and its Bibliographical Supplement, and a review of the book "The Rain Forests of Golfo Dulce" was made for "Tropical Woods".

The Acting Head of the Renewable Resources Department was coeditor of the Boletín de la Sociedad Dasonómica de la América Tropical, published in San Jose, as well as Secretary of the Society.

In July - August 1958, the Acting Head of the Renewable Resources Department participated in the 33rd International Congress of Americanists and presented papers on "The ecological status of fire in tropical American lowlands" and "Some relations between the existing vegetation and former activities of man in Tropical America".

All personnel of the Renewable Resources Department were present at the V Latin American Forestry Commission Conference held at Antigua, Guatemala, November 1958. The Acting Head presented a paper at this conference on "Forest education in Latin America" and was designated as President of the Forest Terminology Committee for Latin America.

C. PLANS FOR THE FUTURE

The rapid increase in the populations of Latin America, accompanied in most countries by the development of industries dependent on renewable resources for raw material or power, emphasizes the fundamental importance of forests, water, soil and wild life.

Indiscriminate destruction of forests with the object of satisfying the demands of increasing populations for land, either for cultivation or pasture, inevitably endangers water and soil, the foundations of agricultural production. In some countries of Latin America the danger point has been passed already, serious floods and soil erosion have been caused and the quantity of water available for men's requirements has been reduced; in such cases, reforestation of vital water catchments, however costly, must be undertaken. Moreover, increasing populations imply greater demands for water in future, consequently conservation and reforestation of existing or former forest lands may have to be supplemented by afforestation, the creation of new forests, in specially critical areas.

Similarly, growing populations result in greater demands in future on forest for timber and other forest products and for recreational facilities which will call for conservation and prudent management of the still remaining forests. In some cases also, new forests may have to be created to meet industrial or other special demands. Should these measures be adopted, they

should result in the disappearance of the present anomaly whereby Latin America as a whole, though with 43% of its total land surface still covered with forest, imports timber and other forest products of a total value of some 300 million dollars.

It is evident therefore that the future welfare and economy of Latin America will depend to a very great extent on its renewable resources. To achieve a balanced economy, a balance will have to be maintained between the conservation, management and utilization of renewable resources on the one hand, and the demands which growing population make on these resources on the other, both on a national and on an all Latin American scale.

The Renewable Resources Department believe that the most effective contribution it can make in this situation will comprise the training of many more men, the development of research, and the giving of increased services to Latin American countries, all aiming at the better conservation, management and utilization of their renewable resources. Though all renewable resources will be given attention, special emphasis will continue to be given to forests, on account of their dual role as suppliers of products and as efficient protectors of water and soil, also because they give shelter and food to much of the wild life.

The number of candidates who have applied for admission in the past indicate that many people are interested in the conservation and management of renewable resources, but the number admitted have been limited by the small number of fellowships available. Research is needed to stimulate training and to collect the reliable data on which progress depends. The increasing demand for services from the Renewable Resources Department indicates that there is much scope for development of this form of activity in the interest of Latin American forests and other renewable resources.

The achievement of these plans will depend on the funds that can be made available for the employment of additional training staff, for the more liberal grant of fellowships to appropriate candidates, for the purchase and operation of equipment required for training and research, and for travel in the course of giving consultation and direct services.

The Technical Advisory Council of the Institute was requested in March 1959 to consider the following specific points in order to strengthen the Renewable Resources Department for its immediate plans:

- 1) Increase of budget allotment and employment of an additional staff member for the requirements of 1959-60 especially in view of the six line projects of research to be undertaken.
- 2) Stimulation of plans to include water, soil and wild life in the regular program of work as from 1960-61.
- 3) Encouragement of training of graduate and special students by more liberal grant of fellowships by international organizations and governments.

- 4) Retention of present period of training, one year, in the case of graduate assistants who have had previous forest training or practical experience in forestry, but extension of the period of training to 1½ or 2 years in the case of other graduate assistants.
- 5) Conferment of a new title, Master of Forestry, instead of Master of Agriculture on satisfactory completion of the period of post graduate training.
- 6) Encouragement of training of special students, since such training is effective in the case of forest technicians from countries which do not have forestry training schools.
- 7) Stimulation of scientific and cultural exchange between the Institute and other Latin American institutions which work in the field of renewable resources.
- 8) Intimation to the Forestry School, University of Yale that the selection of the Institute for establishment of a Central American forestry training center by the School would be acceptable to the Institute.
- 9) Acquisition of 10 hectares of virgin forest in La Florencia property immediately adjoining the grounds of the Institute. Being the only area of true virgin forest in the immediate vicinity of the Institute it would be invaluable for study.

Finally, the future plans of the Renewable Resources Department, integrated with the project that has been prepared to render possible continued collaboration between the FAO and IAIAS on forestry training over the 5 year period commencing on 1 January 1960, will have a profound influence on expansion of forestry training in Latin America. This project visualizes the training of 85 men at professional level and 180 men at subprofessional level at the Institute over this five year period.

ORTON MEMORIAL LIBRARY

A. OBJECTIVES

The Library of the Institute functions as a service unit and as such makes available the materials and printed knowledge necessary to further the Institute's objectives and activities. It strives to serve equally well all the institution's departments and services and their programs. In doing this it performs four basic functions, as follows: (a) supplies the research materials needed by the Institute research workers and others; (b) supplies the tools of instruction needed by the teaching staff and students; (c) disseminates knowledge of the literature on agriculture and related sciences; and (d) contributes to the development of the libraries of the Latin American agricultural institutions. These functions are carried out through the Library program which comprises the following activities: (a) selection and acquisition of materials - books, journals, pamphlets, etc.; (b) classification and cataloging of these materials; (c) circulation and reference services; (d) preparation of bibliographies; and, (e) training and consultation services to Latin American librarians.

B. ACCOMPLISHMENTS

I. The Collection

The Institute's collection includes over 16,000 volumes and its pamphlet file contains over 60,000 pieces. About 650 journal titles and 600 other serial titles are received regularly. The Library's reference collection comprises over 1,300 volumes. Due to the care with which its holdings have been selected and to the efficiency of its organization and management the Library has gained a considerable reputation for service.

In the period from 1954 to 1959 the Library added 970 volumes to its book collection and 3,189 volumes to its journal files. Paid journal subscriptions were increased from 174 to 205. All the other serials received were obtained through exchanges and donations. 189 volumes of back files of important journals were also obtained. More than 15,000 pamphlets were received from agricultural institutions all over the world. Photocopy orders were placed for 459 articles not available in the Library collection.

II. Circulation and Reference Services

A total of 25,249 library items were loaned for use outside the Library for the period 1954-1959. Close to 50,000 publications were used in the Library during that period. About 515 publications placed on reserve were borrowed for use a total of 3,196 times. Over 5,000 requests were answered for information and short bibliographies.

III. Bibliographical Services

Since agricultural literature is so voluminous and scattered throughout a wide variety of publications, bibliographies were compiled including 1,848 references to the materials available in the Library on coffee, 2,774 references on cacao, and around 6,000 references on corn. The latter and a revision of the coffee bibliography will be printed soon.

Short lists including publications on horticulture in Spanish, and publications on research were prepared and distributed in mimeographed form. Various special papers on sources of information on crops were prepared and over 1,500 citations were verified.

Fifteen lists of new Library acquisitions including 2,225 entries were published in Turrialba.

IV. Training

Seventeen special students received training in agricultural library techniques since 1954 representing eleven countries.

Several librarians from agricultural institutions spent time at the Institute Library observing library practices and methods and getting acquainted with the reference and bibliographical tools in agriculture and related sciences.

The Librarian gave courses to graduate students and others in the use of the library and preparation of bibliographies.

V. Cooperation

Within the Institute itself the Library endeavors to cooperate with all the departments and their programs. It supplies the Scientific Communications Service with a high percentage of the materials which are photocopied in their laboratory in answer to requests for technical literature from Latin American technicians. Since 1954 the Library has supplied an average of 54% of the materials handled through the Photocopy Service. Through 1954-1956 the Library took an active part in a rural library project sponsored by the Department of Economics and Rural Life.

In 1955 and 1956 the Librarian taught a course in Library Administration at the Summer School of the University of Costa Rica. In 1956-1957 the Library cooperated with the Costa Rican National Committee on Bibliography and the United Nations Educational, Scientific and Cultural Organization in the preparation of a union list of scientific serials in Costa Rican libraries.

The Librarian acted as Executive Secretary of the Inter-American Association of Agricultural Librarians.

C. FUTURE PLANS

As its part in the proposed Institute expansion, the Library should furnish a supply of basic and new material for new or increased institutional activities and build up a reserve of "background" literature in agriculture and related sciences. This will be essential if the research and instructional activities of the Institute under the expanded program are in any way to approach desired objectives.

The Library will have to take an active part in the organization and coordination of the libraries to be established in the new Temperate Zone Branch and in the Regional Center for the Study of Cacao and Banana Diseases. The Institute Library in Turrialba would be responsible for maintaining uniform library practices in the branch libraries and would supply them with bibliographical services.

It would be desirable to have the Turrialba catalog duplicated for the use of these Institute Centers and other libraries.

An Office of Agricultural Library Development should be established within the Institute Library to participate actively in the improvement of the agricultural library services in Latin America. An important function of this office would be the training of personnel to work in the Latin American agricultural libraries.

The new building which has been planned for the Library will provide more room and greater facilities for work. The Library services must develop at the same pace as the rest of the institution implying added duties and responsibilities for the Library staff.

The Library of a research and educational institution must, of necessity, be sensitive to the expansion of any teaching or research unit of the institution. If a new activity is added or an existing program is expanded there must be a corresponding increase in the Library collection and in the number of qualified staff members to handle these additional duties and responsibilities.

SCIENTIFIC COMMUNICATIONS SERVICE

A. OBJECTIVES

The Scientific Communications Service was established in 1949 with financial assistance from the Rockefeller Foundation. To establish it, a study of the status of scientific communications in Latin America was conducted. The survey was conducted by Ralph R. Shaw, Armando Samper and Arthur E. Gropp, and their recommendations were included in a report entitled "Facilities for Scientific Communications in Latin America". On the basis of that report, the Scientific Communications Service began operating as the Institute's information office and as an agency for the development of scientific communications in Latin America.

The initial objective was "to promote the betterment of scientific communications facilities among technicians working in research, education and agricultural extension".

However, as the Service grew and expanded it became necessary to re-define our objectives. Such redefinition was approved in July, 1957 along the following lines:

I. Promote scientific communications among technicians working in research, education and extension

Our specific end is to:

- a) Provide a greater access to research workers, educators and extension workers to scientific information by producing: scientific and extension magazines; reports on current research; manuals and texts; reprints, technical bulletins, extension and miscellaneous bulletins; abstract reviews; reports, glossaries of technical terms; bibliographic and photocopy services; and promoting the distribution of texts and reference materials produced outside Turrialba.
- b) Promote the development of national services that contribute to the diffusion of scientific information.
- c) Contribute to the development of agricultural libraries and to the professional improvement of librarians.
- d) Promote the interest of Agricultural Colleges for scientific communications and extension.

II. Promote the exchange of personal ideas among technicians of the Americas

Our specific end is to:

- a) Aid in the organization, conduction and development of technical conferences.

- b) Stimulate the organization of professional associations and provide them with secretarial services.
- c) Carry out follow-up activities to assure that resolutions adopted in technical conferences are put into practice.
- d) Maintain an information service on past technical conferences and on those planned for the future, classifying them according to their nature.

III. Promote training in and out of Turrialba in the techniques and methods of scientific communications and extension, through:

Short courses
Seminars and workshops
In-service training
Graduate training
Special training ("than-the-trainer")
personnel meetings.

IV. Develop and promote research in the field of communications

Our specific end is to: know the basic vocabulary of the farmer; develop readability formulae adapted to Latin American conditions; obtain the necessary information for the establishment of effective systems of mass communications under Latin American conditions; develop visual communications media according to the characteristics of the Latin American environment with the aim of establishing effective, minimum programs; determine the effectiveness of communications media in relation to their range and cost under Latin American conditions.

V. Provide editorial, advisory and consultation services to the Institute and its programs to national organisms of the American countries

The specific services will be:

Consultation services
Editorial services
Bibliographic services
Graphic editorial services
Production of publications.

VI. Contribute to the development of the public relations of the Institute and to the establishment of programs of national organizations upon request

Our specific end is to:

- a) Give advice in planning and conducting public relations programs; this will depend on the decision of the Director or Administrator of the Institute.

- b) Produce public relations publications and materials that will be planned and prepared in the Public Relations Office of the Institute.
- c) Give advice and training on public relations to national organizations that request this service.

The Service has an Advisory Board that analyzes the activities carried out as well the planning of programs within the framework of the above objectives. This Board meets at least once every two years. It is integrated by the following members: Stanley Andrews, Executive Director of the National Project of Agricultural Communications, East Lansing, Michigan; José González Saldaña, Extension Service, Río Piedras, Puerto Rico; Ralph R. Shaw, Professor of Library Science, Rutgers University, New Brunswick, New Jersey; Galo Plaza, Ex-President of Ecuador; Lyle Webster, Head, Information Office, USDA.

B. ACCOMPLISHMENTS

I. Scientific Communications

a) Programs Operating in April, 1954

- 1) The photocopy and short-bibliography services for researchers and professors were continued.
- 2) Volumes 4, 5, 6, 7 and 8 of the Turrialba magazine and its Bibliographic Supplement were completed. Publication of the Supplement was initiated in the first quarter of 1954.
- 3) In cooperation with the Inter-American Cacao Center, 14 issues of the Cacao bulletin (Spanish and English editions) were published.
- 4) Forty-one titles were added to the Re-prints series.
- 5) Twelve titles were published under the Miscellaneous Publications series.
- 6) The plan of exchange-coupons for the payment in national currency of services rendered by SIC was extended to 14 institutions in 9 Latin American countries.
- 7) Concerning the personal exchange of ideas among technical staff, the Service participated in organizing and holding technical conferences.
- 8) Eighteen new titles were added to the Comunicaciones de Turrialba series.
- 9) A technical bulletin was published.

10) Technical writing training was offered through the regular courses of the Graduate School and through short training courses.

b) Programs established after April, 1954

- 1) An evaluation on the effectiveness of the Bibliographical Supplement was recommended at the meeting of the Advisory Board held in July, 1957. The purpose was to determine its usefulness as compared to its high cost. The evaluation was initiated in 1957 and completed in 1958. Following the results of the study, the Supplement will continue to include its three sections: (a) article abstracts on 3" by 5" cards; (b) a bibliographical index of articles appearing in outstanding Latin American magazines; (c) a classified list of books and pamphlets received by the Institute Library. However, the format will be changed because it was found that readers do not actually care to clip out the abstracts offered on a card format. The same service will continue to be offered but at a lower cost. The text will be run in two columns, using paper instead of light cardboard. These changes were planned for the first quarter of 1959.

- 2) In 1954 the Rockefeller Foundation gave a donation for the establishment of a new program designed to meet the problem of the lack of information on current research projects. After a period of study and planning, the new program was initiated. It covered: (a) the establishment of an information organ including resumes of projects, progress reports and final results in agricultural research; (b) establishment of a central file at the Scientific Communications Service containing Research Projects in Latin America; (c) establishment of a central index containing the names of research staff in Latin America, classified by countries, organizations and specialities; (d) publication of a periodical newsletter addressed to research men participating in the project.

The project is known as Comunicaciones Cientificas Agricolas. So far, information has been offered on 305 research projects to 1,850 technicians and 201 agricultural libraries. Total distribution amounts to 817,110 sheets distributed among technicians and 71,820 sheets sent to the libraries. Eight issues of the newsletter, under the title Estimado Colega, have been distributed.

- 3) In 1958 the Scientific Communications Service initiated the distribution of microfilms on scientific literature available at the Institute Library. That year Mr. Seidell and Mr. Flemer of Washington D.C., donated a machine for the preparation of microfilms. So far, 1,303 microfilmed pages have been distributed.

- 4) In December, 1957, the Kellogg Foundation approved a donation of \$72,900 for a period of six years, designed to initiate a project on the publication of Manuals and Texts for Latin American Agricultural Faculties. This donation includes funds for the publication of texts, as well as to aid professors and technicians who are able to have their manuscripts ready within a relatively short period. This program has been in effect as of April 1, 1958, and from that date the following has been accomplished: (a) Dr. Clyde B. Moore, Professor of Education at Cornell University was contracted to serve as consultant in Turrialba for the purpose of laying out the philosophical basis of the project; (b) a questionnaire for the Agricultural Colleges, designed to determine the fields of greatest urgency for textbooks, was prepared and distributed; (c) the potential market for the sale of textbooks was determined; (d) 10 manuscripts are being considered for publication; (e) agreements have been reached with three technicians who are receiving financial help to complete their manuscripts in 1959; (f) the editing of two manuscripts - one on pastures and another one on sociology - is being completed and the books are to be published soon.

II. Extension Information

a) Programs Operating in April, 1954

Since 1951 the Scientific Communications Service had been operating in this field in cooperation with Project 39 of the Technical Cooperation Program. At that time the services of a specialist from Cornell University were contracted for one year and another specialist was appointed in charge of information activities.

The following were the main activities conducted:

- 1) Helping to improve Extension publications, including publications of the Institute, Project 39 of the Technical Cooperation Program, and some Latin American information services.
- 2) Advisory and consulting services.
- 3) Publication of a series on Extension designed to suggest ideas to extension and information people on new, more effective methods to carry out their work.
- 4) Publication of illustrated prospectuses and reports both for the Institute and for Project 39 of the Technical Cooperation Program.
- 5) An exploratory study on the vocabulary of children attending for the first time the Experimental Schools of the Institute.
- 6) Cooperation with the Costa Rican Ministry of Agriculture in carrying out an analysis of their radio audience.

- 7) In-service training on the improvement of Extension publications and the use of audiovisual aids.

b) Programs established after April, 1954

On February 1, 1955, the Institute concluded an agreement with the International Cooperation Administration under which the Scientific Communications Service would expand its Extension Information activities to serve the USOM's in Latin America. Such expansion included the exchange of information on Extension and Home Economics, production of supporting materials, and consulting and training services. After a considerable increase in the Service's staff, the following jobs were carried out:

- 1) The magazine Extensión en las Américas was established. This is the only Agricultural Extension magazine published in Spanish. It covers such topics as the history of Latin American extension services, philosophy and methods of Extension, achievements and experiences in Extension, Home Economics, 4-H Clubs, Agricultural Communications, etc. Also, it offers book reviews, Extension abstracts, and news of interest to Extension workers. Three volumes have already been issued, with 5,000 copies per issue.
- 2) A new orientation was given to the series for Extension workers, under the title Ayudas Visuales para los Extensionistas (Visual Aids for Extension Workers). Five titles were published. Spanish and English editions of each were printed.
- 3) A radio-program recording studio was set up. It will be used for demonstration and training in the planning of farm radio programs.
- 4) Some useful English publications were translated into Spanish for use by Extension programs in Latin America. Some of those publications were added as new titles of the series Publicaciones Misceláneas (Miscellaneous Publications) while others were used as teaching materials.
- 5) A project on the preparation of glossaries of terms used in Agricultural Information was initiated.
- 6) A new information program for the general public designed to communicate agricultural knowledge of current interest was established under the title Qué hay de nuevo en la agricultura? (What's new in agriculture?). The series is written in a journalistic style and is being sent to over 200 Latin American newspaper.
- 7) A number of Seminars and Technical Meetings were held to provide opportunities for the personal exchange of ideas and to aid training in Extension Information.

- 8) Training in Extension Information was offered through the regular courses of the Institute's Graduate School and through short courses held in Turrialba and other Latin American countries. Also, in-service training, particularly in graphic arts and printing methods, was offered.
- 9) Most of the staff travelled to a majority of the Latin American countries for the purpose of providing consulting services on the improvement of information offices. In some instances, the services of consultants from the United States were contracted.
- 10) The adaptation for Latin America of a training program developed in the United States by the National Project in Agricultural Communications, known as "Train-the-Trainer", was initiated. It will be known in Spanish as the ADECO program, meaning "Adiestramiento de Extensionistas en Comunicaciones" (Communications Training for Extension Workers). As a starting point for the adaptation, a planning session was held in Turrialba in February, 1958, attended by experts from several Latin American countries and the United States. Institute staff, University of Costa Rica specialists, and experts from other Latin American countries and the United States are presently participating in the adaptation of materials. The first training program has been programmed for the month of January, 1960.

III. New media for mass communication

a) Programs established after April, 1954

In May, 1958, the Institute signed an agreement with the American International Association for Economic and Cultural Development. By virtue of that contract, a new mass-media program was established within the framework of activities of the Service. Such cooperative program tries to explore and develop new mass communications media, both in the agricultural field as in the food and health area. The program entitled "Programa Interamericano de Información Popular", initiated operations in September, 1958. It has already planned a first Basic Information Course to be offered July 5 to November 27, 1959.

IV. Production

Most of the publications put out by the Institute are edited, illustrated and printed at the Service's shops. During the period covered by this report, the equipment needed to carry out effective production was acquired through financial cooperation particularly from ICA and the Rockefeller Foundation.

V. Public Relations

The issuing of Press Releases to over 200 Latin American newspaper was continued. Prospectuses, course announcements, and annual and special reports were published and used as public relations tools.

VI. Organization

a) New Offices

At the end of 1958, the Service was authorized to move to new office quarters located at "La Hulera" Rubber Experiment Station. Some old buildings were remodeled for the establishment of the art and printing shops, and a new training unit was built comprising a classroom, projection room and three discussion rooms. For the first time since it was established the Service has a reasonable office and installation space in which to carry out its work.

b) Publications Policy

Parallel to the planned expansion of the Institute, it has been necessary to consider the expansion of the Scientific Communications Service in order to adapt it to new conditions. To that end, a reorganization of the publications policy is being considered to provide the flexibility needed by a larger Institute comprising several regional offices. A General Publications Committee has been recently established. It is made up by the Director of the Institute, a representative of Department Heads at Turrialba, the Coordinator of Regional Services, the Director of Project 39, and by each of the Directors of the Regional Offices already in operation. This Committee is in charge of directing the Institute's general publications policy. According to such policy, the Institute has a single program of publication series, to which all Institute technicians will contribute. To simplify the approval of manuscripts for publication, editorial boards will be established at each Regional Office. A Manual of Style will be prepared as a guide to help in standardizing the presentation of publications.

C. FUTURE PLANS

As this report indicates, considerable progress has been attained during five years of activities of the Scientific Communications Service. However, the work so far accomplished is relatively small if considered in the light of the tremendous communications problem in Latin America. On the one hand, it is becoming increasingly difficult to make scientific literature available to research men, professors and technicians, because as the amount of research increases so increases the number of persons who depend upon that literature for their research and teaching activities. On the other hand, it is no simple task to shorten the distance between the sources of knowledge and the

man, who at the other end of the chain is to benefit from the use of those sources. But the job assumes tremendous proportions when involving not only the Latin American farmer but the large Indian masses as well. Right in the middle of the 20th Century, those native masses are still outside Western civilization on account of tremendous cultural barriers, including those of language.

To meet this ever increasing problem, larger financial assignments are needed. But above all, a growing participation of competent staff is required. We need to establish permanent training programs, both on the communication among technicians as on the transmission of knowledge to the farmers. Local staff must be trained to develop national programs applying universal knowledge to the development of science and teaching in each country. Local staff must be trained capable of establishing effective systems of communications, so that the farmers and the Indian populations are able to participate in the progress of our modern world.

The Scientific Communications Service is evolving in the direction of training. It is to be hoped that in the coming years it will receive adequate financial endowment to carry out effectively the job of training agricultural communicators for Latin America.

REGIONAL SERVICES TO THE UNITED STATES

OPERATIONS MISSIONS IN LATIN AMERICA

On February 1, 1955, the Inter-American Institute of Agricultural Sciences of the OAS embarked on a new type of service for the member countries: direct regional support to the bilateral programs carried out cooperatively by the Ministries of Agriculture and the U.S. International Cooperation Administration. This partnership of the OAS and ICA has been carried out by means of a contract between the Institute and ICA, with funds supplied by ICA. The services rendered under the contract are made available to the Latin American countries through the U.S. Operations Missions.

A. OBJECTIVES

- 1) To give regional support to the cooperative bilateral programs by means of training of personnel, exchange of experiences, consultation services, applied research, and the production of information materials.
- 2) To assist with the building up of local services and institutions to provide permanent local support and leadership in agricultural programs.
- 3) To strengthen the Institute as a permanent regional agency and develop a pattern of permanent regional services to support the national program.

B. ACCOMPLISHMENTS

The regional services supplied to the Latin American countries through the U.S. Operations Missions have included:

- 1) Coffee, cacao and rubber
- 2) Agricultural and home economics information
- 3) Extension education
- 4) Tropical pastures and range management; and
- 5) Training.

A total of 20 short courses and workshops have been offered so far and a total of 223 participants have received training. Contract specialists have made 120 country visits, upon request, to advise on technical problems.

Among the publications issued under the contract are an Extension magazine, Extensión en las Américas, of which 3,000 copies are sent to extension

agents and home demonstration agents; a coffee technical newsletter, Café, sent to 1,000 coffee technicians and field agents. Several issues have been published of the series Coffee and Cacao Teaching Materials, Visual Aids for Extension Agents, and What's New in Agriculture, the latter a release on the latest developments in agriculture sent to about 300 newspapers in Latin America.

Manuals have been published on coffee growing, cacao culture, the use of radio in agriculture, evaluation in extension, teaching aids in home economics and similar subjects.

Additional information on these regional services is given in the reports of the various departments since the contract services are handled by the departments directly concerned.

At present, a total of 18 technicians and 13 secretaries are paid from contract funds. The International Cooperation Administration will make available to the Institute a total of US\$1,725,000 to pay for these regional services during the period of February 1, 1955 to June 30, 1961.

C. PLANS FOR THE FUTURE

The regional services financed under the contract with ICA will be incorporated gradually to the regular, permanent program of the Institute for the member countries. Although it is expected that ICA will want to continue maintaining direct regional support through the Institute for its bilateral programs in Latin America, the Institute will absorb under its expanded program the services initiated under the contract with ICA.

The pattern of regional services initiated under the contract will be continued when the expanded program goes into effect in order to give across the board subject matter support to the operational centers of the Institute through Inter-American research, educational, and rural development programs.

REGISTRAR'S OFFICE

A. OBJECTIVES

The basic purposes of the Graduate School of the Inter-American Institute of Agricultural Sciences are as follows:

1. To improve academic training of Latin American agricultural technicians.
2. To develop leaders capable of working on research programs, conservation of natural resources, agricultural extension and education.
3. To meet the demand for technicians versed in new and better techniques used in agricultural production.

B. ACCOMPLISHMENTS

The total number of registered students trained during the period 1 April 1954 to 31 March 1959 were 313:

Graduate (candidates to the M.A. degree)	61
Special students	30
Short course students	211
In-service training	<u>11</u>
Total	<u><u>313</u></u>

I. Students registered by Department or Service

Table N^o1 gives the number of students trained by Department.

TABLE N°1

STUDENTS REGISTERED AT THE INTER-AMERICAN INSTITUTE
OF AGRICULTURAL SCIENCES

By: Departments and Services

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

Departments	1954	1955	1956	1957	1958	1959	Total
Animal Industry	2		2	8	4		16
Plant Industry	6	11	59	61	61	19	217
Economics and Rural Life	2	1	6	7	7		23
Scientific Communications Service	1	7	3	2		3	16
Renewable Resources	5	4	4	7	3	1	24
Library	1	5	4	4	3		17
T o t a l	17	28	78	89	78	23	313

As you will be noted the largest number of students were registered in the Department of Plant Industry. This was due to the fact that the Department offered 10 short courses during this period: 4 Courses in Coffee Production Technology; 3 Courses in Cacao Production Technology and 3 Courses in Plant Quarantine (OIRSA).

II. Students trained by country

Students trained by country are shown in Table N°2 which indicates the countries served and number of students enrolled in the different years.

TABLE N°2

STUDENTS REGISTERED AT THE INTER-AMERICAN INSTITUTE
OF AGRICULTURAL SCIENCES

By: Country of Origin

Period: 1 April 1954 to 31 March, 1959

Source of data: Registry files

COUNTRY	1954	1955	1956	1957	1958	1959	Total
Argentina			1	2	1		4
Bolivia	2	1	2	3	4		12
Brazil	2	1	2	3	1	1	10
Colombia	6		4	5	2	6	23
Costa Rica	2	8	8	14	8	2	42
Cuba			5	4			9
Chile		1	1		1		3
Ecuador	1	1	9	5	3	2	21
El Salvador			4	8	5		17
United States				2	2		4
Guatemala	1	3	5	13	5		27
Haiti		1	3	2	2	3	11
Honduras		2	6	1	8		17
Mexico	1		4	2	1		8
Nicaragua			6	6	15	1	28
Panama		4	6	6	5	1	22
Paraguay		1	1		3		5
Peru		1	5	7	7	4	24
Puerto Rico				1	1		2
Dominican Republic							-
Uruguay							-
Venezuela		1		1	1	2	5
Ethiopia	2						2
Switzerland		2					2
Phillipines			4	1			5
Trinidad			1				1
Indonesia			1				1
Hawaii				1			1
Caroline Island				2			2
Ceylon					2		2
Portugal					1		1
British Honduras						1	1
Holland		1					1
T o t a l	17	28	78	89	78	23	313

III. Distribution of students trained by categories

The achievements of the Graduate School in relation to the different categories of students are indicated in the following tables:

a) Number of students with the degree of Magister Agriculturae

1. Table N°3 shows the number of students who qualified for the degree of Magister Agriculturae in the different departments of the Inter-American Institute of Agricultural Sciences.

TABLE N° 3

NUMBER OF "MAGISTER AGRICULTURAE" DEGREE GRANTED TO STUDENTS REGISTERED AND TRAINED DURING THIS PERIOD

By: Department

Period: 1 April 1954 to 31 March 1959

Source of Data: Registry Files

Department	1954	1955	1956	1957	1958	1959	Total
Animal Industry	3	1	1		4	4	13
Plant Industry	11	5	5	4	2		27
Economics and Rural Life		1			5	1	7
Renewable Resources		3	2		1		6
T o t a l	14	10	8	4	12	5	53

The Department of Plant Industry trained the largest number of students who qualified for the degree of "Magister Agriculturae" followed closely by the Department of Animal Industry and Economics and Rural Life.

2. The distribution of postgraduates by country and by year is found in Table N°4.

TABLE N° 4

NUMBER OF STUDENTS WHO HAVE RECEIVED TRAINING

By: Department

Period: 1 April 1954 to 31 March 1959

Source of Data: Registry Files

COUNTRIES	1954	1955	1956	1957	1958	1959	Total
Argentine			1	1			2
Bolivia		1		1	1		3
Brazil	1						1
Colombia			2	1			3
Costa Rica	1	3	2	5	3		14
Ecuador	1	1	3	5		2	12
United States					1		1
Guatemala	1						1
Haiti				1	1		2
Honduras		1					1
Mexico	1		1	2	1		5
Panama		1			1		2
Peru			2	3	3		8
Puerto Rico				1			1
Venezuela		1		1			2
Holland		1					1
Portugal					1		1
Trinidad		1					1
T o t a l	5	9	12	21	12	2	61

Ecuador was the country which profited most from the training offered at postgraduate level, with a total of 14 graduate students, followed by Costa Rica, Bolivia, Honduras and Colombia.

3. Not all of the students who qualified for the degree of Magister Agriculturae were able to graduate. Table N^o5 gives the number of students, who for one reason or another were unable to graduate during the period covered by this report.

TABLE N^o 5

NUMBER OF CANDIDATES TO THE "MAGISTER AGRICULTURAE" TRAINED DURING THIS PERIOD WHO DID NOT RECEIVE THE DEGREE

By: Year, Department and Nationality

Period: 1 April 1954 to 31 March 1959

Source of Data: Registry Files

Country	Department	1956	1957	1958	1959	Total
Argentina	Economics and Rural Life			1		1
Colombia	Renewable Resources		1			1
Colombia	Economics and Rural Life		1			1
Costa Rica	Plant Industry		1	1		2
Costa Rica	Renewable Resources	2	2			4
Costa Rica	Economics and Rural Life		1			1
Ecuador	Renewable Resources			1		1
Panama	Economics and Rural Life	1				1
Puerto Rico	Renewable Resources			1		1
Peru	Animal Industry			2		2
Peru	Renewable Resources		1			1
T o t a l		3	7	6		16

4. Table N^o6 gives the distribution by country and by year of those students who were not able to graduate at the termination of their training, and returned at a later date to complete their final examinations and obtain the degree of "Magister Agriculturae".

TABLE N°6

NUMBER OF "MAGISTER AGRICULTURAE" AWARDED IN THIS PERIOD TO STUDENTS OF PREVIOUS YEARS

By: Country of origin

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

COUNTRY	1954	1955	1956	1957	1958	1959	Total
Bolivia	4	1					5
Brazil	1						1
Colombia		2			1		3
Costa Rica	2						2
Ecuador	6	2					8
Guatemala		1					1
Peru		1					1
Cuba		1					1
Mexico	1						1
T o t a l	14	8			1		23

Ecuador again headed the list of postgraduate students who having received training in the years prior to the period covered by this report, returned at a later date and were granted the degree of Magister Agriculturae.

b. Special Students

30 students obtained fellowships from different Organizations enabling them to receive training under this category. Distribution by department and country may be found in Tables N°7 and N°8.

TABLE N°7

NUMBER OF SPECIAL STUDENTS

By: Country of origin

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

COUNTRY	1954	1955	1956	1957	1958	1959	Total
Argentine				1	1		2
Bolivia	1		2		2		5
Brazil	1	1					2
Colombia	6				1	1	8
Costa Rica	1			1			2
Chile			1				1
Paraguay					3		3
Switzerland		2					2
Ethiopia	2						2
United States				2			2
Honduras					1		1
T o t a l	11	3	3	4	8	1	30

TABLE N°8

NUMBER OF SPECIAL STUDENTS

By: Departments

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

Departments	1954	1955	1956	1957	1958	1959	Total
Plant Industry	3	2	1		1	1	8
Economics and Rural Life	2	1	2	1	4		10
Renewable Resources	5			3	2		10
Animal Industry					1		1
Scientific Communications Service	1						1
T o t a l	11	3	3	4	8	1	30

The Departments of Economics and Renewable Resources received the largest number of special students; followed by the Department of Plant Industry.

c. Short Course Students

Classified in this group are those students who came to Turrialba for training in a special area of agricultural activity, corresponding to the fields in which they were working.

1. Table N°9 shows the distribution of these groups, by Departments, field of training and the year of arrival.

TABLE N°9

SHORT COURSE STUDENTS

By: Department, Services and other Organization

Period : 1 April 1954 to 31 March 1959

Source of data : Registry files

Department	Course	1954	1955	1956	1957	1958	1959
Plant Industry	Coffee			21	23	27	
	Cacao			25	21	12	18
	Statistics				1		
	Leaf Analysis					1	
Renewable Resources	Forestry	5					
Library	Library	1	5	4	4	3	
Scientific Communications Service	Information	1	2				3
Other - OIRSA	Plant Quarantine			10	12	12	
T o t a l = 211		7	7	60	61	65	21

Plant Industry Department received the largest number of students for short courses during this period. This is due to the fact that 4 Cacao Courses, and 3 Coffee Courses were offered under the direction of this Department. The Library took second place and OIRSA courses came third.

2. Table N^o10, short course students are classified by country of origin and by year of registration.

TABLE N^o 10

SHORT COURSE STUDENTS

By: Country of Origin

Period: 1 April 1954 to 31 March 1959

Source of Data: Registry Files

COUNTRY	1954	1955	1956	1957	1958	1959	Total
Bolivia	1			2	1		4
Brazil			2	2	1	1	6
Colombia	6		2	3	1	5	17
Costa Rica			5	8	5	2	20
Cuba			4	5			9
Chile		1			1		2
Ecuador			6		3		9
El Salvador			4	8	5		17
United States					1		1
Guatemala		3	5	14	5		27
Haiti		1	2	1		3	7
Honduras		1	2	1	7		11
Mexico			3				3
Nicaragua			6	5	16	1	28
Panama		3	5	5	4	1	18
Paraguay		1	1				2
Peru		1	3	5	4	4	17
Venezuela					1	2	3
Puerto Rico					1		1
Phillipines			3	1			4
Hawaii				1			1
British Honduras						1	1
Indonesia			1				1
Caroline Island				2			2
T o t a l	7	11	54	63	56	20	211

The largest number of students who attended the short courses offered by the Graduate School of the Inter-American Institute of Agricultural Sciences came from Central America: Nicaragua 28, Guatemala 27, Costa Rica 20 and Panama, El Salvador and Honduras with 18, 17 and 11 respectively. Among the South American countries sending short course students the most prominent are Colombia and Peru; with Cuba in the Caribbean area and Mexico in North America.

d) In-Service Training

A great number of organizations have been interested in studying the administrative mechanism and functioning of the Graduate School of the Institute and have frequently sent their staff members to observe and exchange ideas for application to other Pan American latitudes.

Tables 11 and 12 gives a distribution of these observers who have been classified as "In-Service Training" and visiting trainees respectively.

TABLE N° 11

NUMBER OF STUDENTS CLASSIFIED AS "IN-SERVICE TRAINING"

By: Department and Service

Period: 1 April 1954 to 31 March 1959

Source of Data: Registry Files

Department	1955	1956	1957	1958	1959	Total
Plant Industry						-
Scientific Communications Service	5	3	2			10
Economics and Rural Life		1				1
Animal Industry						-
T o t a l	5	4	2	-	-	11

TABLE N°12

NUMBER OF "VISITING TRAINEES"

By: Country of origin

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

COUNTRY	1955	1956	1957	1958	1959	T o t a l
Argentina					1	1
Bolivia				4		4
Brazil	2		5	2	1	10
Colombia	3	1		1		5
Costa Rica					1	1
Cuba					1	1
Chile				2	3	5
El Salvador				2		2
Ecuador			2	3		5
Guatemala				5	1	6
Haiti					1	1
Nicaragua	1		1	1		3
Paraguay	2	1	1	4		8
Peru	3	1				4
Phillipines	1		2			3
Australia		1		1		2
China (Formosa)			1			1
Surinam				1		1
T o t a l	12	4	12	26	8	62

e. Relations of the Graduate School

The Graduate School has always remained open to frank cooperation with national and international organizations concerned with the development of agriculture.

Among these should be mentioned the agreements formalized between the Institute and the International Cooperation Administration (ICA), The Atomic Energy Commission (AEC), The American Cocoa Research Institute (ACRI), The International Regional Sanitation Organization for Plants and Animals (OIRSA), The American International Association (AIA), The Rockefeller Foundation, The Food and Agriculture

Organization of the United Nations (FAO) and other public and private agencies.

The number of students trained under the auspices of these organizations is shown in Table N°13.

TABLE N°13

NUMBER OF FELLOWSHIP STUDENTS

By: Sponsoring Organizations

Period: 1 April 1954 to 31 March 1959

Source of data: Registry files

Sponsoring Organizations	1954	1955	1956	1957	1958	1959	Total
International Cooperation Administration (ICA)	1	12	51	43	46	14	167
American Cocoa Research Institute (ACRI)			1	1			2
International Regional Sanitation Organization for Plants and Animals (OIRSA)			10	12	12		34
Rockefeller Foundation			1	7	3		11
Atomic Energy Commission (AEC)					1		1
Food and Agriculture Organization of the United Nations (FAO)	3		2	2		2	9
Others	6	11	7	9	9	7	49
T o t a l	10	23	72	74	71	23	273

This table does not include OAS or Project 39 fellowship holders.

C. FUTURE PLANS

When ratification of the protocol of amendment to the Convention of the Inter-American Institute of Agricultural Sciences has been successfully completed the Graduate School will be in a better position to give improved service to the agricultural programs of the Americas.

Based on actual facilities, 4 fields of study have been strengthened in the Department of Plant Industry; these are:

Plant Genetics
Plant Pathology
Plant Physiology
Soils
Radioisotopes

At the beginning of 1954 the Department of Economics and Rural Life extended its program by incorporating, training in Agricultural Extension, and hopes to complete its program by giving emphasis to training in Rural Sociology and Agricultural Economics.

The Department of Animal Industry which will maintain its basic structure is now studying the possibility of establishing training in Pastures. Since 1954 the department of Renewable Resources has improved its training program in forestry and forestry management and hopes to reimburse its training still more upon the return of the head of the department who is now in residence at Yale University (USA) completing his Ph.D degree.

The Scientific Communications Service is interested in planning training programs in "Agricultural Communication". It is the concerted opinion of this Service that the lack of such a mechanism is the limiting factor that has prevented the advancement of agriculture among the technicians, research workers and masses of Latin America.

Finally, the Graduate School hopes to continue offering short courses in "In-Service Library Training" especially prepared to fill the demonstrated need of trained Latin American librarians in the libraries of the Faculties of Agriculture and other governmental centers of agricultural research.

LATIN AMERICA AND HIGHER AGRICULTURAL EDUCATION

A. OBJECTIVES

The development of agriculture is closely tied with the preparation of personnel trained to carry out plans and programs of scientific research and rational utilization of natural resources. It is generally considered that Latin America requires at least 40,000 technicians to carry on its agricultural programs. We have found that the agricultural faculties, are working at one third of their capacity. However, it is difficult for the professional who graduates from these faculties to face up to the various problems related with agriculture.

The program of Higher Agricultural Education, therefore, tends to "find ample and basic orientation for the future development of the Faculties of Agronomy".

B. ACCOMPLISHMENTS

1. A study of agricultural education in the universities of Latin America has been made in cooperation with the Food and Agriculture Organization. On the basis of data obtained from this study, it was deemed appropriate to hold a Meeting of the Deans of the Faculties of Agronomy for the purpose of promoting the exchange of experiences between the representatives of the Faculties and the Governments. It was believed that such a meeting could establish the bases for a future strengthening and adaptation of higher education to the necessities of agricultural development.
2. First Latin American Conference on Higher Agricultural Education, Santiago, Chile, March 1958.

At this conference principles were established and the objectives of Higher Agricultural Education were thoroughly examined. The priorities indicated were: initiation of a revision of plans and training programs, teaching methods, attitudes and ambiances of universities, the governmental and personal connections within which the Scientific field and those dedicated to it are developed. Surveys made of the offers and demand for technical agricultural services indicate negative factors that prevent the better development of agricultural sciences and, particularly, of a higher professional education.

3. Action taken by IAIAS - FAO

The IAIAS and the FAO were charged with the follow-up of the various recommendations formulated at the Conference, and have since engaged in further studies designed to strengthen Higher Agricultural Education. Furthermore through cooperative agreements a number of international and regional agencies and private foundations are

assisting the faculties. It is desirable that such efforts be coordinated into a broad program directed towards the common objective. Currently, contacts with the Faculties of Agronomy are being intensified through personal visits of IAIAS staff members, Project 39 Zone personnel and FAO. A program for the production of text books and teaching materials, especially designed for professors and students of the Faculties of Agronomy, has been established. Also, an information circular has been published on the development of teaching and related activities, for the purpose of stimulating the exchange of ideas between authorities and faculty members.

It is hoped to ascertain eventually the measures that have actually been adopted for the improvement of teaching, to become better acquainted with the actual needs, and thus to be in a position to decide upon the most appropriate means of giving effective assistance to the faculties.

C. FUTURE PLANS

Among the most immediate activities projected for the future are:

1. To ensure that the faculties guide their activities towards the development of technicians in accordance with the country needs.
2. Expedite the development of a basic training plan which will provide for the preparation of semi-specialized professionals in those fields most urgently needed by the countries, through the establishment of an appropriate working nucleus.
3. The elaboration of a specific plan for the intensive training of professors.
4. The establishment of a production program of visual aids and teaching materials, to permit professors to improve their teaching system.
5. The elaboration of plans on certain aspects such as, intensive training for teachers, specialized courses, teaching methods, research programs, fellowships, the use of bibliographies, provision of teaching materials.
6. Research plans should be guided towards solution of problems in their respective areas of influence.

A list of names of graduate and special students for the period 1954-59 is given in Appendix # 1.

PROJECT 39 - TECHNICAL COOPERATION PROGRAM

I. INTRODUCTION

A. History

In 1950 the Organization of American States established the Program of Technical Cooperation, the realization of which was assigned to the Inter-American Economic and Social Council (CIES).

Project 39 is one of the units which make up this Program of Technical Cooperation. The principal emphasis of Project 39 is focused on the problem of the lack of technically trained personnel for the development of agriculture. Thus, its essential purpose is: "To provide technical training for the improvement of agriculture and rural life of the Americas".

B. Organization

The Inter-American Institute of Agricultural Sciences of the OAS (Costa Rica) is responsible for the technical operation of the activities of Project 39. The latter depends administratively on the Office of Technical Cooperation of the OAS (Washington, D.C., U.S.A.).

The Field Service Unit is located in San José, Costa Rica. Regional offices are located in Havana, Cuba, to attend the countries of the Northern Zone; in Lima, Perú, for the countries of the Andean Zone and in Montevideo, Uruguay for the countries of the Southern Zone. A small group of specialists work at each of the Zones under the direction of a Regional Director. Within the jurisdiction of each Zone office, there is a Demonstration and Study Area, which is a small territory unit representative of the agricultural characteristics of the countries which make up that particular Zone.

C. Functions and Disciplines

The principal functions of Project 39 are three: training, consultation and research. The disciplines in which work has been carried out to date are the following: Tropical Forestry, Plant Ecology; Agricultural Economics, Farm Management, Land Use; Agricultural Extension, Home Economics, Communications; Rural Sociology; Plant Industry - horticulture, coffee and cacao; and Agricultural Engineering - conditioning and storage of grains, irrigation and drainage, agricultural machinery.

Training, the essential function of Project 39, is carried out by the following methods; international courses, national courses, regional courses, technical meetings and seminars, and in-service training.

D. Financing

The budget of Project 39 utilizes approximately 33% of the funds of the Special Account of the Technical Cooperation Program of the OAS. The average annual budget has been \$445,000.00. Distribution of the budget in the four Project offices is shown in the following table of expenditures covering the period from approximately April 1st, 1954 to March 31, 1959:

	1 April 54 31 March 55	1 April 55 31 March 56	1 April 56 31 March 57	1 April 57 31 March 58	1 April 58 31 March 59	Totals
Field Service Unit	63,329.00	73,239.00	78,321.00	81,716.00	74,228.00	370,833.00
Northern Zone	137,691.00	119,331.00	96,273.00	111,733.00	133,719.00	598,747.00
Southern Zone	160,142.00	109,101.00	110,674.00	126,513.00	124,243.00	630,673.00
Andean Zone	133,138.00	116,395.00	111,437.00	126,131.00	128,863.00	625,964.00
	494,300.00	418,066.00	396,705.00	446,093.00	471,053.00	2,226,217.00

II. SUMMARIZED REPORT: 1954 to 1958

A. Objectives

From the basic purpose of Project 39 explained above are derived the following specific objectives:

1. To improve the level of competence of the technicians of the Americas;
2. To strengthen the national institutions of agricultural training;
3. To promote the establishment of high-level, specialized training in the national agricultural institutions;
4. To demonstrate the fundamental role that research and demonstration play in the training of technicians and in the education of the farmer.

In the period covered by this report, as also from its initiation, Project 39 has made considerable advance in the accomplishments of these objectives.

B. Accomplishments

Due to the nature of the services of Project 39 - training of

people - it is not possible to measure exactly the accomplishments in physical terms nor is it easy to demonstrate them in tangible form. Nevertheless, in an attempt to estimate the impact on American agriculture, statistics may serve as an illustration at least with reference to the results which are immediately apparent.

1. Students Trained

The following figures constitute adequate references of the training offered during the period 1954-1958:

- Offered 66 international courses, 73 national courses, 11 short intensive courses, 13 regular courses in Colleges of Agriculture, or a total of 163 periods of training.
- In Forestry, 19 different courses were offered; in Agricultural Economics, 13; in Home Economics, 34; in Agricultural Extension, 32; in Plant Industry, 4; in Horticulture, 5; in Extension Information, 13; in Agricultural Engineering, 23; in Statistical Methods, 1; in Pastures, 10; in Sociology, 7; and in Soils, 2.
- The total number of students trained during this period was 3,546, as follows: 1,060 from the Northern Zone; 1,356 from the Andean Zone and 1,130 from the Southern Zone. The total of students trained per country was as follows: Argentina 263, Bolivia, 115; Brazil, 378; Chile, 163; Colombia, 622; Costa Rica, 140; Cuba, 125; United States of America (Puerto Rico), 41; Ecuador, 171; El Salvador, 60; Guatemala, 227; Haiti, 56; Honduras, 84; Mexico, 91; Nicaragua, 135; Panama, 55; Paraguay, 84; Peru, 404; Dominican Republic, 15; Uruguay, 257; Venezuela, 60.

More detailed and complete statistical information may be found in the Appendix to this report.

2. Other Contributions

Research is a base for education, while evaluation complements it. In both fields during the 5-year period, Project 39 contributed to the Member States of the OAS. Due to lack of space in the present report, it is not possible to give detailed information on these activities. They were carried out as services to many institutions in a great number of countries specifically to help in the solution of certain agricultural problems, related to the training program proper of Project 39. A few notes will serve to express briefly the types of activities of research and consultation which were requested most frequently. The following is a descriptive selection of examples of such activities:

a) Stimulatory Action

This type of activity consists in exerting discreetly, but efficiently, influence on the countries, aiming towards vitalizing and developing their agricultural institutions.

In their continued close contact with administrators and field technicians of the countries, the personnel of the Project stimulate the desire of such individuals to activate their programs and offer them ideas for adding new services, to better realize their own possibilities, to adopt and adapt better methods and to introduce progressive reforms. Further, they help them personally in planning these new operations, they cooperate with them directly in the initiation of the execution of such plans and assist them to evaluate the early results of such innovations.

The following are a few examples of this type of activities:

Promoting the creation of university chairs in new or little developed agricultural disciplines; orientation of training and research services; guidance in the selection of training and research areas; guidance in the formation of specialized technical libraries; evaluation of renewable resources; plans for the creation of agricultural offices and specialized institutions; guidance in the work with agricultural youth clubs; planning of agricultural campaigns of various types and guidance on credit and cooperatives.

b) In-service Training

Such stimulating action promotes within the national institutions aspiration for betterment and rejuvenation and facilitates the attainment of this. However, such action is not always sufficient. Some times, it is necessary to go beyond stimulating advice, giving concrete examples by means of projects carried out directly and personally by technicians of the Project. These works are always subordinated to the necessities of the education program of the Project. For example, to give in-service training to a national official, a definite problem is selected as a subject of study on which the instructor and the student carry out together a complete scientific work. At other times to strengthen the basis for the courses or to illustrate evaluation cases in a practical manner, technical research is carried out previous to the course.

The following projects are examples of this type of in-service training:

Socio-economic studies on the adoption of agricultural practices; soils studies; studies on land use; studies on agricultural legislation; production studies; studies on the production costs; marketing studies; reorganization of farm management; cooperative studies of work techniques; studies on storage of agricultural products; plant science studies; especially in cocoa, coffee and potatoes; studies on pasture management and livestock breeding; sociological studies of communities; studies on colonization; studies on nutrition; evaluation of publications; studies of

vocabularies in use in rural areas, and inquires on the impact of rural radio education.

c) Services to Institutions

Finally, there is a third type of activity: that of direct service to national institutions. This is carried out only to a limited extent and only in the event of specific wellfounded requests from the interested countries. Due to the uniqueness of the cases and because there is a preference to assign more time and effort to educational projects of benefit to several countries, this activity is restricted to only the absolutely necessary. It consists of going to a definite institution to carry out a specific technical project for them. Even though project technicians are the ones who personally carry out such specific tasks, this type of work is purely temporary and of short duration. In addition, while carrying out such projects the opportunity is utilized to train local technicians so that they can carry out any task of the same nature in the future.

Examples of this activity are the following:

Preparation of ecological maps, forest inventories, soils and land classification maps; guidance on organization and reorganization plans for service offices in the countries; planning of study programs; planning and evaluation of technical studies; preparation of technical meetings; design of minor engineering works; design of storage plants; design of laboratories, plants and installations; provision of reference materials; distribution of selected seeds and selection of equipment and materials.

Finally, there are three other activities carried out frequently by Project 39 personnel, namely: the production of publications, the giving of lectures and assistance at international meetings.

The production of technical publications is a task of great importance and utility. This permits providing the countries with study texts, specialized manuals and bulletins of diverse technical information. In these publications, the Project personnel assemble their past experiences in training, evaluation, and consultation. By means of these, research results are disseminated to the various countries. The type of material published has a great demand in the Spanish speaking countries, since commercial publications in new disciplines or in specialized fields are extremely scarce and expensive. Technical lectures given by project personnel are also of great value as a means of training or complementary to it and also as another channel for the dissemination of research results.

Attendance at international scientific conferences helps the personnel to obtain information at first hand in the countries where these are held, allow them to present their wide experience

to these countries and through direct professional contacts to increase their own knowledge.

All such activities are complementary to the three major functions of the Project, that is, of training, consultation and research. During the 5-year period the Project personnel gave 34 technical lectures, produced 62 publications, comprising short bulletins, complete manuals and full-size text books and attended 73 international scientific meetings.

3. Cooperation

One of the key assets of Project 39 is its capacity to cooperate with international and national organizations. It does not pretend to an independent superstructure nor further, to impose its services on anyone nor to compete. On the contrary, it dedicates itself to serving and strengthening national institutions by coordinating its efforts with those of other related international organizations. It not only offers help to such units, but at the same time, receives considerable and valuable aid from them.

In 1954-58, Project 39 maintained close relations with the Ministries of Agriculture, Cooperative Agricultural Services, Colleges of Agriculture, Agricultural Schools, Technical Agricultural Institutions, Experimental Stations; Professional Societies and Extension Offices. To a lesser degree the same was done with parallel programs in Education, Health, Nutrition, Economics, Statistics, Population studies, and with private, commercial and industrial organizations linked with agricultural development.

To mention only a few of these international agencies, contacts have been very fruitful with programs such as those of the Food and Agriculture Organization of the United Nations, of the International Cooperation Administration of the Government of the U.S.A., and that of the Rockefeller Foundation.

Exchange of professors and technicians, joint financing and organization of the training period, combined efforts on regional studies and joint sponsorship of technical meetings are examples of such cooperation.

C. Evaluation and Prospects

1. Reasons

In Project 39, evaluation is a continued operation to determine to what degree there has been progress in the attainment of the objectives, to point out weaknesses and to determine the reasons for success attained. This makes it possible for the organization to maintain a live and flexible program. On the basis of such evaluation, reasonable changes in projects are made to better adjust them to the diverse and changing needs of the countries

served. Also it gives flexibility to the administrative set-up and strengthens the technical aspects of the work.

2. Nature

The evaluations are external and internal, but in all cases uniform. During the 5-year period, 2 major evaluations were carried out. To do that, experts of recognized international prestige were contracted. These men, besides obtaining ample information from conferences with officials and technicians of the Project, visited all of the regional offices, observing the activities in progress and sounding out the opinion of those who receive the services. In general, these external evaluations demonstrated clearly the utility and efficiency of the activities of Project 39 in the Americas. In detail, they served to correct certain procedures and to intensify efforts in those areas where the evaluation showed most benefits.

By means of international meetings of the project personnel, through informal consultations with officials of the countries and by means of formal questionnaires, all project offices carry out periodic evaluations of their operations. The results of these have been similar to those from outside evaluations.

3. Conclusion

The principal conclusion of all these evaluation efforts is that Project 39 carries out its mandate efficiently, relative to its limitations of personnel and budget, has made much progress towards the fulfillment of its objectives and has merited the confidence and the recognition of the American States. Nevertheless, in spite of the favorableness of this conclusion, the fact remains that the final objectives of Project 39 cannot be fulfilled completely in a short time, even though the program were to multiply its resources and to raise up still more its level of efficiency. This is due to the fact that the needs of the Americas in training of technical agricultural personnel increase and vary with a speed much greater than the capacity to attend them through a temporary and modest international program. There is a very marked imbalance between the number of professionals dedicated to agriculture in the countries of the numbers needed to effectively speed up the development of agriculture of the Americas. Thus, there is a constant and increasing need that cannot be satisfied except on the basis of permanent action.

4. Integration

According to plans of the Inter-American Economic and Social Council (IA-ECOSOC) on December 31st, 1961 the operations now in charge of Project 39 will cease to form part of the Program of Technical Cooperation. With the utility of efforts and the necessity to continue and amplify the project having been proved, the Inter-American Institute of Agricultural Sciences, a specialized

and permanent international organization will be the logical unit to absorb such functions. Plans to carry out this integration adequately are already being studied and it appears very probable that the period for carrying out this transition will have to be increased somewhat.

TABLE N°1. TOTAL NUMBER OF COURSES OFFERED ACCORDING TO TYPE OF TRAINING, BY DISCIPLINES - Years 1954 to 1958

Discipline	International Courses	National Courses	Short Intensive Courses ^{1/}	In Faculties of Agronomy	Total of courses per disciplines during 5 years
Forestry	9	6	1	3	19
Agricultural Economic	7	1		5	13
Home Economic	11	22	1		34
Agricultural Extension	15	17			32
Plant Industry		2	1	1	4
Horticulture	3		22/		5
Extension Information	1	11	1		13
Agricultural Engineering	11	9		3	23
Research Methods	1				1
Pastures	5	2	33/		10
Sociology	2	3	2		7
Soils	1			1	2
Total courses per type of training in 5 years	66	73	11	13	163

1/ Started to separate them in 1955.

2/ A regional course.

3/ Two regional courses.

TABLE N°2. NUMBER OF STUDENTS PER YEAR PER ZONES.

Zona	1954	1955	1956	1957	1958	Totals per Zone in 5 years
Northern	128	147	267	242	276	1,060
Andean	450	319	93	242	252	1,356
Southern	158	278	207	266	221	1,130
Total per year	736	744	567	750	749	3,546

TABLE N°3. NUMBER OF STUDENTS PER TYPE OF TRAINING RECEIVED.

Type of training	1954	1955	1956	1957	1958	Total per type of training offered in 5 years
International Courses	239	197	228	270	276	1,210
National Courses	439	386	261	329	283	1,698
Short Intensive Courses		51	26	32	88	197
Courses in Faculties of Agronomy	14	70	32	88	89	293
Graduate Studies	8	8	5	7		28
Special Studies	1			2		3
In-service Training	35	31	14	20	12	112
Other Studies		1	1	2	1	5
	736	744	567	750	749	3,546

TABLE N° 4

NUMBER OF STUDENTS PER DISCIPLINE IN WHICH TRAINING WAS OFFERED; : AUXILIARY TABLE SEPARATING THE STUDENTS WHO HAVE RECEIVED SPECIAL TRAINING

Discipline	1954	1955	1956	1957	1958	Totals Per Discipline in 5 years	Graduate Studies	Special Studies	In-Service Training	Other Training	Totals per disciplines in 5 years
Library Science		2	1	1		4			4		4
Forestry	42	108	39	12	74	275	8	1	7	1	17
Agricultural Economics	91	65	62	42	96	356	2		23	1	26
Home Economics	93	158	78	103	156	588		1	31	1	33
Agricultural Extension	147	164	143	209	133	796	9	1	24	1	35
Plant Industry	62	1	2	17	18	100	6		2		8
Horticulture	19	13	25	27		84					
Agricultural Extension Information	183	91	71	38	43	426			6		6
Agricultural Engineering	49	65	96	130	134	474			2		2
Statistical Research Methods				28		28					
Pastures	39	26	38	50	80	233			1		1
Sociology	5	11	12	92	15	135	1		6		7
Soils	4	38				42			4		4
Animal Industry	2	2		1		5	2		2	1	5
	736	744	567	750	749	3,546	28	3	112	5	148

TABLE N°5. NUMBER OF STUDENTS TRAINED PER COUNTRY PER YEAR.

Country	1954	1955	1956	1957	1958	Total per country during 5 years
Argentina	4	68	75	85	31	263
Bolivia	24	40	6	10	35	115
Brazil	76	42	81	132	47	378
Chile	37	40	24	25	37	163
Colombia	333	111	16	52	110	622
Costa Rica	10	26	68	22	14	140
Cuba	25	45	24	20	11	125
United States (Puerto Rico)	7	6	8	12	8	41
Ecuador	25	102	10	23	11	171
El Salvador	5	8	5	4	38	60
Guatemala	9	12	76	62	68	227
Haiti	7	6	4	10	29	56
Honduras	13	8	26	18	19	84
Mexico	24	6	9	42	10	91
Nicaragua	8	14	29	35	49	135
Panama	12	8	14	12	9	55
Paraguay	12	42	13	6	11	84
Perú	40	56	62	135	111	404
Dominican Republic	2	4	2	5	2	15
Uruguay	32	86	14	32	93	257
Venezuela	31	14	1	8	6	60
	736	744	567	750	749	3,546

N O T E:

Titles of theses and publications listed in the following Appendixes # 1 and # 2 are indicated in the language in which they were originally published, i.e. either English or Spanish.

English translation of Departments referred to may be found in the staff listing pages i - iv.

LISTA DE ESTUDIANTES GRADUADOS Y ESPECIALES DEL I.I.C.A.

A. DEPARTAMENTO DE FITOTECNIA

I. Estudiantes que completaron sus estudios.

a) Graduados que obtuvieron el "Magister Agriculturae"

AGUIRRE, LUIS, V. (Ecuador). Estudios sobre el control de la Antracnosis foliar (Colletotrichum gloeosporioides Penz.) en semilleros de cacao. Tesis. Marzo 1956.

ALBORNOZ, GUILLERMO. (Ecuador). Evaluación del rendimiento y resistencia a P. infestans de 10 clones y siete variedades de papas en Costa Rica. Tesis. Marzo 1955.

AMPUERO, ENRIQUE. (Ecuador). Factores que determinan las épocas de aplicación de fungicidas para el combate de la Mycena citricolor en café. Tesis. Noviembre 1958.

BARRIGA, RODOLFO. (Colombia). Estudio de una enfermedad vascular del abacá (Musa textilis Nee) en Costa Rica. Tesis. Marzo, 1955.

BERMUDEZ, SOCRATES. (Ecuador). Distribución del sistema radicular del Coffea arabica var. typica en cinco tipos de suelo. Tesis. Abril, 1954.

BIANCHINI, CARLOS. (Costa Rica). Estudios fisiológicos de fungicidas sobre pellicularia "Mal de Hilachas", especialmente en café. Tesis. Noviembre, 1956.

CAMACHO, EDILBERTO. (Costa Rica). A nutritional study of Hevea rubber seedlings. Tesis. August, 1954.

DIAZ, JAIME. (Ecuador). Estudios de Fusaria en la podredumbre radicular del café en el vivero. Tesis. Mayo, 1954.

DIAZ, R. ROBERTO. (Guatemala). Potassium nutrition of abaca and a survey of the available potassium of an abaca plantation in Costa Rica. Tesis. January, 1955.

De VERTEUIL, L. L. (Trinidad). Contribution to cacao cuttage. Tesis. July, 1956.

FERNANDEZ, C. E. (Guatemala). Efectos de la aplicación de fertilizantes nitrogenados en el cafeto. Tesis. Julio, 1955.

GRANGIER, ALEXANDRE, Jr. (Brasil). Posibilidades del fungicida orgánico "CAPTAN" con adherentes para uso bajo condiciones tropicales. Tesis. Diciembre, 1954.

- HERBAS, R&MBERTO. (Bolivia). Estudios de las causas y algunos efectos de la podredumbre roja del pseudotallo del abacá. Tesis. Abril, 1954.
- HUERTA, ARMANDO. (Bolivia). La influencia de la intensidad de la luz en la eficiencia asimilatoria y el crecimiento del cafeto. Tesis. Abril, 1954.
- MACHICADO, MARCIAL. (Bolivia). Diagnóstico de deficiencias minerales en cacao por síntomas visuales, ensayos en invernadero e inyecciones en el tronco. Tesis. Abril, 1954.
- MARTIN, ELLIS. (Holanda). Preliminary Studies in Replanting Cacao in Costa Rica. Tesis. December, 1957.
- MIRANDA, HELEODORO. (Ecuador). Influencia del fósforo sobre el rendimiento de la papa en Costa Rica. Tesis. Noviembre, 1956.
- MOLINA, JUAN. (Honduras). El efecto de cuatro sustancias de crecimiento sobre la floración, fructificación y crecimiento de Coffea arabica L. Tesis. Octubre, 1956.
- MONTELLANO, CARLOS. (Bolivia). Estudios biológicos del Cosmopolites sordidus Germar, que infesta al rizoma de abacá. Tesis. Abril, 1954.
- MONTOYA, LUIS A. (Perú). Efectos de la deshoja y la deshija en el crecimiento y rendimiento del abacá (Musa textilis, Néé). Tesis. Julio, 1958.
- NOVOA, LUIS GUILLERMO. (Perú). Algunos factores que influyen en la efectividad del TCA en el combate de malezas perennes. Tesis. Marzo, 1955.
- ORBEGOSO, GUILLERMO. (Perú). Estudio sobre la estructura y variabilidad de la cca (Oxalis tuberosa Mol.). Tesis. Septiembre, 1957.
- SEGURA, GUILLERMO. (Ecuador). Hábitos de crecimiento del Paspalum fasciculatum Willd, y su posible control con herbicidas. Tesis. Octubre, 1957.
- SORIA, JORGE. (Ecuador). Eficiencia relativa del método de selección en consanguinidad por cruzamientos dirigidos para mejorar rendimiento en maíz. Tesis. Junio, 1954.
- VALENZUELA, GERMAN. (Ecuador). Comparación de daños causados al frijol (Phaseolus vulgaris L.) por la larva y adulto del crisomelido Diabrotica balteata Lec. y efecto del Aldrin y Lindano en el crecimiento de la planta. Tesis. Mayo, 1954.

VILLAFUERTE, JOSE. (Ecuador). Algunos disturbios nutricionales del cafeto en Costa Rica. Tesis. Julio, 1954.

VIVAR, LUCIO. (Ecuador). Naturaleza, comportamiento y distribución de las hormigas en una plantación de abacá. Tesis. Agosto, 1957.

b) Graduados por obtener el "Magister Agriculturae"

GAROFALO, OSCAR. (Costa Rica). Efecto del ácido giberélico sobre la brotación de tubérculos de papa. (Tesis pendiente). 1958.

c) Especiales

RIHM, EDGARDO. (Chile). Algunos trastornos fisiológicos en la nutrición del cafeto. Septiembre, 1956.

MENINATO, RUBEN. (Argentina). Estudio preliminar sobre los factores influyentes en la absorción y traslocación del Zn^{65} en plantas de café. Abril, 1959.

II. Estudiantes Actuales

a) Graduados

BELLAVITA, OSCAR. (Costa Rica). Nutrición de café.

CARDOSO, ARMINDO. (Portugal). Nutrición de cacao.

FIGUEROA, RAUL. (Perú). Horticultura de café.

MONGE, FERNANDO. (Ecuador). Genética de cacao.

OCAÑA, GILBERTO. (Panamá). Enfermedades del cacao.

SALAS, JOSE A. (Costa Rica). Enfermedades del café.

b) Especiales

MEJIA, ELKIN. (Colombia). Estudio comparativo con ensayos en macetas sobre la fertilidad de los suelos en tres áreas de Costa Rica (La Hulera, La Lola, I.I.C.A. (Ganadería)).

B. DEPARTAMENTO DE INDUSTRIA ANIMAL

I. Estudiantes que completaron sus estudios.

a) Graduados que obtuvieron el "Magister Agriculturae"

TAPIA, CARLOS. (México). Aplicación de métodos de estudio a la pradera subtropical. Tesis. Septiembre, 1954.

- URBINA, OSCAR. (Costa Rica). Efecto del tórsalo (Dermatobia hominis, Linn, Jr. 1781) en la productividad del ganado de carne y algunos aspectos que determinan su infectación. Tesis. Noviembre, 1954.
- ULLOA, GUSTAVO. (Ecuador). Ciclo estrual, duración del estro y resistencia a ectoparásitos del ganado criollo lechero. Tesis. Junio, 1954.
- CARRERA M., CANDELARIO. (México). Melaza de caña de azúcar en la alimentación de bovinos de leche y carne. Tesis. Noviembre, 1955.
- SAMPAIO, JOSE MARIA COUTO. (Brasil). Efecto de la alta temperatura y humedad en diferentes razas de bovinos. Tesis. Enero, 1956.
- MORILLO, FRANCISCO JOSE. (Venezuela). Motilidad del rumen en ganado lechero. Tesis. Abril, 1958.
- VALDIVIESO, ALFONSO. (Ecuador). Comparación entre la harina de yuca y el maíz en mezclas destetadoras para terneros. Tesis. Junio, 1958.
- LARRAGAN, ARMANDO. (Perú). La cáscara de cacao en el engorde de bovinos. Tesis. Septiembre, 1958.
- MALTOS, JOEL. (México). Selección de toretes por su comportamiento en potrero y corral. Tesis. Junio, 1959.
- VILLA CORTA, EDUARDO. (Perú). Ciclo estrual, período de estro y tiempo de ovulación de bovinos en el trópico. Tesis. Junio, 1959.
- CARDOZO, ARMANDO. (Bolivia). Estudio comparativo del valor nutritivo de torta de palma africana, quinua y leche descremada en polvo. Junio, 1959.
- RIOS, CANDELARIO. (México). Alimentación de vacas secas en estabulación y potrero. Tesis. Enero, 1959.
- b) Graduados por obtener el Magister Agriculturae.
- DECKER, GASTON. (Ecuador). Determinación de producción, proteína y aceptación por parte del ganado, de algunas variedades de pasto Elefante (Pennisetum purpureum Schum.). (Tesis pendiente). 1958.
- SOIKES, RAUL. (Perú). El uso de estilbestrol en la ceba de novillos en potreros tropicales. (Tesis pendiente). 1958.
- c) Especiales
- PEREZ CANO, FRANCISCO. (Nicaragua). Estudios sobre sistemas de criar terneros de lechería. 1954.

II. Estudiantes Actuales

a) Especiales

MARSCHALL, JULIO. (Bolivia). Pruebas de rendimiento y adaptabilidad de variedades de Sorgo.

C. DEPARTAMENTO DE ECONOMIA Y BIENESTAR RURAL

I. Estudiantes que completaron sus estudios.

a) Graduados que obtuvieron el "Magister Agriculturae"

CORREA CANCINO, LUIS H. (Colombia). Implicaciones económicas de nuevas prácticas agrícolas; fincas pequeñas y medianas en dos clases económicas de tierra. Tesis. 1956.

JONES, EARL. (E.U.A.). Estudio de un centro de educación rural en Costa Rica. (También en inglés bajo el título "A study of a Costa Rican rural education center"). Tesis. 1959.

JUSTE, CHARLES D. (Haití). Relaciones entre extensión y crédito agrícola en una comunidad de pequeños agricultores en Costa Rica. Tesis. 1958.

LOPEZ GUIMAZU, ANTONIO. (Argentina). Estudio sobre las relaciones entre investigación y extensión en Costa Rica. Tesis. 1958.

LOZA M., GUSTAVO. (Bolivia). Relaciones entre extensión y algunas organizaciones formales en una comunidad de Costa Rica. Tesis. 1958.

NIETO ARTETA, TOMAS E. (Colombia). Eficacia relativa de algunos métodos de extensión en la adopción de prácticas relacionadas con el cultivo del cafeto en Costa Rica. Tesis. 1958.

ROJAS ALVARADO, FRANCISCO A. (Costa Rica). Estudio de las funciones de supervisión de extensión en Costa Rica. Tesis. 1958.

b) Graduados por obtener el "Magister Agriculturae"

GOMEZ G., PORFIRIO. (Panamá). Los círculos de estudios en función del desarrollo de la comunidad rural. (Tesis pendiente). 1956.

MORERA, FRANKLIN. (Costa Rica). Factores que influyen en la asistencia de personas del área rural a los Clubes 4-S. (Tesis pendiente). 1957.

GUERRERO, JOSE. (Colombia). Observaciones y experiencias con los ensayos de finca en función de extensión. (Tesis pendiente). 1957.

GODOY, JOSE PEDRO. (Argentina). Estudio de un adiestramiento de líderes voluntarios 4-S en Costa Rica. (Tesis pendiente). 1958.

c) Especiales

CHALAR, ARTURO. (Bolivia). Estudio monográfico de Pacayitas. 1957.

FLORES, RAUL. (Bolivia). Estudio de la comunidad "La Suiza" y el Centro de Educación Rural. 1957.

VARGAS, ROGELIO. (Paraguay). Informe del estudio de la comunidad de "La Suiza". 1958.

II. Estudiantes Actuales

a) Graduados

PIERRE, PRADEL. (Haití). Estudio sobre la influencia indirecta en la difusión de algunas prácticas agrícolas en una comunidad de Costa Rica.

NORZA, CARLOS LUIS. (Costa Rica). Eficiencia del líder voluntario en la introducción, difusión y adaptación de prácticas agrícolas.

b) Especiales

ANTELO, ALCIBIADES. (Bolivia). Estudios sobre extensión.

BURNEO, EDUARDO. (Ecuador). Estudios sobre extensión.

D. DEPARTAMENTO DE RECURSOS RENOVABLES

I. Estudiantes que completaron sus estudios.

a) Graduados que obtuvieron el "Magister Agriculturae"

ALVAREZ, HUGO. (Bolivia). Estudio forestal del "jafl" (Alnus jorullensis H.B.K.) en Costa Rica. Tesis. 1956.

ECHANDI, RONALD. (Costa Rica). Las Loranthaceae que parasitan el laurel, Cordia alliodora (R. & P.) Cham., en Costa Rica y sus posibilidades de control con inyecciones de hierbicidas al tronco del huésped. Tesis. 1958.

GOITIA, DELFIN. (Bolivia). Estudio del incremento volumétrico del Cupressus lusitanica Mill. en relación a la edad y al sitio. Tesis. 1954.

GONZALEZ DE MOYA, MIGUEL. (Cuba). Ordenación de un bosque subtropical de crecimiento secundario en Costa Rica. Tesis. 1955.

LEON, RAFAEL E. (Ecuador). Estudio de algunas especies forestales tropicales con especial atención a su comportamiento en vivero. Tesis. 1955.

PETRICEKS, JANIS. (Venezuela). Plan de ordenación del bosque de la finca "La Selva". Tesis. 1956.

b) Graduados por obtener el "Magister Agriculturae"

MADRIZ, ARNOLDO. (Costa Rica). Composición y valores relativos de las especies de bosques secundarios de las zonas de Atenas, Grecia y Palmares. (Tesis pendiente). 1956.

LOPEZ, MARIO. (Costa Rica). Producción de maderas para las industrias forestales en Costa Rica. (Tesis pendiente). 1956.

VERDUZCO, JOSE. (México). Restauración de terrenos forestales degradados en el valle de México. (Tesis pendiente). 1957.

MONTENEGRO, ELMO. (Colombia). Posibilidades de introducir algunas coníferas de Centro-América y México a Colombia. (Tesis pendiente). 1957.

SANCHEZ, LUIS. (Perú). Algunos experimentos con arboricidas en Costa Rica. (Tesis pendiente). 1957.

RIVERA, JORGE. (Puerto Rico). Plan de ordenación del bosque Guavate de Puerto Rico. (Tesis pendiente). 1957.

UBILLA, JOSE. (Ecuador). Estudios sobre la preservación de maderas con Osmosalts. (Tesis pendiente). 1957.

CHACON, JOSE FRANCISCO. (Costa Rica). Identificación y estudios tecnológicos de algunas especies forestales, con miras a su utilización en la industria forestal. (Tesis pendiente). 1957.

SAN ROMAN, MANUEL M. (Costa Rica). Manejo de cuencas protectoras de aguas en Costa Rica. (Tesis pendiente). 1957.

II. Estudiantes Actuales

a) Graduados

TASAYCO, HUMBERTO. (Perú). La fisonomía de las hojas en algunas formaciones vegetales del Trópico.

ROSETO, PABLO. (Ecuador). Crecimiento de especies forestales en Florencia y su selección.

b) Especiales

LOPEZ, JUAN A. (Paraguay). Introducción y comportamiento de especies forestales exóticas en la región de Turrialba.

Instituto Interamericano de Ciencias Agrícolas
Turrialba, Costa Rica

PUBLICACIONES

DEPARTAMENTO DE FITOTECNIA

- ACTAS REUNION TECNICA LATINOAMERICANA SOBRE FERTILIDAD DEL SUELO Y FERTILIZANTES. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Mayo 6-11, 1957. 55 p. (mimeografiada).
- ACTAS REUNION TECNICA LATINOAMERICANA SOBRE RECONOCIMIENTO Y CLASIFICACION DE SUELOS. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Mayo 13-18, 1957. 45 p. (mimeografiada).
- ALLEN, T. C., SHENEFELT, R., & CASIDA, J. E. Cacao insects in Costa Rica and their control. A progress report. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958. (sin publicar).
- ALVIM, PAULO DE T. Alguns disturbios nutricionais do cafeeiro em Costa Rica. Trabajo presentado al Segundo Congreso Panamericano de Agronomía, Piracicaba, Sao Paulo, Brasil. Marzo 1954.
- _____. Studies on the cause of cherelle wilt of cacao. Turrialba 4(2): 72-78. 1954.
- _____. Teorías sobre a formação dos campos cerrados. Presentado al Segundo Congreso Panamericano de Agronomía, Piracicaba, Sao Paulo, Brasil. Marzo 1954.
- _____, & DUARTE, O. Mejores preparaciones hormonales para el enraizamiento de las estacas de cacao. Actas Va. Reunión del Comité Técnico Interamericano del Cacao. Vol. 1, Doc. 6, 13 p. Julio 1954. Turrialba, Costa Rica.
- _____, & HAVIS, J. R. An improved infiltration series for studying stomatal opening as illustrated with coffee. *Plant Physiology* 29(1): 97-98. 1954.
- _____, & HUERTA, A. Influencia da intensidade da luz sobre a eficiencia assimilatoria do cafeeiro. Segundo Congreso Panamericano de Agronomía, Piracicaba, Sao Paulo, Brasil. Marzo 1954.
- _____. Studies on the trunk growth in cacao. *Proceedings Sixth Cacao Conference, Salvador, Bahia, Brazil.* May 1956. 83-87 p.
- _____. A simple method to determine the degree of hardening of rooted cuttings. *Proceedings Sixth Cacao Conference, Salvador, Bahia, Brazil.* May 1956. 193-195.p.
- _____. Correlation among rainfall, temperature and production in cacao. *Proceedings Sixth Cacao Conference, Salvador, Bahia, Brazil.* May 1956. 133-136.p.

- ALVIM, PAULO DE T. Factors controlling leaf flush in cacao. Proceedings Sixth Cacao Conference, Salvador, Bahia, Brazil. May 1956. 117-125 p.
- BOROUGHES, H. Algunos aspectos del uso de radioisótopos en la agricultura, excluyendo suelos y genética. Comunicaciones de Turrialba, no. 62. Noviembre 1958. 5 p.
- BOWMAN, J. S. and CASIDA, J. E. Problems associated with the possible use of systemic insecticides in cocoa production. Comunicaciones de Turrialba no. 60. Febrero 1958. 6 p.
- BOYNTON, D. and SANDS, F. A survey of the fertility status of the cacao soils of Costa Rica, as determined by soil and leaf analyses and a preliminary study of the relation of depth of rooting of cacao trees to soil drainage. Proceedings Fifth Meeting of the Inter-American Technical Cacao Com., Vol. 1, Doc. 3, 13 p. July 1954. Turrialba, Costa Rica.
- _____, and ERICKSON, A. L. A response of seedling cacao trees, under nursery conditions to magnesium and calcium. Proceedings Fifth Meeting of the Inter-American Tech. Cacao Com., Vol. 1, Doc. 4, 10 p. July 1954. Turrialba, Costa Rica.
- CAMACHO, EDILBERTO. No. 30-E Informe de una visita de consulta a Nicaragua. Noviembre 1958. 4 p.
- CASSERES, E. H. La conservación de cebollas bajo refrigeración. Suelo Tico. Vol. VII - 201-202. No. 30. Diciembre 1953-54. Ministerio de Agricultura, Costa Rica.
- CASIDA, J. E. & BOWMAN, J. S. A preliminary report of the use of systemic insecticides in cacao production. Comunicaciones de Turrialba no. 59. Octubre 1957. 9 p.
- CHAVES, GERALDO. Método bio-analítico para evaluación comparativa de adherentes en fungicidas orgánicos. Turrialba 4:39-42. 1954.
- DE VERTEUIL, L. L. Cacao Cuttage in the Western Hemisphere. Misc. Publ. no. 8. July 1956. Inter-American Institute of Agricultural Sciences. Turrialba, Costa Rica. 40 p.
- ERICKSON, ARNOLD L. Propagation procedures used at the Inter-American Institute of Agricultural Sciences. Comunicaciones de Turrialba, no. 54. June 1955. 4 p.
- _____. Comparison of yields-cuttings vs. seedlings from selected clones. Paper presented to the VI Meeting of the Inter-American Technical Cacao Committee, Salvador-Bahia, Brazil. May 1956. 185-191 p.

ERICKSON, ARNOLD L. Report on the First Course in Cacao Production Technology held at the Inter-American Institute of Agricultural Sciences in collaboration with the International Cooperation Administration. Turrialba, Costa Rica. March 26 - June 15, 1956. 37 p.

_____. Cultivo intercalado. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 103-111 p.

_____. Preparación del terreno. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 45-47 p.

_____. Propagación del cacao por semilla. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 57-64 p.

_____. Propagación por estaca. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 65-90 p.

_____. Propagación por injerto y otros métodos. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 91-101 p.

_____. Rehabilitación del cacaotal poco productivo. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 219-225 p.

FIESTER, DONALD R. No. 11 Consultant Report on Coffee Culture and its Improvement in Ecuador. Report to USOM/Ecuador. November 1-15, 1956. 10 p.

_____. Second Annual Coffee Technology Course, July 1- September 20, 1957. General Report. Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica. 29 p.

FUKUNAGA, EDWARD T. No. 17-E Informe y recomendaciones sobre el cultivo del café en Guatemala. Reporte a USOM/Guatemala. Julio 1957. 12 p.

_____. No. 18-E Informe sobre el café en Paraguay. Reporte a USOM/Paraguay. Septiembre 1957. 4 p.

_____. No. 20-E Informe sobre el cultivo del café en Costa Rica. Reporte a USOM/Costa Rica. Julio 1-6 y Septiembre 2-7, 1957. 4 p.

_____. No. 21-E Informe y recomendaciones sobre el cultivo del café en Nicaragua. Reporte a USOM/Nicaragua. Agosto 18-30, 1957. 13 p.

FUKUNAGA, EDWARD T. No. 22-E Informe y recomendaciones sobre el cultivo del café en Panamá. Reporte a USOM/Panamá. Septiembre 9-18, 1957. 12 p.

FUKUNAGA, EDWARD T. No. 23-E Informe y recomendaciones sobre el cultivo del café en Perú. Reporte a USOM/Perú. Octubre 1-12, 1957. 12 p.

_____. No. 24-E Informe y recomendaciones sobre el cultivo del café en Ecuador. Reporte a USOM/Ecuador. Octubre 13-19, 1957. 12 p.

_____. No. 25-E Informe y recomendaciones sobre el cultivo del café en El Salvador. Reporte a USOM/El Salvador. Octubre 25 - Noviembre 23, 1957. 10 p.

GARCIA, FRANCISCO. Ensayo comparativo entre pergamino de café y aserrín de madera, como medios de enraizamiento para estacas de cacao. Actas V Reunión del Comité Técnico Interamericano de Cacao. Vol. 1, Doc. 32. 3 p. Julio 1954. Turrialba, Costa Rica.

GIALLULY, MAX DE. Informe preliminar sobre el efecto del grano de café llamado "Springer". Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Junio 1958. 5 p.

_____. Factors affecting the inherent quality of green coffee. Coffee & Tea Industries and the Flavor Field 81(11):127-132. 1958.

GUTIERREZ, LUCY HASTINGS DE. Muerte descendente causada por Colletotrichum en las plantas de café en el almácigo y su combate por medio de aspersiones en Turrialba, Costa Rica. Reimpreso no. 84. Turrialba Vol. 4, Num. 3-4, pags. 115-124, Julio-Diciembre 1954.

_____ y GUTIERREZ G., MARIO. Incidencia del Helminthosporium oryzae y Piricularia oryzae en relación a pérdidas en rendimiento de arroz en Turrialba, Costa Rica. Trabajo presentado a la III Reunión Latinoamericana de Fitogenetistas, Fitopatólogos, Entomólogos y Edafólogos. Bogotá, Colombia, Junio 1955.

_____. Program of Methods in Plant Pathology. Turrialba, Costa Rica. Inter-American Institute of Agricultural Sciences. July 1956. 3 p. (Type-written).

_____. Results from Rice Disease Nurseries in Costa Rica. Turrialba, Costa Rica. Inter-American Institute of Agricultural Sciences. 1956. 51 p. (mimeographed).

_____. Yield and Infection by Helminthosporium oryzae and Piricularia oryzae for 64 varieties of Rice in Turrialba, Costa Rica. Inter-American Institute of Agricultural Sciences. June 1957. 8 p. (mimeographed).

GUTIERREZ G., MARIO y SORIA, JORGE. Eficiencia del método de selección en consanguinidad por cruzamiento dirigido en el mejoramiento del rendimiento del maíz. Trabajo presentado a la III Reunión Latinoamericana de Fitogenetistas, Fitopatólogos, Entomólogos y Edafólogos. Bogotá, Colombia. Junio 1955.

- HARDY, FREDERICK. No. 3 Soil and Climatic Requirements of Cacao, with a note on the Soil Survey conducted by Mr. Charles S. Simmons. Report to USOM/Guatemala. April 26, 1956. 4 p.
- _____. No. 4 Generalities: Cacao Climates and Cacao Soils. Report to USOM/Nicaragua. May 5, 1956. 6 p.
- _____. No. 5 Future Prospects for Cacao Growing in Perú. Report to USOM/Perú. May 23, 1956. 8 p.
- _____. No. 7 A Report on the Cacao Soils of Bahia. Report to USOM/Brazil. August 1956. 19 p.
- _____. No. 8 A Report on a Visit to Jamaica. Report to USOM/Jamaica. July 1956. 12 p.
- _____. No. 9-E Informe sobre la visita practicada a varias zonas cacaoteras en Colombia (La parte de STACA). Agosto 1956. 25 p.
- _____. No. 10 Report on a Visit to Guatemala. Report to USOM/Guatemala. April 16-26, 1956. 17 p.
- _____. No. 12 Future Prospect of Cacao Growing in Panama. Report to USOM/Panama. January 18-28, 1957. 20 p.
- _____. No. 13 A Memorandum on the Projected Soil Survey of the Cacao-Growing Region of Bahia, Brazil. Report to USOM/Brazil. 1957. 12 p.
- _____. No. 14 A Report on the Soil of the Reconcavo Basin, Bahia, Brazil. Summary, conclusions and recommendations. Report to USOM/Brazil. March 19, 1957. 19 p.
- _____. Suelos de Cacao. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 7-44 p.
- _____. Fermentación y bioquímica del cacao (Algunos descubrimientos recientes). En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 177-195.pp.
- _____. Manufactura de los productos del cacao. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 201-203 pp.
- _____. Selected references for general reading (In English). Cacao Course. Turrialba, Costa Rica. Inter-American Institute of Agricultural Sciences. 1957. 18 p. (mimeographed).
- _____. Interim report on the soils of Experiment Stations of Minas Gerais, Brazil and suggestions for further research work. Consultant, Coffee and Cacao Technical Services, Department of Plant Industry. Inter-American Institute of Agricultural Sciences, Turrialba, C. R. 29 p.

HARDY, FREDERICK. Report on the Third Course in Cacao Production Technology held at the Inter-American Institute of Agricultural Sciences in collaboration with the International Cooperation Administration. Turrialba, Costa Rica. Jan. 13- March 28, 1958. 28 p.

_____. Summary of recent advances in cacao soil science. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958.

_____. La relación carbono/nitrógeno en los suelos de cacao. Trabajo presentado a la IV Reunión Latinoamericana de Fitotecnia, celebrada en Santiago de Chile, Noviembre 24 - Diciembre 6, 1958. 10 p.

_____. Senile Soils. Trabajo presentado a la Conferencia del Caribe organizada por la Escuela de Estudios Interamericanos de la Universidad de Florida, Gainesville, Florida. Diciembre 1958.

_____. Cacao Soils. Trabajo presentado a la Reunión Anual de "Soil Science Society", celebrada en St. Petersburg, Florida. Diciembre 1958.

HAVORD, GORDON. Detailed Soil and Land Capability Surveys for Cacao. Paper presented to the 1957 Cacao Conference organized in September by the Cocoa, Chocolate and Confectionary Alliance Ltd., London. (Based on work done at the Imperial College of Tropical Agriculture, Trinidad). 272-280 p.

HUNTER, J. ROBERT. No. 27-E Informe de una visita de consulta sobre problemas del cacao en Bolivia. Noviembre 1958. 8 p.

_____. No. 28-E Informe sobre una visita de consulta al Perú. Septiembre 1958. 10 p.

HUTCHINS, L. M. Current surveys for Cushion gall. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958.

_____. No. 29-E Informe sobre "La Verruga del Cojín Floral del Cacao en Nicaragua". Enero 1959. 4 p.

_____. No. 31 Cushion Gall of Cacao and Disease-free Propagating Material. Inspection of Plantings at Quepos, Costa Rica. February 1959. 9 p.

IMLE, E. P., ERICKSON, A. L. and OECHSLI, L. P. Performance of clonal cuttings and clonal seedlings of cacao interplanted with rubber. Proc. Fifth Meeting of the Inter-American Tech. Cacao Com. Vol. 1, Doc. 25. July 1954. Turrialba, Costa Rica. 11 p.

JIMENEZ, EDUARDO. Estudios preliminares del efecto del ácido giberélico sobre el crecimiento del cafeto. Comunicaciones de Turrialba, no. 64. Enero 1959. 33 p.

LEON, JORGE. *Alfaroa manningii*, una nueva Jaglandácea de Costa Rica. *Ceiba* 4:42-47. 1954.

_____. A Note on Cacao "Lagarto" or Pentagona. Actas V Reunión del Comité Técnico Interamericano del Cacao. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Julio 1954. 4 p.

_____. Inter-American Cacao Center, Annual Report for 1956. Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica. 17 p.

_____. Taxonomía del género *Theobroma* L. En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Marzo 1957. 233-245.p.

_____. No. 19-E Informe sobre el estudio del café en Ecuador. Reporte a USOM/Ecuador. Noviembre 1957. 6 p.

_____. Una especie nueva de *Guarea*, con hojas de crecimiento indefinido. Trabajo presentado al Tercer Congreso Sudamericano de Botánica, celebrado en Huampaní-Lima, Perú. Mayo 11-18, 1958. 5 p.

_____. Lista Colección de Café - Introducciones a Turrialba. Instituto Interamericano de Ciencias Agrícola, Turrialba, Costa Rica. Enero 1959. 11 p. (mimeografiada).

_____. Estudios sobre tubérculos alimenticios nativos de la región andina. Comunicaciones de Turrialba, no. 63. Enero 1959. (en prensa).

MACHICADO, MARCIAL y ALVIM, P. de T. Sintomatología de las deficiencias minerales de cacao. Turrialba 4(3-4):155-163. Julio-Diciembre 1954.

_____, y ALVIM, P. de T. Sintomatología de las deficiencias minerales en cacao. Actas V Reunión del Comité Técnico Interamericano del Cacao. Vol. 1, Doc. 11, 10 p. Julio 1954. Turrialba, Costa Rica.

_____, y HAVORD, G. La nutrición mineral del cacao. Algunos resultados preliminares del análisis químico de hojas de cacao. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958.

MARTIN, ELLIS. Report on the Second Course in Cacao Production Technology held at the Inter-American Institute of Agricultural Sciences in collaboration with the International Cooperation Administration. Turrialba, Costa Rica. January 7- March 29, 1957. 22 p.

_____. Distancias de siembra, trazado en el terreno y hechura de hoyos. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 49-55 pp.

_____. La recolección. En: Manual de Cacao. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. Marzo 1957. 173-176 pp.

- MESA REDONDA SOBRE PROGRAMAS COOPERATIVOS DE CAFE EN AMERICA CENTRAL Y EL CARIBE. Resúmenes y Recomendaciones. Instituto Interamericano de Ciencias Agrícolas. Mayo 20-23, 1958. 19 p.
- MOH, C. C. Efecto de radiaciones ionizantes en las plantas superiores. Boletín Técnico no. 3. Noviembre 1958. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. 22 p.
- MULLER, LUDWIG. Deficiencias minerales en el café en Costa Rica. (MS) 33 p. En: Reunión Técnica Latinoamericana sobre Fertilidad de Suelos y Fertilizantes. Mayo 1957. 39-46 pp.
- _____. La Energía Atómica al Servicio de la Agricultura. Publicación Miscelánea no. 14. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Marzo 1958. 23 p.
- _____. Deficiencias minerales en el café. Trabajo presentado al Tercer Congreso Botánico Suramericano. Lima, Perú. Mayo, 1958.
- _____. La inducción de mutaciones por medio de radiación gamma. El Proyecto del Campo de Gamma de Turrialba. Trabajo presentado al Tercer Congreso Botánico Suramericano. Lima, Perú. Mayo 1958.
- _____. Advances in coffee production technology. Mineral nutrition. Detection and control of minor element deficiencies. Coffee & Tea Industries and the Flavor Field 81(11):71-74, 76-77, 1958.
- OLSEN, K. L. and THOMAS, N. F. Efectividad de dos fumigantes del suelo y dos insecticidas contra el nemátodo de las agallas de las raíces en tomate y okra. Turrialba 4:23-28. 1954.
- ORBEGOSO, GUILLERMO. Estudio sobre la oca (Oxalis tuberosa Mol.) con especial referencia a su estructura y variabilidad. Trabajo presentado al Tercer Congreso Suramericano de Botánica, celebrado en Huampaní -Lima, Perú. Mayo 11-18, 1958.
- ORELLANA, R. G. Recent information on the control of Swollen Shoot of Cacao. Cacao 3(2):1-2. 1954.
- _____. Estudios sobre la podredumbre de la fruta del cacao causada por Phytophthora en Costa Rica. Turrialba 4(1):35-38. 1954.
- _____. Cacao diseases in Venezuela, Colombia, Ecuador and Trinidad. FAO Plant Protection Bulletin, 11(4):49-52, 1954. (Reprinted in "La Hacienda", September 1954).
- _____. Contribution to the study of survival, dissemination and control of Phytophthora of cacao. Proc. Fifth Meeting of the Inter-American Tech. Cacao Com. Vol. 1, Doc. 14. July 1954. Turrialba, Costa Rica 10 p.

ORELLANA, R. G. Growth of P. palmivora of cacao in liquid media containing cacao shell from different clones as a basis for assessment of resistance. Proc. Fifth Meeting of the Inter-American Tech. Cacao Com. Vol. 1, Doc. 29, 13 p. July 1954. Turrialba, Costa Rica.

_____. Variation in Phytophthora palmivora isolated from cacao and rubber. Phytopathology 44(9):501. 1954 (Abstract).

_____. Report on the Cacao Conference held in London, England. Comunicaciones de Turrialba no. 48. Mayo 1954. 13 p.

_____. Chemical Control of Pests and Diseases of Cacao. Comunicaciones de Turrialba, no. 51. October 1954. 14 p.

_____. Chemical control of pest and diseases of cacao. Advances in Chemistry Series, 13. 1955. 21-30 p.

_____, & AGUIRRE, L. The pathogenicity of mutant forms of Colletotrichum of cacao. III Reunión Latinoamericana de Fitogenetistas, Fitopatólogos y Edafólogos. Bogotá, Colombia. Junio 1955.

_____. Diseases of cacao in México, Jamaica, Nicaragua and Costa Rica. III Reunión Latinoamericana de Fitogenetistas, Fitopatólogos, Entomólogos y Edafólogos. Bogotá, Colombia. Junio 1955.

_____, & SILLER, L. R. Basis for the chemical control of Phytophthora of cacao in relation to its epidemiology. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano del Cacao, celebrado en Salvador-Bahía, Brasil. Mayo 20-27, 1956. 255-260 pp.

_____, & BIANCHINI, C. Fungicidal control of Pellicularia thread blight of cacao. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano del Cacao, celebrada en Salvador, Bahía, Brasil. Mayo 20-27, 1956. 261-263 pp.

_____. Report on the occurrence of diseases of cacao in Haiti, their distribution and economic importance. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano de Cacao, celebrado en Salvador, Bahía, Brasil. Mayo 20-27, 1956. (Summarized in Cacao Vol. 3, no. 11, Abril-Sept. 1956).

_____, & SILLER, L. R. Results of two years of chemical control of Phytophthora on yielding cacao. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano del Cacao, celebrada en Salvador-Bahía, Brasil. Mayo 20-27, 1956. 295-300 pp.

_____. Effect of solar radiation and the total nitrogen content on the incidence of Phytophthora leaf blight on young cacao. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano del Cacao, celebrado en Salvador, Bahía, Brasil. Mayo 20-27, 1956. 291-293 pp.

ORELLANA, RODRIGO G. Reporting Monilia pod rot in eastern Panama. Trabajo presentado a la VI Reunión del Comité Técnico Interamericano del Cacao, celebrado en Salvador-Bahía, Brasil. Mayo 20-27, 1956. (Summarized in Cacao, Vol. 3, no. 11, Abril-Septiembre, 1956).

_____. Status of research on Phytophthora pod rot of cacao. Actas VI Reunión del Comité Técnico Interamericano del Cacao. Salvador-Bahía, Brasil. Mayo 20-27, 1956. 45-58 pp.

ORSENIGO, JOSEPH. Combate de malezas en plantaciones de cacao. En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas. Turrialba, Costa Rica. Marzo 1957. 119-132 pp.

_____. Marchitamiento prematuro de los frutos jóvenes del cacao (Cherelle wilt). En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Marzo 1957. 137-146 pp.

_____. Secamiento del cacao. En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Marzo 1957. 195-200 pp.

SILLER, LUIS R. Efecto de tres fungicidas en el combate de P. palmivora en árboles de cacao. Actas V Reunión del Comité Técnico Interamericano del Cacao. Vol. 1, Doc. 20, 10 p. Julio 1954. Turrialba, Costa Rica.

_____. The use of cacao seedlings inoculated with Phytophthora palmivora var. Theobromae to determine the efficacy of fungicides. Actas VI Reunión del Comité Técnico Interamericano del Cacao. Salvador-Bahía, Brasil. Mayo 20-27, 1956. 269-276 pp.

_____. Efecto de la urea, del cinc y del caldo bordelés en aspersiones foliares en cacao. Trabajo presentado a la VIIa. Conferencia Interamericana del Cacao, celebrada en Palmira, Colombia. Julio 1958.

_____. Aplicación de fungicidas a árboles de cacao en producción. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958.

_____. La Ceratostomella fimbriata en el cacao en Centro América. Trabajo presentado a la VIIa. Conferencia Interamericana de Cacao, celebrada en Palmira, Colombia. Julio 1958.

SYLVAIN, P. G. Some observations on Coffea arabica L. in Ethiopia. Turrialba 5(1-2):07-53, 1955.

_____. Le café du Yemen. Agronomie Tropicale II(1):62-73, 1956.

_____. No. 6-E Informe sobre la producción de café en Bolivia. Reporte a USOM/Bolivia. Julio 1956. 14 p.

_____. No. 15-E Informe sobre un programa de investigación y fomento del cacao en el área del Río Escondido (Departamento de Zelaya, Nicaragua). Reporte a USOM/Nicaragua. Junio 1957. 8 p.

SYLVAIN, P. G. No. 16-E Informe sobre un programa de investigación y fomento del café en Nicaragua. Reporte a USOM/Nicaragua. Junio 1957. 14 p.

_____. No. 26-E Informe sobre un programa de investigación en café en el Perú. Julio 1958. 18 p.

_____. Report on the third course in Coffee Production Technology held at the Inter-American Institute of Agricultural Sciences in collaboration with the International Cooperation Administration. Turrialba, Costa Rica. July 1 - September 19, 1958. 45 p.

_____. El cafeto en relación al agua. Instituto Interamericano de Ciencias Agrícolas. Turrialba, Costa Rica. 1958. 41 p.

_____. Algunos trastornos fisiológicos del cafeto. Instituto Interamericano de Ciencias Agrícolas. Turrialba, Costa Rica. 1958. 24 p.

_____. El ciclo de crecimiento del Coffea arabica L. Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. 1958. 17 p.

_____. Ethiopian coffee - its significance to world coffee problems. Reprinted from Economic Botany, Vol. 12, No. 2, April, 1958. 111-139 pp.

_____. Advances in Coffee Production Technology. Conclusions. Coffee & Tea Industries and the Flavor Field 81(11):133-135. 1958.

SYMPOSIUM ON THE CONTROL OF DISEASES AND INSECT PESTS OF CACAO. (H. Marques da Cruz; Orellana, R. G. Silva, Pedrito and Desrosiers R.) Trabajo presentado a la VI Reunión del Comité Interamericano del Cacao, 1956. 277-289 pp.

WEBER, NEAL A. Costa Rican Cacao Insects. Comunicaciones de Turrialba, no. 58. Octubre 1957. 28 p.

WELLMAN, F. L. The Fusarium phase of the root-disease complex in coffee. Phytopathology 44:509. 1954.

_____. Fungi isolated most frequently from dying coffee fruit branches. Phytopathology 44:509. 1954.

_____. Evidencia de resistencia a las enfermedades en los cafetos. Turrialba 4(2):52-57. 1954.

_____. Coffee diseases, insects and weeds controlled by chemicals. Advances in Chemistry Series 13:43-63. 1955.

_____. Control of rubber diseases by chemicals. Advances in Chemistry Series 13:31-42, 1955.

WELLMAN, F. L. & ORELLANA, R. G. "Buba" or Cushion gall of cacao in Nicaragua. Actas V Reunión del Comité Técnico Interamericano del Cacao. Vol. 1, Doc. 18, 14 p. Julio 1954. Turrialba, Costa Rica.

_____. Investigaciones sobre aspersiones en el control de enfermedades del cafeto. FEDECAME. Sec. Divulgación 18. San Salvador, El Salvador. Noviembre 1955.

_____. Report on work accomplished during April 1 to 15, 1956 while in Guatemala. Report to USOM/Guatemala. April 20, 1956. 7 p.

_____. Observations on three-days trip to see coffee planting in Los Diamantes. April 1956. Report to USOM/Costa Rica. April 30, 1956. 3 p.

_____. Enfermedades del café, conferencia Ministerio de Agricultura, SCIDA, Guatemala. April 13, 1956. (mimeographed).

_____. The virus blister spot of Arabica Coffee in Costa Rica. Typewritten MS. Presentation before Caribbean Sec. Amer. Soc. Hort. Sci. April 3, 1956.

_____. Rugose type virus disease of Canephora coffee in Costa Rica. Typewritten MS. Presentation before Caribbean Sec. Amer. Soc. Hort. Sci. April 3, 1956.

_____. Experiences in spraying plants under wet tropic conditions in Costa Rica. Typewritten MS. Presentation in conference-spray group. Conference Plant Protection. June 20, 1956.

_____. Algunas enfermedades importantes del cacao. En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas. Turrialba, Costa Rica. Marzo 1957. 163-170 pp.

_____. Bibliografía seleccionada de enfermedades. En: Manual de Cacao. Instituto Interamericano de Ciencias Agrícolas. Turrialba, Costa Rica. Marzo 1957. 171-172 pp.

_____. Hemileia vastatrix. FEDECAME. Ser. Div. no. 33 Feb. 1957. 67 p. San Salvador, El Salvador.

_____. Blister Spot of Arabica Coffee from Virus in Costa Rica. Turrialba 7:13-15. June 1957.

Series de Publicaciones:

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A Literature Review of Research on Coffee in Indonesia, por Cramer, P. J. (Edited by F. L. Wellman). Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica. 1957. 262 p. Miscellaneous, Publication no. 15.

DEPARTAMENTO DE INDUSTRIA ANIMAL

CADENA C., MELCHOR & BATEMAN, JOHN V. The effect of ration fiber upon respiration rate and rectal temperature. Turrialba, Costa Rica, Inter-American Institute of Agricultural Sciences.

To be published in the Proceedings of the 40 years Annual Meeting Western Division, American Dairy Science Association. Arizona, 1959.

CARRERA M., CANDELARIO & SOIKES C., R. Efecto de implantaciones de estilbestrol sobre ceba de bovinos en pasto Par  (Panicum purpurascens, Raddi). Turrialba 8(3):96-103. 1958.

DE ALBA, J. Alimentaci n de ganado en la Am rica Latina. M xico, D. F., Prensa M dica Mexicana, 1958. 336 p.

_____. Observaciones sobre las razas criollas de Colombia. Comunicaciones de Turrialba no. 52. 1955. 20 p.

_____, & MORILLO, F. J. Disturbio digestivo en el bovino caracterizado por hipermotilidad del rumen. Turrialba 8(3):104-109. 1958.

_____, & SAMPAIO, J. M. C. Climatic stress on tropically reared breeds of cattle. Journal of Animal Science 16(3):725-731. 1957.

_____, & TAPIA, C. Estudio comparativo de dos gram neas forrajeras Axonopus compressus, Swts. y Digitaria decumbens, Stent. Turrialba 5(3):66-71. 1955.

INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS. PERSONAL DEL DEPARTAMENTO DE INDUSTRIA ANIMAL. An lisis de pesos al nacer y al destete en bovinos de carne criados en el tr pico. Turrialba, C. R., Servicio de Intercambio Científico, 1958. (Comunicaciones Científicas Agrícolas - Proyecto no. 5-1-12(2):, hoja no. 5).

_____. PERSONAL DEL DEPARTAMENTO DE INDUSTRIA ANIMAL. Mejoramiento del ganado criollo lechero tropical. Turrialba, C. R., Servicio de Intercambio Científico, 1958. (Comunicaciones Científicas Agrícolas - Proyecto no. 5-1-3(3).)

_____. PERSONAL DEL DEPARTAMENTO DE INDUSTRIA ANIMAL. Mejoramiento del ganado criollo lechero tropical. III. Pruebas de toros. Turrialba, C. R., Servicio de Intercambio Científico, 1958? 3 p. (Comunicaciones Científicas Agrícolas - Proyecto no. 5-1-3(4), hoja no. 7.)

MORRISON, F. B. & DE ALBA, J. La industria ganadera en Venezuela. Caracas, Consejo de Bienestar Rural, 1955. 256 p.

NEEL, W. W. & OTHERS. Ciclo biol gico del t rsalo (Dermatobia hominis, L. Jr.) en Turrialba, Costa Rica. Turrialba 5(3):91-104. 1955.

_____ & OTHERS. Combate del t rsalo (Dermatobia hominis, L. Jr.) por medio de insecticidas, en Turrialba, Costa Rica. Turrialba 5(4):139-146. 1955.

QUE ES el ganado criollo lechero tropical. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Editorial SIC. (Hoja divulgativa.)

DEPARTAMENTO DE ECONOMIA Y BIENESTAR RURAL

ALERS-MONTALVO, MANUEL. Cultural change in a Costa Rican village. Human Organisation 15(4):2-7. 1957.

ARCE, ANTONIO M. El desarrollo de la comunidad requiere buenos agentes de cambio. Extensión en las Américas 3(4):12-14. 1958.

_____. Introducción racional de tecnología en una hacienda de café y sus consecuencias socio-económicas. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico, 1958. (Comunicaciones Científicas Agrícolas - Proyecto 5-1-15(1).)

_____. Rational introduction of technology in a Costa Rican coffee hacienda: sociological implications. Unpublished Ph. D. dissertation. East Lansing, Michigan State University, 1959.

_____. & MORALES, JULIO O., EDS. Sociología; siete casos de desarrollo de la comunidad. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1954. Varias páginas. (mimeografiado).

CHAPARRO G., ALVARO. Role expectation and adoption of new farm practices. Unpublished Ph. D. thesis. State College, Pa., Pennsylvania State College, 1955. 191 p. (typewritten).

_____. Evolución de un servicio de conservación de suelos hacia el enfoque integral de la comunidad. Turrialba 4(1):7-12. 1954.

DEL RIO, FERNANDO. Evaluación en el trabajo de extensión agrícola. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1955. 4 p. (mimeografiado).

_____. Evaluación en el trabajo del informador. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1957. 15 p. (mimeografiado).

_____. Informe sobre viaje de observación a Honduras. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Departamento de Economía y Bienestar Rural, 1957. 12 p. (mimeografiado).

_____. Informe sobre viaje de observación a Nicaragua. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Departamento de Economía y Bienestar Rural, 1957. 6 p. (mimeografiado).

_____. Professional needs of Costa Rican extension workers. Unpublished Ed. D. thesis. Ithaca, N. Y., Cornell University, 1958. 264 p. (typewritten).

_____. Sea usted buen técnico y buen maestro. Extensión en las Américas 4(1):25-27. 1959.

DEL RIO, FERNANDO & ALERS-MONTALVO, MANUEL. La extensión agrícola en la América Latina ante el desarrollo económico. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Departamento de Economía y Bienestar Rural, 1956. 15 p. (mimeografiado).

_____ & ALERS-MONTALVO, MANUEL. El maestro rural en el trabajo de extensión. Extensión en las Américas 1(2):18-19. 1956.

GOMEZ, PORFIRIO. Study circles related to rural community development: description and analysis of five study groups in selected communities in Costa Rica and implications of their utility in extension work. Unpublished M. S. thesis. Ithaca, N. Y., Cornell University, 1957.

INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS. DEPARTAMENTO DE ECONOMIA Y BIENESTAR RURAL. Círculos de estudios cooperativos; cooperativas de ahorro y crédito. Turrialba, C. R., 1955. 19 lecciones, varias páginas. (mimeografiado).

_____ DEPARTAMENTO DE ECONOMIA Y BIENESTAR RURAL. Efectos económicos de ciertas prácticas agrícolas de café. (Ensayo de café en seis fincas de San Juan Norte, San Juan Sur y Santa Rosa). Turrialba, C. R., Servicio de Intercambio Científico, 1958. (Comunicaciones Científicas Agrícolas - Proyecto 5-1-26(1).)

LOOMIS, CHARLES P., MORALES, JULIO O., & ALLEE, RALPH H. Tipos de localidad de hacienda y fincas pequeñas y su relación con los sistemas de comunicación y otros factores sociales en Turrialba, Costa Rica. Turrialba 4(3-4): 106-114. 1954.

MORALES, JULIO O. Análisis de costos de producción de café en una finca de Costa Rica. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Departamento de Economía y Bienestar Rural, 1954. 14 p. (mimeografiado)

_____. El desarrollo agrícola en la América Latina. En Reunión del Consejo Técnico Consultivo, la., Turrialba, C. R., 1956. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1956. Doc. 18. 6 p. (mimeografiado)

_____. Estudios económicos y sociales sobre la producción de café, realizados por el Departamento de Economía y Bienestar Rural. Comunicaciones de Turrialba no. 53. 1955. 4 p. (mimeografiado).

_____. Informe sobre el programa de extensión del Estado de México. Comunicaciones de Turrialba no. 49. 1954. 4 p. (mimeografiado)

_____. El programa de Roldanillo. Comunicaciones de Turrialba no. 47. 1954. 5 p. (mimeografiado)

_____. Los recursos humanos en el área del Caribe. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Departamento de Economía y Bienestar Rural, 1955. 12 p. (mimeografiado)

MORALES, JULIO O. Social and economic implications of extension work in the Caribbean region. Comunicaciones de Turrialba no. 50. 1954. 4 p.

_____. Technical change in Latin America. Comunicaciones de Turrialba no. 55. 1955. 9 p. (mimeografiado)

PAINTER, NORMAN W. The delineation, demographic comparison and population stability of selected types of locality groupings in the Central District of Turrialba Canton, Costa Rica: 1951. Unpublished Ph. D. thesis. East Lansing, Michigan State University, 1956. 154 p. (typewritten)

SARIOLA, SAKARI. Social class and social mobility in a Costa Rican town. Turrialba, C. R., Inter-American Institute of Agricultural Sciences, 1954. 136 p. (Miscellaneous Publication no. 5)

VALERIO, JUVENAL. Empresa de cría de gallinas para la producción de huevos y carne; programa para el desarrollo de habilidades en la vida rural. 3 proyectos, varias páginas. (mimeografiado)

_____. Empresa de cría y engorde de cerdos; programa para el desarrollo de habilidades en la vida rural. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1954. 4 proyectos, varias páginas. (mimeografiado)

_____. Programa de proyectos para el desarrollo de habilidades en la vida rural; antecedentes y descripción del programa. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1959. (En prensa)

_____. Uso de fungicidas; programa para el desarrollo de habilidades en la vida rural. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1956. 4 proyectos. 85 p.

DEPARTAMENTO DE RECURSOS RENOVABLES

BUDOWSKI, GERARDO. Tendencias en la política forestal. Sociedad Dasonómica de la América Tropical (SDAT). Boletín 4:9-12. 1954.

_____. Organización del servicio forestal. Sociedad Dasonómica de la América Tropical (SDAT). Boletín 11:1-5. 1955.

_____. Algunos pinos y otras coníferas de la América Central y sus posibilidades para Venezuela. Venezuela, Universidad de los Andes, Facultad de Ingeniería Forestal. Boletín 2(8):7-22. 1955.

_____. Tropical savannas, a sequence of forest felling and repeated burnings. Turrialba 6(1-2):23-33. 1956.

_____. Sistemas de regeneración de los bosques de bajura de la América Tropical. Caribbean Forester 17(3-4):53-75. 1956.

_____. Gran interés por semillas de pinos del trópico americano de bajura. Sociedad Dasonómica de la América Tropical (SDAT). Boletín 2(8):3-5. 1956.

- BUDOWSKI, GERARDO. El esparcimiento como recurso forestal. Siembra (Caracas) 2(7):11. 1956.
- _____. Envenenamiento de árboles indeseables como tratamiento silvicultural. Sociedad Dasonómica de la América Tropical (SDAT). Voletín 2(9):3-4. 1957.
- _____. Review of "The rain forests of Golfo Dulce" by Paul H. Allen. Tropical Woods 106:97-102. 1957.
- _____. Publicaciones forestales para el trópico americano. Sociedad Dasonómica de la América Tropical (SDAT). Boletín 3(2):8-13. 1957.
- _____. Quelques aspects de la situation forestiere au Costa Rica. Bois et Forets des Tropiques no. 55:3-8. 1957.
- _____. Informe sobre el viaje de prácticas a Venezuela y Trinidad, con esbozo de una política forestal para Venezuela. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1958. 17 p. (mimeografiado)
- _____. Es importante la extensión forestal en América Latina. Extensión en las Américas 3(2):16-19. 1958.
- _____. Climatología. En Instituto Interamericano de Ciencias Agrícolas. Curso de Cacao, 1958. Turrialba, Costa Rica, 1958. 12 p. (mimeografiado)
- _____. Estudio de los fenómenos meteorológicos en el Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico, 1958. 3 p. (Comunicaciones Científicas Agrícolas - Materia 27, Proyecto 5-1-21.)
- _____. Siembra directa del "laurel", Cordia alliodora sobre montoncitos incinerados. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico, 1958. 3 p. (Comunicaciones Científicas Agrícolas - Materia 35, Proyecto 5-1-25.)
- GOITIA, DELFIN. Estudio del incremento volumétrico del Cupressus lusitanica Mill. en relación a la edad y al sitio. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1956. 39 p. (Publicación miscelánea no. 12.)
- HOLDRIDGE, L. R. Dendrología práctica en la América Tropical. Sociedad Dasonómica de la América Tropical (SDAT) 1(7):11-12; (8):9-10; (9):14-15; (10):9-10; (11):9-11; 2(1):11-13; (2):9; (3):9-10; (5):3-4. 1954, 1955, 1956.
- _____. Pine and other conifers. In World Forestry Congress, 4th, Dehra Dun, India, 1954. General Papers. Dehra Dun, India, 1955? pp. 113-118.

- HOLDRIDGE, L. R. Other species. In World Forestry Congress, 4th, Dehra Dun, India, 1954. General Papers. Dehra Dun, India, 1955? pp. 119-125.
- _____. Crecimiento del "laurel" Cordia alliodora (R. & P.) Cham. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico. 3 hojas. (Comunicaciones Científicas Agrícolas - Materia 35. - Proyectos 5-1-1(1), 5-1-1(2), 5-1-1(3), 1955, 1956, 1958.
- _____. La agricultura o la dasonomía en Costa Rica; competencia o co-existencia? Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico. 1955. 12 p. (Comunicaciones Científicas Agrícolas de Turrialba - Materia no. 56.)
- _____. Middle America. In American Geographical Society. A world geography of forest sources. New York, Ronald Press Co., 1956. pp. 183-199.
- _____. A key to the tripinnate and bipinnate leaved trees of Costa Rica. Ceiba (Honduras) 6:5-23. 1957.
- _____ & BUDOWSKI, G. Report of an ecological survey of the Republic of Panama. Caribbean Forester 17(3-4):92-110. 1956.
- STEIN, A. H. Forest conditions and problems in participants countries. Caribbean Forester 18(1-2):40-43. 1957.
- _____. Forest policy and legislation. Caribbean Forester 18(3-4): 68-87. 1957.
- TOSI, J. A. Demostración del buen manejo de un bosque pequeño, finca "Los Espaveles", Atenas. San José, Costa Rica, Ministerio de Agricultura, 1957. 6 p. (mimeografiado).
- VERDUZCO, J. La restauración del suelo y del bosque es urgente en América. Turrialba, Costa Rica, Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico, 1958. 4 p. (Serie "Qué hay de nuevo en la agricultura" artículo no. 5.)
- _____. Mejoramiento con "laurel" Cordia alliodora de charrales y bosques degradados. Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, Servicio de Intercambio Científico, 1959. 2 p. (Comunicaciones Científicas Agrícolas - Materia 35, Proyecto 5-1-29.)

BIBLIOTECA CONMEMORATIVA ORTON

- MARTINEZ, ANGELINA. Administración de bibliotecas - notas de clase. (Library administration - class notes.) Summer course given at the School of Education of the University of Costa Rica. San José, C.R., Universidad de Costa Rica, 1955. 60, xxxiii p.

- MARTINEZ, ANGELINA. Asociación Interamericana de Bibliotecarios Agrícolas. Proyecto de Constitución y Estatutos. (Inter-American Association of Agricultural Librarians. Draft of Constitution and By-Laws.) Turrialba, Costa Rica., Instituto Interamericano de Ciencias Agrícolas, 1955. 11 p.
- _____. La biblioteca especializada y su uso. (The special library and its use.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1956. 7 p. (mimeografiado)
- _____. Fuentes de información a la literatura de pastos y forrajes. (Sources of information to the literature of pastures and forages.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1959. 12 p. (mimeografiado)
- _____. Fuentes de información sobre literatura de cacao. (Sources of information on cacao literature.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1958. 11 p. (mimeografiado)
- _____. Fuentes de información sobre literatura de café. (Sources of information on coffee literature.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1956. 6 p. (mimeografiado)
- _____. La literatura científica y el uso de la biblioteca especializada. (Scientific literature and the use of the special library.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1955. 7 p.
- _____. Problems of Latin American agricultural libraries and proposed program of activities of the Inter-American Association of Agricultural Librarians. Paper presented at the Meeting of the International Committee of Agricultural Librarians in Ghent, Belgium, September 1955. 15 p. (Also in International Association of Agricultural Librarians and Documentalists. Quarterly Bulletin 2(1):48-54; (2)89-96. 1957.)
- _____. & JAMES, C. NOEL. Cacao: bibliografía de las publicaciones que se encuentran en la Biblioteca del Instituto. (Cacao: bibliography of the publications available in the Library of the Institute.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1954. vi, 258 p. (mimeografiada)
- Supplement. 1958. 132 p.
- _____. & JAMES, C. NOEL. Lista de referencias sobre horticultura en el idioma español. (List of references on horticulture in the Spanish language.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1954. 23 p. (mimeografiada)
- _____. & JAMES, C. NOEL. Lista seleccionada de publicaciones sobre investigación. (Selected list of publications on research.) Turrialba, C. R., Instituto Interamericano de Ciencias Agrícolas, 1955. 15 p. (mimeografiada)

SERVICIO DE INTERCAMBIO CIENTIFICO

ANDERSON, CALVERT H. Las relaciones públicas en las organizaciones agrícolas. Extensión en las Américas 3(6):19-20. 1958.

COTO MONGE, ROGELIO. Servicio de Intercambio Científico. Informa Anual 1954. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1955. 16 p. (mimeografiado). (Publicado también en inglés).

____ Servicio de Intercambio Científico. En: Reunión del Comité Administrativo del Instituto, Septiembre de 1955. Informe. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1955. 17 p. (mimeografiado).

____ Servicio de Intercambio Científico. Informe de actividades 1949-1955. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1955. 26 p. (mimeografiado). (Publicado también en inglés).

____ La comprensión del texto es un problema básico de las publicaciones. En: Primera Reunión Centroamericana sobre el Mejoramiento del Maíz. Turrialba, Costa Rica, Octubre 24-30, 1954. Informe. Turrialba, Costa Rica, 1955. pp. 424-446.

____ Servicio de Intercambio Científico. En: Primera Reunión del Consejo Técnico Consultivo. Turrialba, Costa Rica, Marzo 8-11, 1956. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1956. 7 p. (multigrafiado).

____ Organización de una oficina eficiente de información agrícola. En: Información de Extensión. Informe del Seminario de Información de Extensión Agrícola y Economía Doméstica para los países centroamericanos. San José, Costa Rica, Enero 29-Febrero 8, 1957. Turrialba, Costa Rica, Instituto Interamericano de Ciencias Agrícolas, 1957. pp. 55-59.

____ La preparación del artículo de extensión. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 4 p. (mimeografiado).

____ Servicio de Intercambio Científico. En: Segunda Reunión del Consejo Técnico Consultivo. Turrialba, Costa Rica, Marzo 10-14, 1957. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 5 p. (multigrafiado).

____ Preparación del SIC para la futura expansión del Instituto. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 26 p. (mimeografiado). (Publicado también en inglés).

____ Servicio de Intercambio Científico. Informe anual. Julio 1955-Junio 1956. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 3 p. (mimeografiado). (Publicado también en inglés).

COTO MONGE, ROGELIO. Servicio de Intercambio Científico. Informe anual. Julio 1956-Junio 1957. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 5 p. (mimeografiado). (Publicado también en inglés).

_____ y CORDERO J., CARLOS. Campaña sobre conservación de recursos naturales. En: Información de Extensión. Informe del Seminario de Información de Extensión Agrícola y Economía Doméstica para los países centroamericanos. San José, Costa Rica, Enero 29-Febrero 8, 1957. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. pp. 35-47.

_____ y DIAZ BORDENAVE, JUAN E. Cómo los agricultores adoptan nuevas ideas. En: Información de Extensión. Informe del Seminario de Información de Extensión Agrícola y Economía Doméstica para los países centroamericanos. San José, Costa Rica, Enero 29-Febrero 8, 1957. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. pp. 19-23.

_____ Escritura para la lectura y escritura para la basura. Extensión en las Américas 3(6):19-20. 1958.

_____ Servicio de Intercambio Científico. Informe anual. Julio 1957-Junio 1958. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1958. 7 p. (mimeografiado).

_____ Servicio de Intercambio Científico. En: Tercera Reunión del Consejo Técnico Consultivo. Santiago, Chile, Marzo 10-13, 1958. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1958. 15 p. (multigrafiado).

_____ Servicio de Intercambio Científico. En: Cuarta Reunión del Consejo Técnico Consultivo. San José, Costa Rica, Marzo 9-12, 1959. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1959. 25 p. (multigrafiado).

_____ Project on the publication of textbooks and teaching materials financed by the Kellogg Foundation. Report of First Year of Activities, April 1958-March 1959. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1959. 9 p. (mimeografiado).

CRUZ RIASCOS, LUIS CARLOS. Cómo aprenden los agricultores. Extensión en las Américas 1(3):16-17. 1956.

_____ Usted puede mejorar el vehículo de su atomizador de motor. Extensión en las Américas 1(2):5-7. 1956.

_____ Siete razones para usar las ayudas visuales. Extensión en las Américas 3(3):22-25. 1958.

_____ Haga más eficaz su reunión de extensión. Extensión en las Américas 3(6):15-17. 1958.

DIAZ BORDENAVE, JUAN E. Cuidado con los insecticidas ! Extensión en las Américas 1(5):28-31. 1956.

_____ Folletos en Extensión Agrícola. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 11 p. (mimeografiado).

_____ Sea un buen comunicador. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 4 p. (mimeografiado).

_____ El artículo de extensión. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 4 p.

_____ Escriba noticias para el periódico de su localidad. El Mensajero Extensionista 6:1-9. 1958.

_____ Necesitamos aprender a comunicar mejor. Extensión en las Américas 3(3):8-10. 1958.

_____ Acido giberélico un nuevo regulador del crecimiento vegetal. Extensión en las Américas 3(5):26-27. 1958.

_____ Mejor extensión con información. Extensión en las Américas 2(3):23-25. 1958.

_____ La radio en extensión. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 4 p.

_____ Los extensionistas y la prensa. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 4 p.

DIAZ LEON, ADELAIDA. La bibliografía y el artículo científico. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 6 p. (mimeografiado).

_____ El compendio. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 6 p. (mimeografiado).

FERRARA, MIGUEL ANGEL. "Superar lo mejor" es el lema de la juventud rural del Paraguay. Extensión en las Américas 3(3):3-5. 1958.

_____ Cartas circulares. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 12 p. (mimeografiado).

KADDERLY, WALLACE L. La mujer en el desarrollo agrícola. Extensión en las Américas 1(4):3-5. 1956.

_____ La carta circular eficaz. Extensión en las Américas 1(3):21-23. 1956.

KADDERLY, WALLACE L. Laboratorio educativo de prensa y radio agrícolas.
Extensión en las Américas 1(2):20-22. 1956.

_____ Por qué usar ayudas visuales ? Extensión en las Américas 1(1):
9. 1956.

PALMA DE BUDOWSKI, THELMA. Cómo ayudamos a nuestras familias campesinas.
Extensión en las Américas 3(2):3-4. 1958.

_____ La enseñanza en nutrición es urgente en América Latina. Exten-
sión en las Américas 3(6):3-5. 1958.

RAZ DE ERICKSON, ANA MARIA. La documentación científica agrícola en Améri-
ca Latina; labor bibliográfica del Instituto Interamericano de Ciencias
Agrícolas, Turrialba, Costa Rica. En: Seminario Pilote de Bibliografía.
La Habana, Cuba, Julio 11-15, 1955. Informe final. La Habana, Cuba,
1955. pp. 6-13.

SANCHEZ MARVAEZ, ENRIQUE. Adiestramiento de agentes de extensión en materias
de información. En: Información de Extensión. Informe del Seminario
de Información de Extensión Agrícola y Economía Doméstica para los paí-
ses centroamericanos. San José, Costa Rica. Enero 29-Febrero 8, 1957.
Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas,
1957. pp. 57-60.

_____ y COMBARIZA HERRERA, GUILLERMO. Su portafolio gráfico. Turrialba,
Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957.
11 p. (Serie Ayudas Visuales para la Extensión Agrícola N°3).

_____ Las ayudas visuales dan eficiencia a la enseñanza. Turrialba,
Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958.
6 p. (mimeografiado).

_____ Serigrafie sus carteles. Turrialba, Costa Rica. Instituto Inter-
americano de Ciencias Agrícolas. 1958. 18 p.

_____ Comunicación oral. Turrialba, Costa Rica. Instituto Interamerica-
no de Ciencias Agrícolas. 1958. 11 p.

_____ y COMBARIZA, GUILLERMO. Utilice bien la pizarra. Turrialba, Costa
Rica. Instituto Interamericano de Ciencias Agrícolas, 1958. 14 p.
(Serie Ayudas Visuales para la Extensión Agrícola N°4).

SAMPER, ARMANDO. Servicio de Intercambio Científico. Informe anual de 1953.
1954. 19 p. (mimeografiado).

_____ Resultados de la investigación agrícola en la América tropical pu-
blicados en la revista Turrialba 1950-1953. Agricultura Tropical 10(6):
27-35, (7):37-44. 1954.

_____ Servicio de Intercambio Científico. Informe semestral, Enero a Ju-
nio 1954. 6 p. (mimeografiado).

SAMPER, ARMANDO. Estructura lógica del artículo científico agrícola. 1954. 26 p. (mimeografiado).

STEPHEN, VICTOR R. y SANCHEZ NARVAEZ, ENRIQUE. Use una exhibición portátil para reuniones, demostraciones, exposiciones, arreglo de escaparates o vitrinas. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas, 1957. 6 p. (Serie Ayudas Visuales para la Extensión Agrícola N°2).

ZURIGA, EVENOR. Aspectos del trabajo de traducción. Turrialba, Costa Rica. Instituto Interamericano de Ciencias Agrícolas. 1958. 4 p. (mimeografiado).

PROYECTO 39 DEL PROGRAMA DE COOPERACION TECNICA

En la página 71 del presente Informe, se incluye una referencia a las publicaciones del Proyecto 39. La lista de ellas aparece regularmente en los Informes Anuales. Quienes desearan obtener dichas listas, pueden dirigirse a las Oficinas del Proyecto 39 (Apartado 4359, San José, Costa Rica).

Dirección del Proyecto 39

"A Key to the Tripinnate and Bipinnate Leaved Trees of Costa Rica" (Artículo aparecido en CETIBA, de la Escuela Agrícola Panamericana, correspondiente a Diciembre/57, Vol.6).

"Información de Extensión Agrícola - Apuntes" (mimeografiado, 1957).

"Informes Anuales (impresos e ilustrados períodos 1955, 1956, 1957 y 1958).

"Informes Trimestrales (mimeografiados. Abarcan todo el quinquenio).

"La Agricultura y la Dasonomía en Costa Rica - Competencia o Co-existencia?" (N°56 correspondiente a Set./55 de 'Comunicaciones de Turrialba'. Fué publicado en inglés en la 'International Journal of Agrarian Affairs, vol. II, N°2, 1955, de Inglaterra).

"Middle America" (Separata de 'A World Geography of Forest Resources' editada en 1956 para 'The American Geographical Society').

"Recomendaciones para Cultivo de Papa en Nicaragua, Costa Rica y Panamá" (Editado en 1957 en forma de boletín impreso).

"The Vegetation of Mainland Middle America" (Separata de 'Proceedings of the Eight Pacific Science Congress', Vol. IV, 1957).

Zona Andina

ALMACENAMIENTO DE PAPA CON VENTILACION CONTROLADA EN LA SIERRA DEL PERU.
Por Enrique Blair.

ANALISIS DE LOS COSTOS DEL FUNDO. Por Wells M. Allred y Antonio Giles.

DEMOSTRACION DEL USO DEL METODO DE LA ENCUESTA EN LOS ESTUDIOS ECONOMICOS
EN AREAS AGRICOLAS. Por Quentin M. West.

EL CLIMA Y LA ECOLOGIA CLIMATICA GENERAL DE HUANCAYO, PERU. Por Joseph
Tosi Jr.

ESTUDIO DEL INCREMENTO VOLUMETRICO DEL CUPRESSUS LUSITANICA MILL EN RELACION
A LA EDAD Y AL SITIO. Por Delfin Goitia.

MANUAL DE RIEGOS Y AVENAMIENTOS. Por Enrique Blair.

NIVEL ECONOMICO MINIMO DE PRODUCCION DE LECHE POR VACA EN ESTABLOS ALREDEDOR
DE LIMA, PERU. Por Wells M. Allred y Antonio Giles.

Zona Sur

CLUBES AGRARIOS JUVENILES.

CONSTRUCCION DE UN GALLINERO.

DEBE MI HIJA ESTUDIAR ECONOMIA DOMESTICA ?.

ESTADO ACTUAL DE LA EDUCACION, INVESTIGACION Y EXTENSION EN ECONOMIA AGRICOLA
EN ASIA Y AMERICA LATINA.

FUNDAMENTOS DE EXTENSION AGRICOLA.

INFORME DE LAS ACTIVIDADES DE LA ZONA SUR.

LIBRO DE CONTABILIDAD PARA AGRICULTORES.

LLEGARON LOS POLLITOS.

MANUAL DE PASTURAS.

PEQUEÑO ENSAYO PARA UN GRAN DESARROLLO.

RESUMEN DE ACTIVIDADES (1952-59).

SIEMPRE MAS ALFALFA.

USO DEL TIEMPO POR LAS AMAS DE CASA DEL AREA DEMOSTRATIVA DE SAN RAMON.

Zona Norte

ALMACENAMIENTO DE GRANOS, 1958.

COMO HACER LA DEMOSTRACION DE RESULTADO EN EL TRABAJO DE EXTENSION. Ex-
tensión en las Américas.

CONSERVACION DE ALIMENTOS EN EL HOGAR.

CONFERENCIAS DE SOCIOLOGIA RURAL.

CURSO DE SOCIOLOGIA RURAL: Conferencias y Estudio de Flores, Honduras. Di-
visión de Extensión Agrícola, Secretaría de Recursos Naturales, Teg-
cigalpa, Honduras. 1957. 82 p.

DEMOSTRACIONES DE RESULTADO.

DISASTERS AND SOCIAL SYSTEMS. American Sociological Review. 1956.

ESTUDIO Y PLANEACION DE OBRAS DE RIEGO: a) Reconocimientos preliminares, Julio
1958. Memorándum Técnico #139, publicado a través de la Secretaría de
Recursos Hidráulicos de México.

GUIA PARA SUPERVISORES DE ECONOMIA DOMESTICA.

INFORME DE LA INVESTIGACION PRELIMINAR SOCIOECONOMICA PARA EL PROYECTO PILOTO
DE COOPERATIVAS RURALES. Banco Nacional de Costa Rica, publicación N°10,
1955. (reproducido en 1957, por el Dpto. de Extensión Agrícola de la Se-
cretaría de Agricultura y Ganadería de México). 34 p.

LA SOCIOLOGIA RURAL: Su aplicación a los programas educativos. 1956. 124 p.

LA SOCIOLOGIA RURAL. Agrotecnia. Marzo-Abril, 1957. 66-82 p.

LA INTRUSION SALINA. Mayo 1956.

OBJETIVOS DE EXTENSION.

ORGANIZACION DE CLUBES JUVENILES.

RIEGO. 1955.

SISTEMAS DE ESTRATIFICACION SOCIAL. Agrotecnia. Mayo-Junio, 1958. 72-78 p.

THE RIO GRANDE FOOD: Comparative Study of Border Communities in Disaster.
National Research Council, Washington, D.C., 1956.

USO Y CUIDADO DEL AUTOCLAVE.

USO Y CONSERVACION DE LA MAQUINARIA AGRICOLA. 1956.

VISITAS A FINCAS Y HOGARES.

VISITAS A LA OFICINA.

