

<sup>H</sup> ANNUAL REPORT  
OF THE  
INTER - AMERICAN INSTITUTE  
OF AGRICULTURAL SCIENCES  
FOR THE YEAR

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Turrialba, Costa Rica  
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**TENTH ANNUAL REPORT**

**of the**

**INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES**

**(A specialized organism of the Organization of the American States)**

**1952**

**Turrialba, Costa Rica  
June 1954**

Gentlemen of the Board of Directors:

I have the honor to submit herewith the Annual Report of the Inter-American Institute of Agricultural Sciences for the year 1952. The Annual Reports aim to maintain continuity in the record of technical progress. They form part of a series of publications, including the quarterly technical journal Turrialba, the monthly Information Bulletin, and technical bulletins on specific items as required. All these publications are widely distributed throughout the Americas and to our cooperators in other parts of the world.

In the introduction to the report for this year we have attempted to review the experience of the Institute to date and to suggest the nature of desirable future development. This has seemed desirable in that ten years have elapsed since the first informal beginnings of the institution. The largely physical preparations made prior to July 1946 have been followed by an intensive period of equipping the institution to serve its intended ends. We have outlined the proportions of success achieved in this effort and submitted them for the judgment of the Board of Directors and our colleagues in the member countries.

As we review the experience of the first decade, a most striking feature is the evolution of our Board of Directors into an efficient corps of representatives of the American peoples. We highly appreciate the guidance and assistance which the Board and its Secretariat in the Pan American Union have accorded to us.

Respectfully,

Ralph H. Allee  
Director

4 June 1953

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## INTRODUCTION

Ralph H. Allee

In our report for the year 1945-46 we said that the three years reported previous to that date had been dedicated to preparation for a program of research and education. We can say now that the period since that date has seen the development of such a program. Furthermore, these formative years have matured in the institution a pattern of fundamental research and advanced education and the inception of a program of international leadership in service to the American countries. The period ahead will be characterized by expansion of the function of complementing national effort and stimulating advances in the welfare of agriculture and rural life with a sense of coordination.

At the close of the fiscal year 1945-46 Turrialba possessed seven scientific staff members. Eight students were registered at the Institute, but none had been graduated. The total income was \$215,720.53 of which \$168,728.61 came from quotas of 9 member States. The remaining \$46,991.92 was derived from farm income and miscellaneous receipts. There were no private grants. The laboratory consisted of one microscope the library had 1,542 volumes and received 72 serial publications; there was no breeding stock on the farm.

As of 31 December 1952<sup>1/</sup> there were 39 technical staff members in the Turrialba research and teaching program. There were 76 students resident during the year and 211 had been trained. The total income foreseen in the current budget was \$640,120.47 of which \$223,032.00 represented the quotas of 14 member countries, \$296,900.00 represented income from Institute farms and miscellaneous receipts, and private grants in the amount of \$120,488.47 were available. A reasonable well-equipped physiological chemistry laboratory and a pathology laboratory were available. A climatology laboratory had been constructed. The library contained 11,012 well-organized volumes in air-conditioned stacks, and 1,100 serial publications were being received. The farm had 300 breeding animals.

In addition to the above, a program of training for the improvement of agriculture and rural life was in the process of organization supported by the Technical Assistance Fund of the Organization of American States. This program had centers in Montevideo, Lima, and Havana. It contained 28 technical workers and had trained in less than two years a total of 260 students in international courses and 550 students in national courses.

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<sup>1/</sup> In 1949 the reporting system was changed from a fiscal to a calendar year basis.

Since the Convention became effective in November 1944, an institution has been created not just in terms of an investment of more than two million dollars in a physical plant, but of the competence and experience to serve the member countries effectively. A highly competent, well-trained staff in which fourteen nationalities are represented has been gathered. The majority of them are leaders of their own fields, whose advice is sought by technicians in the member countries and whose consultation services have contributed directly to the solution of problems in the member countries. Others are well-trained young scientists who are beginning to make fundamental contributions to research in their own fields. Over the years, criteria have been developed as to how an institution such as this can best serve the member countries, approaches to the problems have been worked out, and methods have been developed. Effective relations have been established with national and international institutions, and work has been conducted successfully on the basis of true partnership. These represent the foundations on which programs are built and without which an international agency can fail to perform its tasks or to see that its own success is measured in terms of the success of the national programs. They represent the most important assets the institution has today.

Distribution to member countries of improved plant material developed in Turrialba has increased. During 1952 distribution was made of the following new varieties: Chirripó sweet corn, Milfruto sweet pepper, Peraoro pumpkin, Rico black-seeded dry bean, Bonita peanut, and a new cowpea variety which had been developed and distributed previously. Four lines of tomatoes selected from crossings made in Turrialba have yielded better and have shown greater adaptation to the humid subtropics than 32 selections tested. An improved local snap bean variety, Jamaica, has yielded better than the imported high producers and has shown greater resistance to anthracnose. In yield tests of blight-resistant varieties of potatoes, three introduced varieties have given high yields, and a Cornell seedling, DUA-2, has produced three times as much as the local variety Morada Blanca. Some of the corn inbreds of the variety I-451 showed resistance to lodging, and this variety has produced larger yields than the 34 varieties imported from five countries. During last year, a total of 250 plant introductions was added to the various collections, including several varieties and types of coffee from Brazil, Guatemala, and Ethiopia.

It has been determined that the incidence of the most damaging coffee disease of the Americas, the leaf spot produced by Omphalia flava, is definitely correlated with the presence of shade and that spread of the lesion is altogether dependent on rainfall; a control method by defoliation was developed and practiced on commercial farms. During the past year, basic steps have been taken towards the solution of important agricultural problems of the Americas. These include experiments to control coffee root mealy bugs; studies of Café macho, a condition widely prevalent in the coffee-producing regions of several countries; application of zinc to cacao trees to increase the yield of fruit; field experiments on control of the sweet-potato weevil, in which Dieldrin gave the best control; field experiments with the corn root worm, Diabrotica

balteata Lec., in which Aldrin, Dieldrin, and Toxaphene gave the best control; successful control of weeds in sugar cane under humid conditions with chemicals; and commercial use of new propagators, with automatic water regulations, for rooting of cacao and coffee cuttings, which were developed at the Institute.

Tests conducted to determine the utilization of tropical products as animal feed have indicated that banana leaves, ripe bananas, cacao pod meal, and dehydrated and ground young leaves and stems of yuca can be fed to dairy cattle.

Studies with dairy cattle breeds indicate that, under good conditions of management and feeding, Jersey cows can maintain a high production record under complete barn feeding and produce better than Holsteins in the wet tropics. In a 305-day milking period, ten selected criollo cows produced an average of 4,699.9 pounds of milk with an average betterfat content of 4.6%. This gives a positive indication of the future possibilities of criollo dairy cattle selection.

Fertilization tests on Imperial grass have shown that the addition of nitrogen results in a forage that is consumed in quantities two to three times larger than unfertilized grass with an increase in milk production. This has opened the way for research on the improvement of tropical grasslands, a key to the improvement of the productivity of cattle in the tropics.

Further studies have been conducted on the tórsalo grub, Dermatobia hominis, L. Jr., the worst pest of tropical cattle. Spraying tests with Toxaphene, Aldrin, and DDT-BHC mixture have shown the complexity of the factors involved in an adequate control. Replicated, long-term tests are narrowing the field of variables. A trapping survey to capture egg carriers of the tórsalo fly has revealed that one muscid species, Saracopromusca arcuata Town., is the chief egg carrier. Fundamental studies of larval development with guinea pigs have been initiated.

An inexpensive, practical dew-point moisture indicator for determining the condition of stored grain has been developed. Also a trailer-type rice drying unit to dry the crop while harvesting has been developed and is being used commercially by some farms.

Experiments on quick drying of coffee in the cherry cut down costs considerably but decreased the quality of the bean. However, drying of washed hulled coffee has reduced the processing, which under good sunshine conditions takes an average of a day, to a three-hour operation that can be performed in all kinds of weather.

By means of graduate training, international courses, and consultation, a contribution has been made to the realization of the place of the forest among the key renewable resources in the Americas. Demonstrations have been made, directly on farms, of the commercial utilization of the forest as a farm enterprise.

The Community Development Project has been getting at the heart of the factors involved in introducing change in a rural community to raise the level of living of the rural people. The research project under way has been directed toward answering two fundamental questions: How does community development occur and how can community development be stimulated through education? Fundamental observations, applicable to the improvement of farm life in other areas of rural America, have been made.

Research on the factors affecting costs and returns on coffee farms in Costa Rica and Colombia has indicated that labor efficiency is the most fundamental factor. It has been determined that labor represents approximately two-thirds of the cost of production and the use of land about one-fifth. Studies are under way to determine the factors affecting the efficiency of the harvesting operation, since this is the operation consuming the largest amount of labor.

The quality of the publications has been improved, the number of them has increased, and the distribution has been larger, although on a selective basis. The technical journal Turrialba now reaches 813 libraries, institutions, and individual subscribers, the Information Bulletin 2,756, and Cacao 1,335. A new series Comunicaciones de Turrialba was initiated in 1952 and 26 titles added. While 33 titles were added to the Reprint Series in the six-year period 1944-49, 25 were added in the three-year period 1950-52. A farm management text Administración Rural (in Spanish) and a manual entitled Grain Drying and Storage in Warm Humid Climates (in Spanish and English) have been published. The English edition of a manual for extension agents and rural teachers summarizing the Community Development studies is now in press.

Since the scientific communications program was started in July 1949, 32,722 photocopies of articles have been distributed to 464 scientists and the libraries of 128 Latin American institutions which would not have had access by other means to the literature needed. The 57 articles, 771 abstracts, 2,205 references to literature, and 135 news items published in Turrialba have contributed further to keeping the research workers informed about current literature and developments. A total of 200 agricultural libraries has been visited in all the Latin American countries except Bolivia, Ecuador, the Dominican Republic, and Paraguay, to study means of assisting them in the improvement of their services, and 40 libraries have participated in a program to increase the use of abstract journals and other reference tools in Latin America.

An interdisciplinary approach to the solution of farm and rural home problems is making important contributions in the field of technical cooperation. Techniques have been developed by which the tools of land economics, farm management, home economics, anthropology, sociology, ecology, forestry, engineering, agronomy, vocational education, and extension are used in a combined manner to assess the conditions and resources in an area and the best methods of increasing production



and improving rural life. To this end international demonstration and training areas have been developed in Costa Rica and Uruguay, in cooperation with the national agencies, and are being developed in Cuba and Peru. Assistance has been given to El Salvador and Chile in the development of national demonstration areas.

The research function of the central experimental station at Turrialba is to establish criteria according to which research on the problems of agriculture and rural life can be oriented in the member countries. Although some of the work at Turrialba results in varieties of plants, methods of drying and storing grains, and such directly applicable to rural problems, the major portion of its energies should be directed toward sponsoring and guiding projects which are carried out individually or cooperatively by national agencies. The following list of projects and activities illustrates some of the cooperation which is under way and indicates the direction in which future efforts should be applied:

1. The promotion of improvement in cacao production is organized under the Inter-American Technical Cacao Committee set up by the Inter-American Economic and Social Council of the Organization of American States. Its participants are representatives of the cacao-producing countries of the hemisphere. Close relations are maintained with technical workers in other cacao areas of the world. Turrialba supplies the Secretariat of the Committee, conducts basic research, has trained 50 workers for 17 countries, supplies consultation services, and issues an information bulletin.
2. Cooperation in coffee improvements has been developing for several years between Turrialba, Brazil, Colombia, and Guatemala. As in most of our projects, close cooperation with Costa Rica has supplied a laboratory of great value to all countries. This program will be developed into a close set of working relations with all coffee-producing countries during a meeting of coffee technicians which is to be held in 1953.
3. Food crops projects have extended into many countries. Potato research has proceeded in cooperation with Costa Rica to the point where breeding lines and varieties are being distributed and relations for closer cooperation are being established. Vegetable varieties and breeding lines have been distributed to cooperators. Corn breeding has proceeded in cooperation with Mexico, Colombia and Costa Rica. This project has received the special attention of The Rockefeller Foundation, and it is hoped that the Foundation may take leadership in a hemisphere-wide program.
4. The destructive cattle grub Dermatobia hominis (tórvalo, muche, berne) has been under intensive research at Turrialba, and valuable work has been done in Brazil, Nicaragua, and Ecuador. This project should be made the subject of a cooperative campaign to eliminate the insect before it spreads into the entire hemisphere. It appears to have spread northward from subtropical South America and could

apparently infest as far north as the Gulf States of the United States of America.

5. Rice diseases and their control have been studied extensively at Turrialba and in various parts of Costa Rica. Recommendations for control of seed-borne diseases have been extensively applied. A world-wide collection of rice varieties has recently been established at Turrialba. Cooperative testing of varieties for yield and disease resistance should be inaugurated throughout the American countries.
6. Selection of a dairy cow for the hot wet tropics from native stock is one of Turrialba's most promising projects. The basic herd at Turrialba now contains over 70 animals. Breeders in Nicaragua, Honduras, and Costa Rica are cooperating. This project must be extended to all countries with tropical lowlands before the native stock is lost through unplanned admixture with ill-adapted temperate-zone breeds.
7. Human relations in the process of promoting improvements in agriculture and rural life have been under investigation in Turrialba's Community Development Project for the past six years. Cooperation has been organized with the United States, Colombia, Costa Rica, and to a lesser extent with several other countries. Ninety-six students have been trained. In addition 34 rural teachers have taken the short course given by the Department of Economics and Rural Life. The process of finding and stimulating local initiative, the role of the school, the organization of the farm and home, and such, have been sufficiently clarified to permit placing this project on a cooperative basis in all countries as soon as the necessary support is available.
8. A process of regional analysis whereby rural improvement programs can be organized on the facts of land-use capability and social organization has been developed to the point where it should be extended into applicability tests and demonstrations in all countries. This process is being used by the Technical Cooperation Program for training purposes in its centers in Cuba, Peru, and Uruguay.
9. Closely related to the above is preliminary work under way on the development, use, and conservation of our renewable resources with particular emphasis on forestry. A small section should be created at Turrialba to promote these activities in all countries and to train graduate students.
10. The Scientific Communications Service at Turrialba with 40 cooperators in 16 countries has made an effective start at solving the problem of getting the world's knowledge to our workers in agriculture and rural life programs. A necessary complement to the present work is information services to assure the cross-fertilization of projects in the American countries and facilities to hold meetings and promote personal relations between countries.

11. The engineering research and training program has made fundamental contributions to the vital problem of drying and storing grains. This fundamental work and the contributions of engineering to mechanization, farm structures, and water and soil problems should be placed on a cooperative basis with national programs. It is a commentary on the financial position of the Institute that when the engineering work had arrived at a point of greater potential contribution, it was necessary to eliminate the Engineering Department entirely because of shortage of funds.

At the close of the year 1952 the Institute's Administrative Committee and the Institute staff had initiated studies aimed at determining the extent to which the quota income would require supplementation in order to make optimum use of the facilities and experience of the institution in its service to national programs.

TECHNICAL STAFF OF THE INSTITUTE 1952

✓Ralph H. Allee	Director of the Institute
José L. Colom	Secretary (Washington, D.C.)
Lowell Curtiss	Treasurer (Washington, D.C.)
A. B. Lewis	Director of Technical Cooperation
Armando Samper	Deputy Director
H. C. Thompson	Director of Research and Education
Anna Marie Dye	Administrative Secretary to the Director

PLANT INDUSTRY DEPARTMENT

✓H. C. Thompson	Head
Aida Romero	Secretary
✓Arnold L. Erickson	Associate Horticulturist
✓Donald Fiester	Horticulturist
Hernán Granados	Laboratory Assistant
✓Lucy Hastings Gutiérrez	Plant Pathologist
✓Mario Gutiérrez	Geneticist
✓John R. Havis	Horticulturist (Esso Project)
✓Jorge León	Botanist
✓Kenneth L. Olsen	Physiologist (Shell Project)
✓Pierre G. Sylvain	Physiologist (on leave of absence with FAO)
✓Florence Thomas	Olericulturist
✓Emilio Viale	Entomologist
✓Frederick L. Wellman	Phytopathologist (Employee of the United States Department of Agri- culture assigned to the Institute)

Inter-American Cacao Center

✓George F. Bowman	Head, Horticulturist
Victor Muñoz	Administrative Assistant
✓Paulo de Tarso Alvim	Physiologist
✓Francisco García	Assistant Horticulturist
✓L. P. Oechsli	Director of Research for the American Cocoa Research Institute assigned to Turrialba
✓Rodrigo Orellana	Plant Pathologist
Luis A. Paredes	Administrator of La Lola Farm
Luis Rey Siller	Assistant Pathologist

Abacá Project (United States Department of Agriculture Project being carried out in Cooperation with the Institute)

✓Brittain B. Robinson	Agronomist
Miriam Rodríguez	Secretary
✓Charles H. Batchelder	Entomologist
✓William Q. Loegering	Pathologist
✓Germán Servando Rivera	Assistant in Agronomy
✓Rodrigo López	Assistant in Pathology
✓Alto E. Royer	Soil Specialist

ANIMAL INDUSTRY DEPARTMENT

✓Jorge de Alba	Head
✓Jaime Basadre	Assistant Administrator
José María Castillo	Assistant

AGRICULTURAL ENGINEERING DEPARTMENT

(Temporarily in abeyance. See engineering staff under the Technical Cooperation Program.)

DEPARTMENT OF ECONOMICS AND RURAL LIFE

✓Julio O. Morales	Head
Inés V. Stone	Secretary
✓Antonio Arce	Assistant Rural Sociologist
✓Narciso Arce	Assistant in Rural Sociology
✓Eduardo Arze	Assistant Rural Sociologist
✓Margaret Fiester	Nutritionist (Employee of FAO assigned to the Institute)
✓Edwin Murillo	Assistant in Rural Sociology
✓Juvenal Valerio	Assistant Educationist

SCIENTIFIC COMMUNICATIONS SERVICE

✓Armando Samper	Head
María Felicia Carro	Secretary
✓Alejandro Mac Lean	In Charge of Publications
✓Ana María Paz	Bibliographer

Library

✓Angelina Martínez	Librarian
✓Catherine Noel James	Assistant

## RENEWABLE RESOURCES SERVICE

(See forestry and conservation staff under the Technical Cooperation Program .)

### BUSINESS OFFICE AND ESTATE MANAGEMENT

Henry G. Laprade	Comptroller
Jorge Granados	Purchasing Agent
León K. Smith	Administrator of Buildings and Grounds
George M. Slater	Estate Manager

### TECHNICAL COOPERATION PROGRAM

#### Field Service Unit

✓ A. B. Lewis	Director of the Program
María Schlicker	Secretary
Maynard E. Baker	Administrative Officer
✓ Luis Carlos Cruz Riascos	Executive Secretary
✓ Rogelio Coto Monge	Visual Aids Specialist
✓ Lola Fernández	Visual Aids Assistant
Molly Fonseca	Secretary

#### Northern Zone

✓ Olen E. Leonard	Director
Gregorio Alfaro	Assistant in Agricultural Engineering
Luis Balma	Assistant in Agricultural Engineering
Ernest H. Casseres	Crops Specialist
✓ Fernando del Río	Extension Education Specialist
Leslie R. Holdridge	Ecologist and Forester
Norton C. Ives	Agricultural Engineering Specialist
Alvaro Jenkins	Assistant in Agricultural Engineering
Eduardo Jenkins	Assistant in Agricultural Engineering
Ralph Loomis	Farm Management Specialist (Employee of FAO assigned to the Program)
José A. Pérez	Assistant in Extension Education
Charles H. Proctor	Statistical Assistant
Arthur W. Peterson	Agricultural Economist
Pánfilo Rodríguez	Assistant in Agricultural Economics
✓ Sarah Rodríguez Chacón	Home Economist

Andean Zone

✓ Carlos Madrid  
✓ Enrique Blair  
  
✓ Minnie Price  
✓ Joseph A. Tosi, Jr.  
✓ Quentin M. West

Director  
Agricultural Engineering  
Specialist  
Home Economist  
Forester  
Agricultural Economist

Southern Zone

✓ Manuel Elgueta  
Ingrid Hansz  
✓ Ignacio Ansorena  
✓ Santiago Antuña  
Antonio Arena  
✓ Franklin Cagnoli  
✓ H. C. Ramsower

Director  
Secretary  
Assistant in Extension  
Extension Specialist  
Soils Specialist  
Administrative Assistant  
Extension Education Specialist

ADMINISTRATIVE COMMITTEE

The Administrative Committee of the Institute, established by the Board of Directors in December 1945 for the purpose of orienting and supervising the general plan of work of the institution as concerns its research and educational programs, met in Turrialba from 29 September to 2 October 1952. The following members of the Committee were present for the meeting:

- o Dr. Knowles A. Ryerson (Chairman of the Committee)  
Dean, College of Agriculture  
University of California  
Berkeley, California, U.S.A.

Sr. Ing. Claudio A. Volio  
Minister of Agriculture and Industry  
San José, Costa Rica

Sr. Alvaro Barcellos Fagundes  
Former Director of Agricultural Research  
Ministry of Agriculture  
Rio de Janeiro, Brazil

Dr. J. Wayne Reitz  
Provost, College of Agriculture  
University of Florida  
Gainesville, Florida, U.S.A.

Sr. Ing. Eduardo Mejía Vélez  
Dean, College of Agriculture  
Medellín, Colombia

Sr. Ing. Adolfo Alarcón M.  
Agricultural Attaché  
Embassy of Mexico  
Washington, D.C., U.S.A.

Dr. Ralph H. Allee (Member ex officio)  
Director of the Institute

Sr. José L. Colom (Secretary of the Committee)  
Secretary of the Institute

During this meeting the Administrative Committee devoted special attention to the research and education program being carried out in Turrialba and its relation to the Technical Cooperation Program of the Organization of American States.



PLANT INDUSTRY DEPARTMENT

H. C. Thompson

INTRODUCCION

During the year all research projects have been revised and reclassified under line projects as follows: Coffee, cacao, food crops, chemicals in agriculture, and general studies. The number of projects has been reduced to less than half of the former number. Reports on all of the projects are given under "Research".

ORGANIZATION AND ADMINISTRATION

Rodrigo G. Orellana joined the staff of the Cacao Center as Plant Pathologist on April 24, 1952.

Mario Gutiérrez rejoined the staff as Geneticist in charge of the corn breeding program on June 2, 1952.

León Laprade resigned as La Lola Farm Administrator on August 31, 1952. Luis Alfredo Paredes was appointed to this position as of September 18, 1952.

TRAINING

The program of instruction of graduate students has been expanded, and the number of such students has increased over previous years. Three members of the staff of the Department gave one course each and a fourth member is giving a course in statistics in the second quarter. The staff of the Department directed the work of 15 graduate students in their research for these and supervised the work of a number of special students who were at the Institute for periods ranging from a few weeks to a year.

COOPERATION AND CONSULTATION

Donald R. Fiester, Lucy Hastings Gutiérrez, John R. Havis, Kenneth L. Olsen, Emilio Viale, and Frederick L. Wellman attended the Second Latin American Assembly of Plant Breeders and Phytoparasitologists held in Sao Paulo, Piracicaba, and Campinas, Brazil from March 31 to April 8, 1952.

Lucy Hastings Gutiérrez, and Donald R. Fiester remained in Brazil until the end of April, observing the research and consulting with the research workers at the substations at Ribeirao, Pindorama, Jarí, Mocosa, Monte Alegre do Sul, and Sao Paulo. Lucy Hastings Gutiérrez was interested in the work on rice and coffee diseases and Mr. Fiester in the breeding and agronomic research work on coffee.

Emilio Viale, John R. Havis, and K. L. Olsen on their return trip from Brazil visited the major cotton-producing area of southern Peru and the Caffete Experiment Station, the Agricultural College and the Experiment Station at La Molina in Lima, and Paramonga in Pativilca Valley where the Grace Company has large sugar cane operations.

K. L. Olsen visited Ecuador and Colombia from April 16 to April 26, 1952 to consult with workers on the use of agricultural chemicals. In Guayaquil he had the opportunity to meet the Director of the Agricultural Experiment Station at Pichilingue, Ecuador, and the Director of the Empresa Para la Renovación de Cacao. In Colombia he visited the Agricultural Experiment Station at Palmira and the National Center of Coffee Research at Chinchiná.

On his way back to Turrialba Emilio Viale stopped in Panama for two days to discuss with Mr. Elton E. Hooser the Oriental Fruit Fly problem.

H. C. Thompson, Paulo de T. Alvim, George F. Bowman, and Luis R. Siller, attended the Fourth Meeting of the Inter-American Technical Cacao Committee held in Guayaquil, Ecuador from 9 to 16 June 1952. On the return trip from the cacao conference Dr. Thompson visited the College of Agriculture and the Experiment Station at Medellín, Colombia for consultation with research workers. Dr. Alvim and Mr. Siller inspected the research work on cacao at Palmira and on coffee at Chinchiná, Colombia on the return trip from Guayaquil.

During his trip to the United States from July 30 to September 16, H. C. Thompson spent two days in Washington, D.C. conferring with officials of the United States Department of Agriculture, the Director and Secretary of the Institute, and with the Secretary and General Counsel of the American Cocoa Research Institute. In New York City conferences were held with personnel of The Rockefeller Foundation, the Standard Oil Development Company, General Foods Corporation, and the American Cocoa Research Institute. September 8 to 10 was spent in attendance at meetings of the American Institute of Biological Sciences in Ithaca, New York. Several conferences were held with members of the staff of the College of Agriculture at Cornell University on research and student training problems of the Institute.

N. Florence Thomas attended the meeting of the International Horticultural Congress in London, England from September 8 to 15 and visited some of the research stations in England. She also spent a few days in Paris and Rome, visiting FAO headquarters in the latter city.

In December H. C. Thompson and K. L. Olsen spent a week inspecting the research and conferring with research workers at the United Fruit Company at La Lima, Tela, and Lancetilla, Honduras, and the Standard Fruit Company at La Ceiba, Honduras. Two days were spent at the Escuela Agrícola Panamericana in Zamorano, Honduras, inspecting the work and conferring with Dr. Wilson Popenoe, Director of the school, on agricultural education and other problems.

Members of the staff have had excellent cooperation from the Ministry of Agriculture of Costa Rica, from STICA, and from many farmers in the conduct of certain phases of the research program of the Department.

## RESEARCH

During the year research was conducted by 13 members of the staff of the Department on 30 projects, some of which were started during the year. The staff members were assisted in their programs by graduate students and other assistants. This report includes a short discussion of all active projects, including some on which no results were obtained or on which the results have not been compiled and analyzed.

### Abstract

In 1952 measurements of diameter of 400 coffee trees in an experiment on cultural practices indicated that the greatest growth had been made by those in the plots given the deep shoveling (5 inches) treatment. Yield of fruit in this first year of harvest was also greatest from this treatment. It is, however, too early to draw definite conclusions from this experiment.

A distance of planting experiment with coffee comparing eight distances with and without shade was planted in December. Two other experiments were started during the year as shown in the report on Project 232.

Spraying of coffee plants in an unshaded coffee nursery showed good results from weekly sprays of SR-406 and Fermate. Unsprayed plants were all dead by the end of five months, while those sprayed with SR-406 and Fermate showed vigorous growth and a low percentage of infected leaves, OS-377C, OS-377D, and iron citrate were much less effective than SR-406 and Fermate, but better than the check.

In experiments to control coffee root mealy bugs Dieldrin, Aldrin, Chlordane, and BHC in certain formulations prevented infestation of the roots when the materials were mixed with the soil at planting time. The chemicals, applied to the walls of the transplanting holes, protected the trees for nine months, but they showed increasing infestations thereafter. Three types of coffee have maintained a moderate to high degree of resistance to the mealy bug. Several varieties were highly infested.

Leaf analyses have shown that coffee plants affected with "Café Macho" had 803.9 ppm. of manganese, whereas healthy leaves had only 165.7 ppm. The zinc content was 15.2 and 20.9 ppm., respectively. Symptoms of "Café Macho" were induced in healthy plants by placing 20 milligrams of manganese chloride in holes bored in the trunk.

Results of experiments on shading of cacao seedlings indicate that the shade requirements decrease as the seedlings increase in age. During the first two months the highest growth rate was under 50 percent shade; from two to four months the highest rate was under 25 percent shade; from four to six months there was no significant difference between full sunlight and 25 percent shade. Disease incidence was highest in full sunlight.

Application of zinc by use of zinc-coated nails driven into the trees and crystals of zinc sulfate placed in holes drilled in cacao trees increased the yield of fruit. Trees sprayed with Dithane, a compound containing zinc, also increased the yield of cacao, although it did not control disease.

Indolebutyric acid has given the best results in rooting of cacao cuttings of several hormones that have been tested.

In screening tests for the evaluation of fungicides in the control of Phytophthora palmivora Batl. on cacao Bordeaux mixture has continued to give the best control. Phygon XI, Bioquin, Perenox, and Copper A showed considerable promise and will be given a more thorough test.

Progress has been made in studies on the mode of infection of cacao by Phytophthora palmivora, the physiology of the organism, control of diseases in the propagator, and other cacao pathogens.

In field tests of later blight-resistant varieties of potatoes three introduced varieties, Harford, Cortland, and Kennebec averaged about 373 bushels per acre. A seedling DUA-2 produced at the rate of 437 bushels per acre, nearly three times that of the main local variety Morada Blanca.

Seeds of a sweet pepper variety Milfruto, sweet corn variety Chirripó Dulce, and pumpkin variety Peraoro, all developed at the Institute, were distributed to about 60 agricultural organizations in this hemisphere for testing and increase. These varieties have shown superiority over all those tested.

In field experiments on control of the sweet-potato weevil Dieldrin gave the best control as measured in the least infection and highest yield. Other insecticides used were Aldrin, Chlordane, and Lindane, all of which gave considerable control. Bio-analyses of the edible part of the sweet potatoes were made using vestigial-winged Drosophila flies and showed fly mortality rates below that of the lowest standard used of 0.1 ppm. of the chemical.

A black-seeded dry bean, developed at the Institute from a single plant selection from a lot of Costa Rican beans has been given the name "Rico" and was widely distributed for test in the Latin American countries, Hawaii, and some areas of the United States. This variety is a heavy yielder and is more resistant to common bean diseases than any other variety tested.

Results of two tests on chemical control of the corn-root worm Diabrotica balteata Lec. showed excellent control with Aldrin, Dieldrin, and Toxaphene. In general, post-emergence applications showed a lower larvae population on the roots than the pre-emergence treatment, but yields were significantly higher from the latter.

In the corn-breeding program some of the inbreds of the variety I-451 showed resistance to lodging under conditions of heavy lodging incidence. In tests of 34 accessions from Colombia, Cuba, Guatemala, Mexico, and the United States none produced larger yields than the varieties I-451 and I-452.

Seed treatment of rice with Granosan for the control of seedling blight caused by Helminthosporium oryzae gave a highly significant increase in yield. Other studies of rice diseases included field inoculations, testing of varieties for resistance to H. oryzae and tests of variation within the fungus.

Soil fumigation with various chemicals for control of nematodes on roots of tomato and okra plants showed that infestation was reduced greatly and the yield increased. Fumigation of tobacco seedbeds was also effective against damping-off organisms, but reinfection occurred.

Satisfactory control of most broad-leaved weeds in sugar cane has been obtained with 2,4-D at rates of one to two pounds to the acre. Post-emergence applications have usually been more successful than pre-emergence.

A mixture of 2,4-D and 2,4,5-T in equal proportions at the rate of four pounds to the acre has shown promise for brush control in pastures. Repeat applications have been necessary in heavily infested pastures.

Several herbicides used for tests of weed control in coffee have been found to be injurious to the trees. Amine salts and the butoxy ethonol esters of 2,4-D produced less injury to the coffee than the isopropyl ester. Diesel oil emulsions appeared to improve the kill of weeds and to reduce the injury to the coffee trees.

A field test of various adhesive agents with SR-406 made on the Morada Blanca variety of potatoes showed good results from weekly applications. The yield was 452 bushels to the acre. Biweekly applications produced 281 bushels and the untreated 155 bushels to the acre.

During the year 250 plant introductions were added to the various collections. These included several varieties and types of coffee from Brazil, Guatemala, and Ethiopia; potatoes from Holland; a collection of cowpeas from Florida; sweet potatoes from Louisiana; corn from the United States Department of Agriculture; and various ornamentals from several countries. Thirty-nine requests from nearly all of the American countries, Europe, Africa, and the Philippines were received and filled for seed and other propagating material.

The herbarium received over 3,000 specimens of plants from elsewhere and 297 were collected in Costa Rica. All of the plants collected in Costa Rica were identified by Dr. Paul Standley, Escuela Agrícola Panamericana in Honduras. This lot included four new species.

### Coffee

Project No. 206.

Plant Improvement—Breeding, selection and propagation (Donald R. Flester).

During the year the variety collection was reorganized and the number of trees per variety reduced from 64 to 16, allowing a larger number of types to be planted in the area set aside for this collection. Sixty-seven new varieties from Honduras, Guatemala, Ethiopia, Brazil, and Costa Rica were received and planted.

In the variety collection the first crop was harvested from 19 varieties, and small samples of seed were sent to fill requests from Departments of Agriculture in Liberia, Argentina, Mexico, Panama, and Bolivia.

Forty-three selected progeny blocks were planted for field observation. Eighty-two selections were made by the Costa Rican Ministry of Agriculture and planted in the Meseta Central. Some 243 selected observation plots of 16 trees each were planted.

Measurements of plant height and stem diameter were made on 7,272 of the progeny trees in the nursery. Trees of selected lines were transplanted to recorded positions in the observation plots so that growth measurements may be continuous throughout their growth and production. Growth data of 2,676 trees already existing in the observation plots were also taken. Yield records from the first light crop of the progenies were made and recorded. The collection of unusual plants was revised, and 82 types were added.

Thirty-five selected coffee lines been propagated by cuttings in order to multiply the available material for use in comparison of seed and cutting and for experimental plantings where elimination of genetic variation is desired. Seed of 100 individual-tree selections made in Costa Rica, El Salvador, and Guatemala were received and planted in the nursery. This material is destined for a study to be conducted by Dr. H. F. Robinson of the Statistical Institute of the University of North Carolina on progeny selection.

Individual yield records of 120 coffee trees, half of which are growing in full sun and the remainder growing under legume shade trees, were continued for the fourth consecutive year. During the past four years three of the trees (approximate tree age 20 years) growing under shade and seventeen trees in full sun have died. Of the highest ten trees in yield six were located in the shade plot and four were from the sun plot. Yields varied from 16 lbs. of coffee in cherry for the highest tree to 2 ounces for the least productive tree. No pruning has been made in these plots for the past five years.

Project No. 232

Cultural Practices--Methods of planting,  
culture, pruning, fertilizing, etc.  
(Donald E. Fiester)

Stem diameters of 400 trees in the cultural practices experiment were taken on February 16, 1952.

From stem diameter measurements, the deep shoveling treatment resulted in greater growth than any other treatment with highly significant odds. There was no significant difference between the mulch and shallow shoveling (weed-covered) treatments, but they were significantly better than all treatments except deep shoveling. The reason for the increased growth in the deep-cultivation treatment (shoveled to a depth of 5 inches) is not explained and cannot be considered conclusive. The experiment was planted during December 1949 and has received three to four applications of the various treatments annually since planting. Two treatments, cultivation and cover crop, have proven impractical and may have to be eliminated. The former has caused severe damage to the coffee trees during application of the treatment, and the latter has been extremely difficult to maintain free of weeds under the existing shade. The cover crop used has been Indigofera endecaphylla.

Complete yield data, not yet analyzed for significance, show somewhat similar trends in production as shown by trunk diameter measurements made in February.

A severe soil deficiency has appeared with the heavy crop borne this year. Soil samples from all plots have been made and sent to the Ministry of Agriculture of Costa Rica for analysis.

A planting distance experiment, comparing eight planting distances under sun and shade, was started during the year. The distances used vary from 1,800 to 7,500 trees per manzana. A total of 7,400 trees are included in the study.

An experiment comparing growth of Bourbon and Typica varieties of coffee was planted for the Shell Project and will be under the direction of Dr. Olsen. A planting of 1,200 trees was made under shade for the Esso Project. This study of the influence of the type of ground cover on the growth and yield of coffee will be under the direction of Dr. Havis.

A preliminary trial on the storage of herbaceous stems of coffee during shipment was made during the year. Material consisting of several nodes, with leaves, were cut in the commercial coffee planting and packed in Pliofilm bags, polyethylene sheet, and waxed paper. No packing method was satisfactory for over 12 days of storage. The Pliofilm bags gave better results than the polyethylene sheet when stored at ordinary room temperatures. Cuttings made from the material alive after 12 days was planted in the propagation bins and rooted satisfactorily.

A coffee nursery consisting of 25,000 seedlings was planted for a series of nursery experiments by the staff. The nursery trials on planting distances and fertilizer application have not been evaluated for growth differences.

Project No. 208

Physiological and Ecological Studies (Paulo de T. Alvim)

1. Mineral nutrition. In an experiment to study mineral nutrition of coffee seedlings 18 treatments, including six minor elements, lime, sulphur, and magnesium, were used. Disease incidence (Cercospora on the leaves and probably Rhizoctonia on the roots) was very severe in all treatments except sulphur at 1,500 Kg. per hectare. By the end of the year this treatment was the only one in which most of the plants were still alive and showing good growth. No spray was used to control disease. The pH of the soil was lowered to 3.6. It appeared that the action of sulphur was to control soil-borne diseases rather than to correct deficiency. Application of 500 Kg. of sulphur per hectare had little effect on controlling disease.

2. "Café Macho". Leaf analyses have shown that coffee plants affected with the malady known as "Café Macho" had an average of 803.9 ppm. of Mn, whereas healthy plants growing in the same region (Grecia) had only 165.7 ppm. This zinc content was, respectively, 15.2 and 20.9 ppm. (Maria E. Peralta).

Symptoms of "Café Macho" were induced in healthy coffee plants growing in Turrialba by placing 20 mg. of  $MnCl_2$  in holes bored in the trunk. Bean seedlings growing in "Café Macho" soils exhibited typical symptoms of manganese toxicity, which could be corrected by application of  $CaCO_3$  to the soil (raising the pH from 4.7 to 7.5). These results indicate that "Café Macho" may result from Mn toxicity.

3. Stomatal movement. When light intensity was higher than 8,000 foot candles, stomatal opening of coffee leaves exposed to direct sunlight decreased to about half of the maximum opening. Light intensity reaches as high as 18,000 or 20,000 in Turrialba. Shaded leaves maintained their stomata wide open throughout the day. As mentioned in previous reports, cacao leaves did not decrease their stomatal opening when exposed to direct sunlight.

These studies on stomatal openings have been made by means of an improved infiltration technique which was developed in cooperation with Dr. Havis. It consists of using solutions of various surface tensions or degree of penetrability obtained by mixing the mineral oil Nujol with one of the following liquids: n-Dodecane, n-Tetradecane, or Bayol-D. These mixtures have great advantage over the liquids previously recommended for "infiltration" tests in that they give more accurate results and are not toxic to the leaves. They are especially useful for experiments in which it is important to preserve the leaves of the plants.



Project No. 228

Diseases and Their Control (Lucy Hastings  
Gutiérrez, Geraldo Chaves, and Octavio Fernández)

Seedling and nursery diseases have been found a limiting factor in production of healthy coffee trees. Plantings have suffered from direct early losses and especially from retarded, irregular, and sickly growth of the remaining plants. The problem has been one of soil-borne infection due largely to Rhizoctonia, though Cercospora, Fusarium, and occasionally Sclerotium have also been involved. Under dry conditions after transplanting to unshaded areas, these plants have been seriously infected by Cercospora and later by Colletotrichum. Early tests at control in greenhouse flats with artificially inoculated soil showed highly significant reduction in loss in the case of the first two fungi with formaldehyde and Arasan soil treatments prior to planting. Chemotherapy has been under study as an approach to control in 6 tests of dipping roots at transplanting, soil drenches, and laboratory testing for lethal concentrations of various chemicals with considerable promise for some of these. Nutritional relationships to the disease have been under study. (Lucy Hastings Gutiérrez)

An experiment has been conducted in an unshaded coffee nursery in which weekly sprays of SR-406, Fermate, OS-377C, OS-377D, and iron dinitrate were applied for a period of 7 months. Unsprayed plants were all dead by the end of 5 months, from attacks of Colletotrichum and Cercospora. Plants sprayed with SR-406 and Fermate showed vigorous growth and a low percentage of infected leaves. The other treatments were markedly poorer than those fungicides, but better than the unsprayed check. (Geraldo Chaves and Octavio Fernández)

Studies of the severe Colletotrichum die-back and leaf infections of coffee of this region have been continued. In nursery spray trials with weekly and biweekly applications of 6 fungicides, Fermate has again shown consistent and highly significant control of the disease which killed more than 60% of the branches produced in the check plots during the 12 months of this spray test. In commercial spraying of young trees, die-back counts have also shown highly significant improvement for Fermate as compared to unsprayed trees. Analyses of data accumulated during the past year on heavy incidence of die-back and rainfall have shown a positive correlation. Investigations of nutritional relationships to this disease have so far been inconclusive. (Lucy Hastings Gutiérrez)

Project No. 207

Insects, Other Pests, and Their Control -  
Coffee-Root Mealy Bugs (Emilio Viale)

1. Effects of the pest upon infested plants. Dr. P. G. Sylvain, during the first quarter of this year, made analyses of total ash on six of the samples of leaves from infested and uninfested coffee plants. Total ash content was steadily higher on the uninfested samples, averaging 7.46% vs. 6.54%.

Stem diameter measurements from the 460 young coffee trees subject to a preventive chemical control test showed very little growth for all the treated or untreated trees when taken after the dry season (measurements taken in April), but 6 months later the average growth rate for the plants treated with some of the most effective chemicals against the coccid-ant complex was higher than that of the untreated coffee plants. There may be a possibility of a growth factor influence from the chemicals used, not directly related to insect control.

2. Resistance trial. Two six-months' counts during 1952 indicate that three coffee types have maintained the moderate to high degree of resistance shown in previous observations to the coffee-root mealy bugs Geococcus coffeae (Laing) and Neorhizoecus coffeae Green in the Alajuela area. On the other hand, Guadalupe, Blue Mountain, Purpurascens, Arabiga, Abeokuta, Erecta, Sumatra, San Ramón, and Padang types were among those with higher infestation.

During the last quarter of the year, with the cooperation of Donald R. Fiester, cuttings were collected from seven of the most promising coffee types for studies of resistance to the mealy bug. These cuttings were brought to Turrialba for multiplication, preliminary grafting tests, and further screening under severe artificial infestation.

3. Preventive chemical control. Up to the last observation conducted in September Dieldrin and Chlordane, either as emulsion or suspension, Aldrin emulsion, and BHC suspension, when mixed with the soil at transplanting time (June 1951) prevented the coffee trees from root mealy-bug infestation. Dieldrin and Chlordane dust treatments showed some trees being infested. The same chemicals applied only to the walls of the transplanting holes protected the coffee trees for a period of nine months, showing slightly increasing infestation thereafter. All the 48 trees under different treatments with the insecticide Otoba, of plant origin, are infested and all untreated trees continued to be infested.

An attempt was made to get the chemicals into the soil by pouring a water suspension or water emulsion of the insecticides into a basin around the young trees included in the experiment mentioned above. Three grams of the insecticide in three quarts of water were poured into a basin, 1½ feet in radius, around the base of the tree and also in a similar basin on treeless soil nearby. Exploratory bio-assays were made to determine how deep the chemicals penetrated in given periods of time. Samples of soil were taken at depths of 1, 2, 4, 8, and 12 inches and at intervals of 24 hours, 7, 14, and 28 days. The basins were left open for a week after the insecticide application to allow rain to accumulate and help in the penetration of the chemicals. Rain-fall was very heavy during the first 10 days following application. Soil samples were brought to Turrialba, mixed with banana and exposed to vestigial-winged *Drosophila* flies to be bio-analyzed. The preliminary results thus obtained on the soil tested showed that: (1) Aldrin emulsion progressed one inch deep during the first 24 hours, eight

inches in 7 days, and twelve inches at the 14th day (No deeper samples were taken), The Aldrin emulsion reached as far as four inches deep in 28 days in treeless soil. (2) The Dieldrin and Chlordane emulsions used seemed to have progressed at a slower pace taking from one to two weeks longer time than Aldrin to reach the same depth. (3) Wettable power formulations of these insecticides hardly reached the second inch into treeless soil four weeks after application.

### Food Crops

#### Project N° 209

#### Potato Improvement (E. H. Casseres)

Potatoes were grown at four locations in the highlands during 1952 for study or increase. Progress was made in determining the adaptation, disease resistance, and yielding ability of a large new group of seedlings and varieties, involving 300 tuber samples from Cornell University, including some originally from the United States Department of Agriculture and 26 samples from Pennsylvania State College. Records were kept during the growing season. At harvest 78 samples were worthy of saving for further increase and evaluation. Of this group, 39 seedlings showed considerable advantage over other materials by their high degree of resistance to Phytophthora infestans and good yield.

In a yield experiment near Cartago, the late blight-resistant varieties Harford, Cortland, and Kennebec gave similar high yields at the average rate of 373 bushels per acre. Cornell seedling DUA-2 produced at the rate of 437 bushels per acre, a yield of nearly 3 times that of the main local variety Morada Blanca. Since no fungicides were used, the later susceptible variety was killed by the fungus by mid-season, while the other resistant varieties matured normally. DUA-2 and Kennebec also out-yielded the local variety by almost 4 to 1 in a yield test conducted by agronomists of the Costa Rican Ministry of Agriculture.

Plans were made for naming and introducing cooperatively seedling DUA-2 and two others of merit, also from Cornell, which have been under study and increase since 1948.

Of eleven Dutch varieties tested, Alpha, Voran, Gloria, and Ackersegen gave the highest yields. All varieties showed a high incidence of P. infestans early in the season. Fungicides were not applied.

Pentachlorophenol (6 lbs. in 100 gals. of water per acre), used as a vine killer on mature potato plants, gave excellent results. Ethylene chlorhydrin gas, used in a cooperative test by the Costa Rican Ministry of Agriculture, broke the dormancy of Kennebec seed potatoes after the standard 5-day period of treatment.

#### Project N° 210

#### Vegetable Breeding and Variety Testing (N.F. Thomas, E. H. Casseres, and H.C. Thompson)

Vegetable breeding and variety testing continued in 1952 with the further testing, selection, increase, and seed distribution of varieties developed by the Institute and with the testing of varieties developed by other organizations.

Seeds of the Institute's sweet pepper variety Milfruto, sweet corn variety Chirripó Dulce, and pumpkin variety Peraero were distributed to about 60 agricultural organizations in this hemisphere for testing and further increase. Milfruto pepper has shown a lower incidence of diseases and higher yields than any of the 15 imported sweet pepper varieties with which it has been compared in Turrialba. Chirripó Dulce is of better eating quality than other varieties of corn which gave comparable yields at the Institute. Peraero pumpkin is especially recommended for its high nutritive value. Analysis by the Nutrition Institute of Central America and Panama showed it to be more than twice as high in content of carotenoids as the test sample of creole pumpkins. Milfruto sweet pepper was described in more detail in a technical note in Turrialba Vol. 2, Number 3. Descriptions of Chirripó Dulce sweet corn and Peraero pumpkin have been prepared for inclusion as news notes in a forthcoming issue of Turrialba.

Trials of vegetable varieties included some previously untested and inadequately tested varieties of tomato, sweet potato, broccoli, cauliflower, celery, cabbage, eggplant, garden pea, lima bean, and sweet pepper. The introductions which appear to be superior to varieties previously tested include Puerto Rico No. 3 sweet potato and Piracicaba (Brazil) Green Sprouting broccoli.

Project No. 211

Vegetable Insects, Other Pests, and Their Control - Tropical Sweet-Potato Weevil  
(Emilio Viale and N. F. Thomas)

During the early part of the year the second comparative field test on control of the sweet-potato weevil was completed. The insecticides were applied to the soil before planting. In addition to determining the effectiveness of the various insecticides on control of the weevil, bio-analyses were made for possible contamination of the sweet potato root by the chemicals applied. The data obtained indicate the following:

1. Dieldrin gave the best results as expressed in the least infestation, and the highest marketable yield. The increase in yield for the treatments over the untreated was 561, 579, and 572 percent for the suspension, emulsion and dust, respectively. No significant difference was found for Dieldrin in different treatments which included three formulations and three concentrations.

2. Aldrin was second best, even though its performance seemed to be poorer than during the previous year. The higher vapor pressure of Aldrin over Dieldrin exposed to a drier growing period for this experiment may account for the differences. Emulsion showed a better control than wettable powder (449.5 vs. 254.9 percent over the check yields).

3. Chlordane wettable powder gave a low degree of control as in previous experiments (206.3 percent over check). The emulsion form, however, showed a much higher control. The 55 grams per 100 sq. meters of soil surface showed slightly better control than the other two concentrations of 25 and 40 grams per 100 sq. meters.

4. Lindane was used only as water suspension. Results for the 40 and 44 grams per 100 sq. meters of soil surface were similar to last year's test but much lower for the 25-gram treatment. The average yield for Lindane was 310.5 percent over the check.

5. The results obtained on the control of this sweet-potato weevil were supplemented by vestigial-winged Drosophila fly bio-analyses. All the samples so analyzed, including the various Dieldrin, Aldrin and Lindane treatments, showed fly mortality rates below that of the lower standard level of 0.1 ppm. of the chemical involved.

Project No. 214

Bean Breeding (N. F. Thomas)

The bean breeding during 1952 consisted of variety testing, maintenance of superior varieties, increase and distribution of seeds of a new variety, selection of superior plants from within several heterogeneous variety populations, and cross-breeding of local and imported varieties. As additional varieties became available, they were tested in comparison with those which had been superior in previous tests and the superior ones are being maintained for possible use and improvement through breeding. The black-seeded dry bean, IAIAS No. 2015, showed a lower incidence of Pellicularia blight and gave a yield exceeding that of other dry-bean varieties. It was increased and distributed under the name "Rico" to 56 agricultural organizations in this hemisphere for testing and further increase. High-yielding plants were selected from among heterogeneous populations of high-yielding, red-bean varieties and the single plant progenies ( $S_1$ ) are ready for comparison, and possible line selection and increase for distribution of a superior type of red bean. Rico was crossed with Tendergreen, Low's Champion, and Red Valentine snap-bean varieties; the first generation hybrids were grown, and seeds are on hand for the first segregating populations in which selection is to be made primarily for tender, stringless pods.

Cowpea "Chinegra" was increased and distributed for use as a black-bean substitute for locations where high disease incidence makes the growing of dry beans unprofitable.

Project No. 233

Corn Breeding and Strain Testing (Mario Gutiérrez G., leader, and Víctor Matarrita)

A total of 123 lines inbred six generations were topcrossed and tested for general combining ability. Data from these tests were completed recently and have not been analyzed yet; they will be included in a future report. Forty-six of the lines tested have white endosperm and were obtained from the variety I-451; the remaining 77 are yellow-endosperm inbreds derived from the variety I-452. One hundred and three new inbreds were started from plants of the variety I-451 that showed lodging resistance under conditions of heavy lodging incidence. Topcrossed seed was obtained from most of these  $S_1$ 's to test their combining ability and agronomic performance. The superior lines will be used in a recurrent selection scheme. Serious difficulties were experienced in maintaining some of the long-time inbreds; seed production

was low or nil in many cases and a high rate of protandry, that made pollinations impossible, was observed during the second crop (August-January) of the year. It seems logical to think that this situation could be greatly improved by decreased rates of inbreeding such as are obtained in breeding by recurrent selection. This possibility will be explored.

Ten non-inbred progenies from the variety I-452, obtained by ear-to-row selection or bi-parental control pollinations, were chosen as yielding significantly better than the original variety. They were recombined in all possible combinations, and the recombination product will be tested for yield and general performance in the next crop.

In the February-June crop 34 accessions from Colombia, Cuba, Guatemala, Mexico, and the United States were compared for yield and agronomic performance with the standard varieties I-451 and I-452. None of the introductions yielded more than the controls, but ten of them did not yield significantly less. A second test including most of these accessions grown during the second crop had to be discarded as a result of irregular stands caused by poor seed germination. Seed from most of the introductions was secured and new accessions for testing were obtained from workers in different countries in this hemisphere.

Project No. 212

Corn Insects, Other Pests and Their Control  
(Emilio Viale and J. R. Havis)

Data were obtained in the early part of the year from two comparative tests designed for the chemical control of the corn-root worm Diabrotica balteata Lec. Some of the findings were:

1. Plots treated with Aldrin, Dieldrin, Toxaphene, and DDT either as water suspensions or water emulsions did not show a single lodged plant. Methoxychlor, Chlordane, and BHC showed a few (1-5%) lodged plants. Check plots had from 31 to 71 percent of lodged plants.

2. In general, post-emergence applications showed a lower Diabrotica larvae population in the roots at each of the 3 monthly counts made than the pre-emergence treatment, but corn yields were significantly higher in the pre-emergence treated plots. The range of increased yields recorded over the check plots was from 0 percent for the Chlordane-water suspension at 300 mgr. per hill in the post-emergence treatment to 210 percent for the Toxaphene-water emulsion at 500 mgr. per hill in the pre-emergence treatment. The higher yields were from plots treated with Toxaphene, Dieldrin, and Aldrin. The lower ones, from Chlordane, BHC, and DDT-treated plots, at the rates included in these tests. No significant differences were found at the 1% level among the four concentrations (250, 150, 70 and 30 mgrs. per hill) and two formulations, suspension and emulsion, of Aldrin tested, nor with the 250 mgrs. per hill of Aldrin dust. (Viale)

A new comparative test was initiated last June in cooperation with the Esso Project to explore the possibilities of pre-emergence combined applications of herbicides and insecticides. The three replicated 36 treatments included four different concentrations of Toxaphene, two of Aldrin, and two of Dieldrin alone and in combination with the herbicides dinitro, 2,4-D, and chloro IPC. Bio-analyses were made to determine the possible incorporation of any of the above insecticides into the green tissue of the corn plant or into the kernels. In general the data indicated that: (1) Broad-leaved weed control resulted from the applications of dinitro and 2,4-D. The chloro IPC failed to control broad-leaved weeds or grasses. (2) There was a certain independence of action of both types of chemicals. Diabrotica control by the insecticide was comparable whether applied alone or in combination with the herbicides mentioned. (3) One-month-old corn plant tissue from the treated plots showed evidence of small amounts of insecticide present, while none was detected on plants two and a half months old, and no evidence of the insecticides listed was detected in the kernels at the milk stage. (Viale and Havis)

This test was financed in part by the Standard Oil Development Company.

Project No. 213                      Rice Diseases      (Lucy Hastings Gutiérrez)

A large part of the rice disease investigations has been on the study of the destructive disease caused by Helminthosporium oryzae and control measures. Rice seed treatment for control of H. oryzae seedling blight increased yield as well as stand again in 1952. A 41.4% increase in yield was found for Granosan-treated seed at 1.14 oz. per 100 lbs. Results of a greenhouse experiment of nutritional relationships to the disease have so far been inconclusive.

In field inoculations for the 3 phases of the disease, losses from seedling infections were greater than from leaf or head infections though the head inoculations also resulted in a highly significant reduction in yield. A variety which had shown marked resistance in a series of greenhouse seedling inoculations was severely infected in these field inoculations, indicating the need of further work in testing the validity of the seedling reaction as a fair evaluation of resistance-susceptibility.

Of 49 rice varieties studied for seedling reaction to H. oryzae, Berlin, Dourado Peludo x Fortuna, Dourado Agulha, and Kriviman Kotti showed considerable resistance to heavy artificial inoculations.

Isolates of H. oryzae have been compared in a number of tests for variation within this fungus. These isolates, approximately 175, have been recovered from various Central and South American Republics and represent infections from all parts of the rice plant. Laboratory and greenhouse tests have shown a wide range in variation in physiology and pathogenicity as well as in general appearance on culture media. Strain differences in pathogenicity have shown consistent and highly

significant variation, following a pattern well known in many other organisms, and should not be overlooked in breeding work in rice.

Project No. 215

Sugar Cane (Jorge León, K. L. Olsen,  
Arnold Erickson, and Guillermo Esteves)

Three types of studies were made during the year as follows:

1. Yield test of three Puerto Rican varieties. These three were compared with the standard variety P.O.J. 2878. The yields per hectare were as follows: 208 tons for P.O.J. 2878, 185 for P.R. 902, 179 for P.R. 905, and 174 for P.R. 907. These differences are not statistically significant. (Erickson)

2. Growth studies of ratoon cane. Growth data collected from the selected plants was compiled. The growth curve for this year had two peaks: one reaching its maximum April 18, the second May 30. This was followed by relatively even growth to August 8, when the cane entered into a period of rapid elongation which culminated in flowering. Growth curves for treated cane showed similar patterns but with a reduction in growth 4 to 8 weeks following treatments. This was noticeable especially in the plots treated with TCA (30 lbs.) plus 2,4-D (2 lbs.), and with plants sprayed with a combination of 0.05% 2,4-D plus 0.1% MH. The mortality among plants selected for measurement was highest in the TCA plus 2,4-D plots (28.1%) and least in the check plots (6.2%). (Esteves)

3. Flowering of sugar cane variety plots. The Institute sugar cane variety plots include clones developed at stations ranging from 27° N. latitude to 27° S. latitude. Turrialba is located at approximately 10° N. latitude. Canal Point, Hawaii, and Puerto Rico varieties began to flower during the period September 1 to 20. These varieties attained nearly 100% flowering by October 27. Barbados, Manuelita-Colombia, and Java varieties began to flower between September 20 and October 13, but have not reached 100% flowering as yet. Tucumán and Coimbatore varieties began flowering between October 13 and 27. The Tucumán clones had flowered completely by the first week in December, while the Coimbatore clones had reached 50%. (Esteves)

This project was financed in part by a grant from the Shell Oil Company.

Fiber Crops

Projects Nos. 223-227.

Abaca (B. B. Robinson, Wm. Loegering, C. H. Batchelder, and Alto Royer of the United States Department of Agriculture)

Research on abacá, Musa textilis, is being carried on by the United States Department of Agriculture in cooperation with the Institute. The work includes projects on agronomy, plant breeding,



diseases, insects, fertilizers, drainage, and soil physics. The research is conducted in the field and laboratories at the Institute and in the field at abacá plantations in Panama, Costa Rica, Honduras, and Guatemala. In the field of agronomy, studies are in progress on harvesting methods, weed control, plant populations, plant growth characteristics, and land preparation. The principal disease being investigated is tip-over which results from a deteriorated root system which is due to a variety of causes such as activity of gophers and insects, infection by nematodes and fungi, and environmental conditions. Considerable progress has been made toward an understanding of these, and a beginning is being made on development of control practices to prevent some of the losses. The study on fertilizers is well under way, although results are not available as yet. The studies on drainage and soil physics have shown that both are important factors in abacá. Surveys have been made of areas possibly suitable for the production of abacá in Central and South American countries in the interest of further development in this industry.

### Chemicals in Agriculture

#### Project No. 229

Herbicide Studies : (J. R. Havis, leader, and Oscar A. Bullón)

Work has been done during 1952 on the following phases: (1) weed control in coffee, (2) weed control in sugar cane, (3) brush control in pastures, and (4) basic studies on the activity of 2,4-D.

1. Coffee - Of the several herbicides tested for weed control, the isopropyl ester of 2,4-D, TCA (Sodium trichloroacetate), and CMU (3 (P-chlorophenyl)-1,1-dimethylurea) have been found to be injurious to coffee. A paper entitled "Injury to Coffee from Herbicides" has been prepared for publication in Turrialba. Experiments have indicated that the amine salts and the butoxy ethanol esters of 2,4-D produced less injury to coffee than the isopropyl ester. Applications in diesel oil emulsions appeared to improve the weed kill and reduce the injury to coffee from the two former formulations.

None of the chemicals tested has given satisfactory control of grasses from single applications. Experiments are being conducted to determine the value of repeated applications of herbicides for grass control.

2. Sugar cane - Satisfactory control of most broad-leaved weeds has been obtained with 2,4-D at rates of 1 to 2 pounds per acre, depending on the size of the weeds. Under conditions at Turrialba, post-emergence applications have usually been more successful than pre-emergence. Field-scale applications of 2,4-D on plots up to 2 hectares in size have been made with 3-gallon knapsack sprayers. The results have shown this method of weed control to be economically practical, and results have been satisfactory except where the major weed species were resistant to the 2,4-D.

Observations on the growth of young cane after the application of 2,4-D sprays indicated the following: (1) The isopropyl ester at 1 pound per acre could be applied safely over the tops of the plants one or two months after planting. (2) Both the ester and the amine salt at 2 and 4 pounds per acre were injurious when applied one month after planting, but safe to apply over the plants two months after planting. (3) Less injury resulted from the ester sprays directed at the base of the plants than when applied over the tops. A paper on these studies is being prepared for publication.

Grasses in sugar cane, particularly Paspalum fasciculatum, Panicum purpurascens, and Cynodon dactylon remained a serious problem. TCA has been the most promising of the several herbicides tested, although single applications of TCA at rates up to 50 pounds per acre have not given satisfactory control. Experiments are being conducted to determine the value of repeated applications of herbicides for grass control.

3. Pastures - A 50:50 mixture of 2,4-D and 2,4,5-T at 4 pounds per acre has shown promise for brush control in pastures. General observations have indicated that success with these materials may be markedly influenced by the condition of growth of the brush plants or by soil-weather factors. Repeated applications have been necessary in heavily-infested pastures due to (1) failure to obtain complete coverage of all plants with hand equipment and (2) growth of annual weeds when competition of the brush was removed and before the grass population had become established.

4. Basic studies on 2,4-D - The single droplet technique is being adapted for testing the influence of carriers on the translocation and herbicidal activity of 2,4-D. The kidney bean is being used as a test plant for these studies.

These studies have been financed largely by a grant from the Standard Oil Development Company, Linden, New Jersey.

Project No. 216

Fungicide Studies (J. R. Havis, Lucy Hastings Gutiérrez, G. M. Chaves)

A field screening test of stickers has been made during 1952. Additional tests of stickers were started, and a laboratory test was being developed.

A field test of various adhesive agents with SR-406 was conducted on the Morada Blanca variety of potatoes. Plots which were given a weekly spray with SR-406 produced an average of 452 bushels per acre. Plots sprayed biweekly produced 281 bushels. The average yield of unsprayed plots was 155 bushels. Of the plots sprayed biweekly with stickers mixed with SR-406, none gave as high a yield as the weekly sprays of the fungicide alone, although a few showed better results than the biweekly applications. Further field tests of stickers are being conducted on coffee and cacao seedlings.

A laboratory bio-assay method is being developed to provide a rapid evaluation of fungicides and stickers.

These tests were financed largely by a grant from the Standard Oil Development Company, Linden, New Jersey.

Project No. 231

Insecticide Studies (K. L. Olsen, Emilio Viale, J. R. Havis, W. W. Neel, and Rafael González)

During the year the work on this project included studies on: (1) the use of D-D in the fumigation of soil for the control of coffee mealy bugs; (2) insecticide control of the tórsalo grub in cattle, and (3) methods for testing stickers for use with insecticides.

1. D-D on control of mealy bug - A preliminary study was made with D-D (Dichloropropane-dichloropropene) in the fumigation of the soil adjacent to coffee trees to obtain information on the toxicity of D-D to the coffee root mealy bugs Neorhizoecus coffeae Green and Geococcus coffeae (Laing). Applications were made at the rate of 21 gallons per acre at depths of 6, 12, and 18 inches, spacing the injections 1 foot apart and at varying distances from the tree of  $\frac{1}{2}$ , 1, and  $1\frac{1}{2}$  feet, covering a total area of 25-30 sq. feet around the tree. Results obtained in the control of the mealy bugs and their attendant ants look promising. Phytotoxicity symptoms appeared in two trees only—a slight wilting and yellowing and appearance of brown spots on some leaves. Further work is planned using chlorinated insecticides alone and in combination with D-D. This study was financed in part by a grant from the Shell Oil Company. (Rafael González).

2. Insecticide control of tórsalo grub - The chemical control experiments include: (1) a Toxaphene emulsion stability test at the Cortés Finca, Atirro, (2) spraying tests at the Institute consisting of different concentrations and time interval studies, (3) a comparative insecticide test at Finca Azul consisting of the spray application of Toxaphene, Aldrin, and a DDT-BHC mixture, and (4) a test at the Finca La Roncha consisting of the spraying of recommended insecticides on dairy cattle.

A trapping survey under way in the Institute vicinity since July to capture egg-carriers of the tórsalo fly has revealed that one muscid species, Sarcopromusca arcuata (Town.) is the chief egg-carrier of the collected dipterous specimens. The collection of only one other muscid egg-carrying species, in much smaller numbers than the first named species, has been made.

Fundamental studies of larval development with guinea pigs have been initiated.

This study has been financed largely by a grant from the Standard Oil Development Company, Linden, New Jersey.

3. Study of methods for testing stickers - Assays have been conducted to find practical and quick means to evaluate stickers to be used on insecticidal applications in the tropics. Two sets of tests were carried out--one using a highly toxic highly residual chlorinated hydrocarbon, Dieldrin, and another with a less toxic and residual chlorinated camphene, Toxaphene. The chemically pure insecticides were put in xylene solution and used Triton X-100 as emulsifier. Concentrations were 0.1% for Dieldrin and 0.5% for the Toxaphene. Six different stickers were tested to determine the efficacy of the method. The method consisted in exposing vestigial-winged *Drosophila* flies to treated banana leaves. Each insecticide included four replications with one banana tree per replication. On each plant all treatments were represented, one leaf per treatment. Half of the leaf received application on the upper side, the other half on the under side. De Vilbiss hand atomizers were used for the applications. At intervals of 2 hours, and 3, 8, 13, 18 and 23 days, following application time, carefully measured sections of the differently treated and untreated banana leaves were placed in Dixie cups and exposed to 20 *Drosophila* flies for a period of 24 hours. Curves of mortality were drawn and properly compared.

Results seem to indicate that the method used is a reliable one to compare the value of stickers to be used with insecticides. The mortality of the flies was uniformly lower for Toxaphene than for Dieldrin as the post application time increased, but for both tests the results were comparable. (Emilio Viale)

Project No. 217

Growth Regulating Materials (K. L. Olsen and Guillermo Esteves with cooperation of Victor Pérez)

1. Pineapple flowering - In a preliminary experiment it was found that naphthalene acetic acid, 2,4-dichlorophenoxyacetic acid, and 2,4,5-trichlorophenoxyacetic acid showed marked stimulation of flower initiation. Triodobenzoic acid, which has stimulated the induction of flowers on tomatoes, did not increase flowering of pineapple plants.

In another experiment various rates of maleic hydrazide (MH) were applied alone and in combination with naphthalene acetic acid (NAA). At the lower amounts of MH per plant (25 mg., 50 mg., and 125 mg.) stimulation of flowering was obtained. At the rate of 250 mg. MH per plant flowering and growth of new leaves were inhibited. Fifteen weeks after the applications were made, all plants treated with NAA and NAA in combination with the two lower concentrations of MH had flowered. The fruit on the plants treated with 125 mg. MH alone or in combination with NAA were deformed. The results of this experiment do not support the idea that MH is an anti-auxin. (Olsen)

2. Chemical defoliation of coffee - Several cotton-type defoliantes have been used, such as pentachlorophenol, sodium chlorate, and calcium cyanamide. Various experiments were conducted utilizing different concentrations of each material. In general the results were somewhat

erratic, and it does not appear that any of these materials would give practical defoliation without injury to the tips of the growing stems. Growth regulating chemicals of the hormone-type have been assembled and further work is planned with these materials. (Olsen)

3. Treatment of sugar cane seed pieces with growth-regulating substances - Seed pieces were placed in the furrow and sprayed with three hormone-type materials. Counts of the number of primary and secondary shoots showed no significant differences between treated and check plots. Seed pieces consisting of a single node plus corresponding internode from top, middle, and bottom sections of cane stalks were treated with 10 hormone-type materials. Each material was applied in three forms: lanolin, talc, and quick-dip solution. The growth of each shoot was recorded periodically, and at 2 months the plants were harvested. Green and dry weights were taken and percent of dry weight calculated. These data are being analyzed. (Esteves and Olsen)

4. Pre-harvest fruit drop in coffee - At the time of chemical application, the fruit on any one branch was in all stages of ripeness. Therefore, three applications at five-day intervals were made using several different materials. These were applied to the leaves and fruit as a spray. In general, there was very little fruit drop this season. Only maleic hydrazide (600 ppm) burned the fruit and increased fruit drop. The fruit treated with 2,4-D (40 ppm) developed a deeper red coloration and was eaten by animals. (Olsen)

These studies were financed largely by a grant from the Shell Oil Company.

Project No. 221

Soil Fumigation (K. L. Olsen, leader,  
A. L. Erickson, Lucy Hastings Gutiérrez,  
W. Q. Loegering, N. F. Thomas, and G. Esteves)

1. Fumigant and insecticidal applications against root-knot nematodes - Soil treatments were made with the two soil fumigants, Dowfume W-40 (ethylene dibromide) and D-D (Dichloropropane-dichloropropene), and the two insecticides, Aldrin and Parathion. Tomato and okra were seeded directly to the treated plots. It was found that the infestation of the root-knot nematode on these two test plants was reduced greatly in all plots treated with the soil fumigants. Increased yields of both okra and tomato were obtained only from the plots treated with the soil fumigants. A technical report on this work is being prepared for Turrialba. (Olsen and Thomas)

2. Soil fumigation of coffee seedbed and nursery - Soil treatments, including arasan, formaldehyde, and four soil fumigants, were made in coffee seedbeds. Initial counts indicated retarded germination in the soil fumigation plots, but at the time of transplanting there was no significant difference. Seedlings were transplanted into the nursery where the same treatments had been made. Disease is a major problem, however, and no significant control has been obtained by any of the treatments. (Olsen and Hastings)

3. Seedbed fumigation against damping-off of tobacco - Several fumigants, arasan, and formaldehyde have been employed on this problem. The indication is that the soil fumigants were effective against the causative organism, but the reinfection occurred. Further work is planned to clarify this point. (Olsen)

4. D-D fumigation for abacá - Seed pieces planted in treated soil developed more plants per mat, had more roots per plant and a greater rate of growth in height than those in the check plots. These results were the same eight months after treatment, although no significant difference was evident at this time between numbers of nematodes in roots from treated and non-treated soil. (Olsen and Loegering)

5. Fumigation against Panama disease - Eight months after planting the seed pieces, the banana plants were cut and examined for traces of Panama disease. At this time the location of the infected plants could not be correlated with the original points of infection. Although the plots injected with the higher rate of brominated D-D had fewer infected plants, no significant control was obtained. (Olsen)

6. Soil fumigation for sugar cane - Treatments were made employing three fumigants. At four months the smallest increase in number of plants over the control was 17% with the treatments being about equal. At six months the treatments still exhibited superiority over the check. The general growth of the cane did not seem to be altered by the treatments. (Esteves and Olsen)

7. Soil fumigation in cacao seedbeds - Various experiments have been started with cacao, but in all cases vary poor and erratic germination was obtained. This has made it impossible to evaluate the effect of the soil treatments. Future work is planned on this project. (Olsen and Erickson)

8. General - Other treatments have been made in a Hevea nursery and in the field as pre-transplanting treatments for coffee. No results have been obtained on these treatments as yet. (Olsen, Esteves, and Fernández)

#### General Studies

Project No. 234

Herbarium and Botanical Studies. (Jorge León leader, and José Córdoba)

Although the leader of this project has been on leave for study at the Missouri Botanical Garden, the work on the project has been continued. During the year, 297 specimens were sent to Dr. Paul Standley, Escuela Agrícola Panamericana in Honduras, for identification. Four new species were included in the collection as follows:

<u>Ardisia chariantha</u>	Standley and L. Williams
<u>Anguria Cordobae</u>	" " "
<u>Amalona longipes</u>	" " "
<u>Mouriria so.oria</u>	" " "

The herbarium received 620 specimens from Dr. Hugh H. Iltis of the Missouri Botanical Garden and 2,548 from Jorge León of the same institution.

Specimens from the Institute were sent to Dr. H. Stehle, Director des Recherches Agronomique, Base-Terre, Guadaloupe, and to Dr. J. Swallen, Smithsonian Institution, Washington, D.C.

The collection of economic plants has been maintained, and some additions were made during the year.

Project No. 220

Plant Collections and Maintenance of Stocks  
(Arnold L. Erickson, Jorge León, leaders,  
and José Córdoba)

During the year 250 plant introductions were made to the various collections, 37 being in the last quarter. Included in the introductions were several varieties of Coffea arabica from Guatemala, Ethiopia, and Brazil; potatoes from Holland; a collection of cowpeas from the Florida Agricultural Experiment Station; sweet potatoes from Louisiana Experiment Station; corn from the United States Department of Agriculture; and various ornamental plants of economic value. Thirty-nine requests from nearly all of the American countries and from Europe, Africa, and the Philippines were received and filled for seed and other propagating material.

A list of plant material available for distribution was made and sent to interested organizations and individuals.

Seed of varieties of several crops developed by Institute staff members was produced and distributed widely, as indicated in the reports on projects 209, 210, and 214.

Project No. 219

Plant Disease Survey - Miscellaneous Disease Investigations (Lucy Hastings Gutiérrez)

During the year, a number of identifications have been made of organisms causing diseases of various crops. These have been from collections of seed-borne pathogens, from disease problems observed at this Institute, from investigations in cooperation with other Plant Industry technicians of this Institute, the Costa Rican Ministry of Agriculture, STICA agents, farmers, and occasionally from outside Costa Rica. Attention has been called to the more serious of these disease problems, with special study of the pathogens in some cases. Control measures have been suggested wherever possible. Identifications have comprised 59 organisms involving 18 crops.

Project No. 230

Seed Studies—Disease, Storage, and Germination  
(Lucy Hastings Gutiérrez)

Work on the serious reduction in quality of seed rice during storage under prevailing unfavorable conditions of high humidities and temperatures has been continued. A series of tests has been

completed for germination, early development, and disease incidence for variously stored rice run at intervals of 0, 1, 2, 4, 6, and 12 months. Examinations of the microflora involved have shown that, where germination was greatly reduced, this was directly correlated with high percentages of Helminthosporium oryzae. The data from these tests, which involved studies of approximately 75,000 seeds, have shown that rice seed viability can be greatly prolonged and the seed maintained in good condition when carefully dried to 9% moisture, treated with the seed disinfectant Granosan or Granosan M at 1 oz. per 100 lbs., and kept in air tight containers.

Project No. 218

Insect Collections and Taxonomic Studies  
(Eulio Viale)

During the year, with the cooperation of the Smithsonian Institutions and the Division of Insect Detection and Identification of the United States Department of Agriculture in Washington, D.C. over 1,000 classified specimens have been added to the collection. They include some 350 different species particularly related to our tropical economic crop plants. The majority were collected in Costa Rica and some are from Colombia, Brazil, Guatemala, Honduras, Nicaragua, and El Salvador.

#### INTER-AMERICAN CACAO CENTER

George F. Bowman

#### Introduction

The year has been marked by increased yield and increased profits in the demonstration farm, by greatly increased interest of local farmers in this farm, and by a very gratifying close cooperation with the local extension office, the Servicio Técnico Interamericano de Cooperación Agrícola (STICA).

In research we can note a rapid increase in understanding of the physiology of cacao and in improved propagation techniques adapted to the needs of the small farmer. These are covered in separate reports.

Of special interest is the Fourth Meeting of the Inter-American Technical Cacao Committee. This meeting was an unqualified success, due in large part to the efforts made by the Empresa para Renovación de Cacao C.A. and all the other agricultural entities of Ecuador to organize and conduct the meeting.

#### Demonstration Farm

The farm made a net profit of more than \$13,000 over and above an estimated rental of \$25 per hectare and estimated depreciation reserves for the machinery. The actual net cash return to the Cacao Center was



\$16,500 on the 88.66 hectares under cultivation. This was in spite of the very high cost of supervision. On a commercial farm this administrative organization could easily manage 250 hectares, reducing the cost per hectare to about 35% of the amount spent at La Lola. The profits were reduced for this period also by the lower yield during the months comprised in this calculation. The November-December crop of 1952 was later than usual and will spread well into January and February of 1953.

The year was rather dry, and infection was lower than normally, but heavy rains and continued cloudiness in December have caused a severe outbreak of disease that may be reflected in early 1953 by a wider variation between sprayed and unsprayed parts of the farm.

Records of the fungicide plots indicate that the beneficial effects of spraying with Bordeaux mixture are carried over for a number of months after spraying has been discontinued. This constitutes a danger to the grower who is inexperienced in disease control, since he is likely to stop spraying and gain a short-term benefit at the cost of future production.

The unshaded section is still continuing to increase in production, and all indications are that disease control and increased light can increase yield markedly. Also of interest is the steadily increasing productivity of all areas treated with zinc compounds.

During the year a new propagator was designed to permit rooting of cuttings in soil in bamboo pots. By use of jute covers kept moist by capillarity from an overhead trough, this propagator eliminates the need for continuous supervision. The rooting of plants in pots avoids necessity for transplanting except for final field placement.

A long series of trials with bench grafting methods indicated that cleft grafting of young seedlings is possible if the entire scion and graft are covered with paraffin.

### Research

#### Project No. 205

Propagation and Nursery Practices (George F. Bowman, leader, Francisco Garcia, Paulo de T. Alvim, and Arnold L. Erickson)

During the latter half of 1951 and all of 1952 exploratory tests have been conducted at the Inter-American Cacao Center by George F. Bowman and Francisco Garcia to select a method of bench grafting young cacao seedlings. The objective is to select for further study a method which is not complicated, will give a relatively high percentage of success, and allows the most rapid possible work at the bench.

Exploratory trials of bench grafting techniques were planned to test variation in treatments under the following main divisions: (a) stock, (b) scion, (c) fungicidal treatment, (d) technique of grafting,

(e) post-treatment with growth regulators, (f) tying and wrapping, (g) post-treatment of grated plant, and (h) planting or heeling out. More than 140 variations were tested, with at least ten and usually twenty or more plants per trial. Records were kept on the number of plants surviving at the end of two, three, and four weeks or more after treatment.

More than 100 variations were tried using 10, 20 or more plants per treatment. After 2, 3, and 4 weeks of treatment observations were made of the number of living plants.

The most promising techniques of all those tried can be described as follows: Seedling plants of 1 to 3 cm. in trunk diameter below the cotyledons (6 months to one year in age) are pulled up from the nursery and cut off squarely just below the cotyledons. Roots are trimmed to leave clean cuts. Scions of 2 to 5 buds are taken from mature wood of the last two flushes of young trees, and the leaves are cut off immediately, leaving part of the petioles. At the bench the stock plant is recut squarely and a shallow split made on one diameter. The scion is prepared with a double wedge cut and pushed down into the split stock, extending the split and making a solid connection of the cambium layers, maintained by the natural pressure of the split stock. No wrapping is required, but the entire scion, graft area, and split section of the stock are immersed momentarily in melted paraffin wax at 55° to 60°C. The plant is then planted in a nursery bed, under shade, and kept well watered. It has been found advisable to supply the young plants with additional nitrates during the first few weeks.

With this technique it has been found possible, with practice, to secure 75% or more successful unions and 50% or more surviving plants for field transplanting. With very little practice the man at the bench can graft more than 100 plants per hour with this method. (Bowman and Garcia)

The propagation of plant material for planting at Turrialba has continued. Seedlings of 6 clones is being grown in bamboo pots. The material to be used for rootstocks and rooted cuttings are growing in nursery beds. Land has been prepared and seed of *Crotalaria* has been planted for temporary shade for the planting on Institute land at Turrialba. (Erickson)

Experiments on the rootings of cuttings are discussed in another section.

Project No. 203

Physiological and Ecological Studies (Paulo de T. Alvim, leader, George F. Bowman and Francisco Garcia)

1. Influence of shading on cacao seedlings. Growth measurements (on a dry weight basis) of seedlings grown under four different light intensities (0, 25, 50, and 80% shade) indicated that the shade requirement of cacao tends to decrease as the seedlings get older. During the

first two months the highest growth rate was under 50% shade; from two to four months after planting, the highest growth rate was under 25% shade; from four to six months there was practically no difference between full sunlight and 25% shade. Disease incidence was higher at full sunlight (66.4% of the leaves infected) and lowest at 50% shade (22.8% of the leaves infected). At 25% and 80% shade disease infection was about the same (37.3% and 38.8%, respectively). Leaf deformation (crinkled) decreased with light intensity (52.4, 35.0, 31.3, and 3.3% of crinkled leaves at respectively 0, 25, 50, and 80% shade).

Three experiments have been conducted for the purpose of studying the response of cacao seedlings to "shading" at night with a celloglass cover. Results with young seedlings (up to 46 days old) have shown that plants shaded only during the day had about 70% of the dry weight of the seedlings shaded day and night, and about 60% of the number of leaves. Seedlings shaded only during night had about 40% of the dry weight of the ones shaded day and night and about 56% of the number of leaves. When no shade was used, the dry weight was 30% and the number of leaves about 25% compared to seedlings shaded day and night. A general analysis of the results seems to indicate that the main benefit of night shading is in preventing leaf abscission. Death of seedlings in early stages of growth was significantly higher when no shade was used during the day hours.

In another experiment with older seedlings it was seen that night shade played an important part in preventing fungus infection. Thus, the percentage of leaves infected with sooty mould was as follows: (a) no shade, 77%; (b) shaded only during day, 60%; (c) "shaded" only during night, 17%; and (d) shaded day and night, 1.8%. Complete results of this experiment will be reported in June.

2. Hormone spray to increase production. The possibility of increasing fruit setting and controlling cherelle wilt by means of spraying the flowers and fruits with a solution of parachlorophenoxyacetic acid, as suggested by Gardner and Naundorf, has been checked in an experiment with mature trees. The following treatments have been applied: (a) spraying with parachlorophenoxyacetic acid at 50 ppm, every other week; (b) idem, 20 ppm; (c) spraying with water; and (d) control (no treatment). The experiment started in July 1952 when all the fruits were removed to give the plants an even start. The results so far obtained show no effect of the hormone on increasing fruit setting or decreasing cherelle wilt.

3. Mineral nutrition. This experiment, started one year ago to study the response of the cacao plant to zinc application, is now showing differences in yield in favor of the zinc treatments. For the last six months the average number of fruits harvested per plant was as follows: (a) galvanized nails driven in the trunk, 46.7; (b) iron nails driven into the trunk, 38.7; (c) crystals of zinc sulfate placed in holes bored in the trunk, 51.1; and (d) control, no treatment, 34.0. Statistical analyses show that (a) and (c) are better than (b) and (d); the differences between (a) and (c) as well as between (b) and (d) are not significant. This experiment indicates that there is a zinc

deficiency at La Lola. The increase in yield obtained by spraying cacao with Dithane, as reported by Bowman and McLaughlin, is very probably due to the presence of zinc in this fungicide.

A large greenhouse test for detecting mineral deficiencies in soils at La Lola was started in December with young cacao seedlings growing in pots receiving different treatments.

4. Rooting of cuttings. A total of 12 experiments has been carried out to test the effect of various concentrations of different hormones and combination of hormones on rooting of cuttings. In all experiments the best results have been obtained with indolebutyric acid at 8,000 ppm. in 60% alcohol, applied by the quick-dip method. The combination of 4,000 ppm. of indolebutyric acid and 4,000 ppm. of naphthaleneacetic acid, which has been recommended by Trinidad, gave poorer results than indolebutyric alone at 8,000 ppm. In some of the tests Merck's Hormodin No. 2 gave practically the same percentage of rooting as indolebutyric at 8,000 ppm., but the number of roots formed was only half and the length of roots was from 1/3 to 1/10 of the cuttings treated with indolebutyric at 8,000 ppm.

In experiments with the "Turrialba No. 2" propagator (covered with wet cloth) fairly good rooting (65%) was obtained with only one application of water inside the propagator during the whole rooting period (first day).

5. Growth and flowering of cacao. Data have been taken every two weeks on flushing, flowering, and growth in diameter of cacao. Growth in trunk diameter was higher in May and August and lower in March, June and November-December. Growth flushes occurred six weeks after the peaks of growth in diameter. Flowering was most intensive in the early part of June and middle of July, and was lower in November and December. Cherville wilt was higher when growth in diameter reduced and growth flushes occurred. It was extremely high in November—soon after a period of heavy rains (20 inches in 2 weeks)—when growth in diameter was completely checked. (Paulo de T. Alvim)

Project No. 204

Cacao Diseases and their Control (R. G. Orellana, leader, L. R. Siller, and George F. Bowman)

1. The mode of infection of Theobroma cacao by Phytophthora palmivora. From this study it was found that the fungus penetrates directly through the cuticle of the tissues. Although stomatal penetration was not observed, this mode of penetration, if it occurs; would be of lesser importance in view of the fact that direct penetration takes place. From the point of view of the control of the disease, it is significant that the fungus sporulates within ducts in the cortical layers of the pod. This is the first report of internal sporulation of P. palmivora in cacao. A paper is now being prepared. (R. G. Orellana)

2. Pathogenicity studies of *Phytophthora palmivora* and *Colletotrichum* sp. It was found that leaf abscission resulted from infection by both of these fungi. *P. palmivora* is, therefore, more aggressive than the other and kills seedlings in a few days after stem inoculation. But infection of seedlings with *P. palmivora* produced symptoms of die-back under field conditions. *Colletotrichum* inoculations did not, however, produce such symptoms. Field inoculations with *Phytophthora* of woody chupons and fan branches produced canker symptoms, while these symptoms did not result with *Colletotrichum*. (R. G. Orellana)

3. Physiological specialization of *Phytophthora palmivora*. A study of the utilization of sugars and vitamins is under way. From this study it appears that Thiamine is an essential growth substance for the development and conidia production of the fungus. It is hoped that a reliable criterion for race differentiation is to be found from these investigations. (R. G. Orellana)

4. Survival value of *Phytophthora palmivora*. A preliminary study showed that the fungus remains viable and in a pathogenic condition for several months in sterilized and non-sterilized soils infested with a conidial suspension of the fungus and kept constantly moist. The severity of infection was greater on pod pieces placed in the sterilized and inoculated soil than in the non-sterilized and equally inoculated soil, indicating that the survival of the fungus may depend in part, on the competition of soil microflora. (R. G. Orellana)

5. Resistance of cacao to *Phytophthora palmivora*. From tests conducted to find method of determining the resistance of six United Fruit cacao clones, it was found that at least 2 infection types resulted when pods from these clones were inoculated under control conditions with a standardized conidial suspension of the fungus. This may indicate that there exist in cacao various levels of resistance to this pathogen. These studies are to be conducted in the field by the method of mass and individual inoculations of seedlings, vegetative clonal material, and trees. (R. G. Orellana)

6. Soil survey of cacao area at La Lola. A soil survey of an area planted with cacao was made to establish a new control experiment with contact fungicides. From this survey it was found that the soil is a very fine sandy loam to silt loam varying in depth from 90 to approximately 120 cm. The cacao trees and the shade trees were mapped individually. The experiment is designed in a randomized block consisting of 5 treatments and 5 replications. Based on the performance of fungicides in screening tests on seedlings (conducted by R. Siller) and from laboratory assays it was decided to include in the experiment Bioquin 1, Phygon XL, Crag 658, and Bordeaux mixture. Film-fast will be used as an adhesive material. (R. G. Orellana)

7. Diseases of cacao cuttings and leaves while in the propagator. From leaves, apparently dead due to infectious causes, there were isolated *Fusarium* spp., *Colletotrichum* spp., *Pestalozzia* spp., and *Diplodia* spp. In one experiment the sawdust used as rooting medium

was either steam sterilized or left natural, and both were inoculated with Fusarium spp. More leaves died in the sterilized and inoculated series than in the other. From a preliminary study on disinfection of the sawdust, it was found that Bordeaux, Fermate, and hot-water treatment reduced infection of the cuttings. Fermate gave the best results--70% survival as compared with 51.5% in the checks. This difference was not significant, however. Additional experiments with varying chemical and physical treatments of the sawdust are being conducted. Treatment of the rooting medium, if necessary, will be determined when more is learned about the nature of the cause of death of leaves and cuttings and conditions for their survival and rooting.

8. Studies of other cacao diseases. Among other fungi attacking cacao, it was found that Rosellinia spp. causes sporadic death of trees at La Lola. This disease, however, is still of minor importance. Other diseases also of minor importance are those caused by Pellicularia spp. and Diplodia spp.

In the Atlantic zone of Costa Rica, there was found a new pod rot symptom induced by P. palmivora presenting a typical internal zonation of concentric brown and light bands. Pods thus affected show large dark patches on the usual lesion.

No spores of P. palmivora were captured in 2 attempts made by placing vaseline smeared slides over Phytophthora-infected nursery beds at the Institute grounds. This method was apparently not efficient for capturing wind-borne spores of the fungus, if they are thus disseminated.

It is hoped that from the investigations now in progress evidence can be obtained on the epidemiology of the most destructive disease of cacao.

Fungicide spraying has been done systematically on most of the La Lola plantation. The evaluation of the fungicides in the seedbed is also being continued. (R. G. Orellana)

9. Field control of Phytophthora palmivora Butl. with fungicides. Recording of production and natural infection data was continued throughout the year on the plots treated with fungicides. This experiment was started in September of 1950 and contains 20 individual plots with from 67 to 88 mature trees each.

In 1952 the following results were obtained from the five treatments: Bordeaux mixture 1%, applied every 30 days, produced 51.4 pods per tree with 1.53% infection; Bordeaux at 60 days 45.4 pods per tree with 2.43% infection; Dithane Z-78, 62.5 with 7.86%; SR-406, 44.8 pods per tree with 5.76%; and the unsprayed plots produced 51.0 pods with 3.95% infection.

It is possible that the failure of Bordeaux mixture to produce more fruit than the check plots can be partly attributed to the fact

that two of those checks were sprayed with Bordeaux during the first 10 months of the experiment, one at 30-day and the other at 60-day intervals. During the same period one of the present 30-day Bordeaux plots and one of the 60-day Bordeaux plots received no spray.

Up to the present the Bordeaux mixture apparently has reduced infection but has not stimulated production. SR-406 appears to have had no effect, either in control or in production. Dithane Z-78 seems to have induced an increase in production, but its efficacy in control of disease has not been demonstrated. (L. R. Siller)

10. Screening tests for evaluation of fungicides as protectants for Cacao against Phytophthora palmivora Butl. During this year the testing of fungicides was continued. The method followed was the same as that used during the preceding year except that the small plants have been inoculated 7, 14, and 21 days after the application of fungicides. The first inoculation is made 2 or 3 hours after spraying, or soon after the fungicide has dried. This method subjects the fungicide to a much more rigorous test, since with the former method only the first inoculation was made.

During the year fifteen separate trials were conducted, with a total of 174 treatments. The following fungicides were tested at various concentrations: Bordeaux mixture, Malachite Green, Phygon XL, Cupron 130, Fercupron, Mercupron, Ziram, Copper A, Dithane A-78, Dithane D-14, OS-377 C (Wettable powder), OS-377 (Emulsible concentrate), Parzate, SR-406, Zerlate, Vancide 51, Perenox, and Bioquin 1.

Combined with these trials, the following spreaders and stickers have been tested at different concentrations with various of the fungicides: DuPont Spreader Sticker, Multi-Film L, Multi-Film PB, Vancide Sticker, Vancide Sticker A, Dow methocel F-1068 J T-398, Neutrol Spread-er 105, Triton B-1956, Armour Sticker, Summer Spreader 250, and Peps.

In these tests Bordeaux mixture has shown consistently the best control, followed by Phygon XL, Bioquin 1, Perenox, and Copper A, in that order. (L. R. Siller)

### Extension

The bulletin Cacao is being issued quarterly and is in great demand for workers in all cacao-producing countries. At the conference in Guayaquil, Ecuador, in June 1952, it was agreed that the Ministers of Agriculture in the countries where work on cacao is in progress would be asked to designate a representative to contribute progress reports and news of the programs for publications in Cacao. Representatives have been designated for Costa Rica, the Dominican Republic, Ecuador, Haiti, Honduras, and Venezuela.

A new series of publications, called Comunicaciones de Turrialba, has been started in the Institute, and the Cacao Center has prepared 13 articles which have been distributed widely to persons interested in cacao culture.

Close liaison has been established with the local extension service (STICA) through the agents in the cacao areas of Costa Rica. These agents ask for technical advice from the staff and for visits to the farms in their districts to demonstrate techniques to groups of growers. Two field days were organized during the year for independent farmers. Small local groups visit the farm nearly every week. During the year cacao research workers, extension workers, or persons interested in commercial production of cacao from 11 countries visited the Institute and La Lola. Five special students have been sent to the Institute for special study and experience ranging from a few weeks to six months. These students represent four cacao-producing countries.

The experience gained in working with the local extension agents, farmers, and visitors from the various countries is of value to the staff of the Cacao Center in that it gives us indications as to the type of information desired and methods of presenting it.

From the results of research and other studies, we are convinced that the following things are true:

1. The present production per unit of area is far below potential.
2. The present cost per unit of weight is greater than it could be.
3. New plantings can be made more efficient than existing plantations.
4. Our present knowledge is sufficient to increase production to a considerable extent in both old and new plantings.
5. Present knowledge is insufficient to realize the potential production or potential efficiency in either old or new plantings.
6. No single treatment nor single method of attack can be a panacea for the present situation in the world nor in this hemisphere.

The following recommendations can be made:

1. For existing farms.
  - a. Frequent harvesting. In most cases frequent harvesting will increase the number of pods harvested by salvaging pods that would otherwise deteriorate because of disease. The economics of the operation should be considered.
  - b. Frequent brushing where ground vegetation is heavy. Much harvested fruit may be lost if it drops into heavy undergrowth. However, heavy underbrush generally results from an incomplete stand of cacao trees and inadequate shade.



- c. Replanting where there is an incomplete stand of trees. In many instances yields could be increased materially by filling vacant spaces, preferably with good clonal materials. Spraying of young plants may be needed.
  - d. Spraying for control of fungus diseases where disease incidence is high. Bordeaux mixture has given the best control of Phytophthora palmivora Butl. in experiments at La Lola. The economic aspects of spraying need to be given more study under commercial farm conditions.
2. For new plantings.
- a. Planting of rooted cuttings of productive clones.
  - b. Propagation of cuttings in inexpensive easily-operated propagators now being developed.
  - c. Light pruning of young trees to establish desirable shape and form. Heavy pruning is likely to reduce yield.

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ANIMAL INDUSTRY DEPARTMENT

Jorge de Alba

INTRODUCTION

During the year 1952 all the projects of the Animal Industry Department were reorganized after the herds were declared free of tuberculosis and Bangs disease. Work conducted by Dr. Arturo Solano, Costa Rican Veterinarian and part-time member of the Animal Industry staff, culminated with the finding of all animals negative to the T.B. test at the end of 1951, after all reactors that had been found in previous tests had been slaughtered.

Brucellosis was also declared well under control with a small number of reactors of the dairy herd being kept under entirely separate management from the rest of the herd. Two more reactors were discovered in the Santa Gertrudis herd and were quickly disposed of. No reactors will be allowed in the beef herd.

Work was intensified in the creamery in an effort to find a more economical way to operate it. Shipments of pasteurized milk were started to San José, and a contract was signed with a dealer in that city to deliver the bottled milk. This plan did not work out very well due to difficulties in transportation and poor refrigeration. The volume of milk that could be marketed in San José was limited by the opening of a large plant in that city, and it was soon discovered that the strain put on the machinery and personnel of our creamery was not being paid for by the little increase in volume. Shipments of milk were discontinued in October 1952, and the creamery was reorganized to operate with less labor and fewer hours of work for the machinery. This situation will be maintained until some changes can be made in the units of machinery, which will enable the plant to handle more milk without putting undue strain on any one piece of equipment and with a minimum of labor.

During this year the operation of the slaughter house was discontinued. This decision was taken since data obtained so far indicated that no profit was being obtained from it. Since no personnel could be dedicated to beef cattle investigations alone, and no advantage in studies of beef conformation could be obtained from the slaughtering of our own steers, it was decided to simplify the operations and thus be able to dedicate more time to the management of the herds themselves.

In the field work, new pastures were established and intensive use was initiated on other plots of pangola grass (Digitaria decumbens). This grass, which has been under study for some years in small plots, has proven so productive in the area and so aggressive in its establishment, that more extensive use of it is being made now. It is

the only palatable grass that has been found capable of producing a uniform sod on the soils of the area and can do so in plots of relatively poor drainage where Molasses grass (Melinis minutiflora) cannot hold its own. The best management of the pangola pastures seems to be one that will keep it continually low, and pangola grass pastures can be kept clean and productive by repeated mowing with machinery. Guinea grass and Para grass are not adaptable to machine cleaning on the Institute soils, since they need a taller growth to keep their vigor. In fact, it has been observed that Guinea grass and Para grass when mowed very often soon disappear from the pasture.

Systems of record-keeping of breeding data for all herds were reorganized. New forms were printed and a check made on all data taken to date.

Active work was conducted on three research projects, and the data gathered are presented herewith. Much preliminary work was done in getting the project on Climatological Studies under way. Pending the acquisition of a special grant to put the Climatological Laboratory in full operation, some breed testing for heat tolerance was contemplated and a graduate student has been put to work on that problem. The breeds to be tested in the immediate future are Costa Rican and Honduran Criollos, half-bred Brown-Swiss, and half-bred Jerseys. Sufficient numbers of heifers of these breeds and crosses are available at present to make a good study of their comparative heat tolerance. However, since none of these have proven their permanency as good breeding material for milk production in the tropics, it has been found necessary to include a pure breed in these studies. The Jersey has been chosen as the representative which will likely have importance in tropical dairy breeding of the future, since previous studies conducted by the Institute at Mindi Dairies of Panama have so demonstrated the superior adaptability of the Jersey.

The Chamber of Agriculture and Minister of Agriculture of Costa Rica have cooperated in promoting a donation of Jersey heifers to the Institute by the Costa Rican breeders. The American Jersey Cattle Club has also given support toward obtaining donations from American breeders in the United States.

#### ORGANIZATION AND ADMINISTRATION

Robert R. Shrode, who was Acting Head of the Department on a temporary appointment, finished his period of service in January 1952. Jorge de Alba was called in to fill the position of Head of the Department in February, though he had to return to Mexico from March to June to terminate the work he had started in Hermosillo, Sonora, and to give an international course on Modern Methods of Livestock and Range Management at Saltillo, Mexico, under the Northern Zone of the Technical Cooperation Program (Project 39 of the Organization of American States). Jaime Basadre was left in charge until Dr. de Alba's return in July 1953.

Subsequently, Jaime Basadre, who had been acting as manager of the Animal Industry Farm, became a graduate student, with part-time duties as manager.

José María Castillo, who had been working as superintendent of the creamery, was promoted to the post of administrative clerk.

### TRAINING

Active training was initiated with two graduate students, Jaime Basadre and Carlos Tapia Jasso. Mr. Basadre (Peruvian), a graduate of the University of Maryland who had been acting as manager of the Department, began his thesis work on "Agronomic and Nutritional Studies of Imperial Grass (*Axonopus scoparius*)" as a part of the requirements for the Magistri Agriculturae degree.

Mr. Tapia (Mexican) a graduate of the Escuela Superior de Agricultura "Antonio Narro" of Saltillo, Coahuila, Mexico, was put in charge of the studies of Breed Difference in Heat Tolerance as found in the Climatological Laboratory. He also initiated a grass herbarium for the Department.

### COOPERATION AND CONSULTATION

Jorge de Alba finished his leave of absence during which he acted as Director of the new School of Agriculture and Animal Husbandry at the University of Sonora, Hermosillo, Sonora, Mexico. Then he spent a month organizing and teaching a Technical Cooperation course on Livestock and Range Management Practices. This short course was given in conjunction with FAO at the Escuela Superior de Agricultura in Saltillo, Mexico. In October 1952 he was invited by the University of Sonora to the inauguration of the first agricultural building of the new School of Agriculture by President Miguel Alemán of Mexico, and he spent a few days there discussing with University officials some staff appointments for the new school. In November he travelled to Honduras at the invitation of the Honduran Government to act as technical advisor to the First Congress of Honduran Cattlemen.

### RESEARCH

#### Project No. 235

#### Studies in the Utilization of Tropical Livestock Feeds (Jorge de Alba and Jaime Basadre)

All work conducted under this project in 1952 was centered on thesis work of Jaime Basadre based on studies on the utilization of Imperial grass (*Axonopus scoparius*). Agronomic work comprised three plots: Rejuvenation of old stands with different fertilizers and soil correctives, establishment of new stands testing different methods of seeding, and effects of various methods of cultivation on old stands. In addition, chemical analyses were run on Imperial grass in different stages of development.

A trial was completed on the utilization of Imperial grass for pasturage as compared with mixed grazing of pangola (*Digitaria decumbens*) and molasses grasses (*Melinis minutiflora*). Differences observed were not statistically significant. This in itself speaks well for the feeding value of Imperial grass. However, the inability of the stand to

recuperate after grazing and the difficulty of keeping the stands free of weeds due to slow growth of the grass after trampling make this type of pasturage very costly and definitely inadvisable in this climate.

Project No. 236

Tropical Dairy Cattle Improvement (Jorge de Alba)

During the year the study herd of Criollo cattle was put into final shape with the purchases of cattle made in Rivas, Nicaragua, and Choluteca, Honduras. The Nicaraguan cattle were all bought by Robert R. Shrode from the herd of Joaquín Reyna of Bahía de la Flor, Rivas, Nicaragua. These included twenty heifers and two bulls. Thirty-two cows were bought in Honduras by Jorge de Alba and Jaime Basadre and flown from Tegucigalpa to San José, Costa Rica, in February 1952.

Work during the year consisted of breeding all available cows to three young bulls. Two of these bulls were of the Reyna herd, and one had been obtained as a calf in a previous purchase. Cows bred in March began to calve at the end of the year. The younger animals were not bred until September 1952, and the first calves of this group are expected in June 1953. It is hoped by the end of 1953, at least one-half of all animals purchased will have completed one lactation.

Lactation studies were completed on a group of cows of the original Criollo herd of the Institute and some purchased during 1950. The results are presented herewith:

Milk and Butterfat Production of Original Institute Criollo Cows and Those of the First Importation

<u>Name</u>	<u>Total Production without corrections. Kgs.</u>	<u>Days in lactation</u>	<u>Production in 305 days at 4% kgs.</u>	<u>Butterfat produced in 305 days</u>	<u>Percent of butterfat</u>
*Coqueta	3,005.5 3,547.2	349 350	2,844.9 3,608.2	114.9 151.3	4.1 4.6
*Limeña	2,058.0	371	2,182.9	93.7	4.7
*Apuesta	2,723.8	401	2,817.3	121.4	4.7
*Perla	1,141.6 1,193.5	196 219	1,621.0 1,408.0	77.6 62.3	6.8 5.2
*Coquina	2,185.7	281	2,284.0	93.1	4.3
*Mimosa	925.2	153	883.5	34.6	3.7
*Cecilia	2,029.2	219	2,067.5	83.7	4.1
Overa	1,042.2	179	1,120.4	40.8	4.5
Luisa	1,419.8	210	1,504.9	66.6	4.4
Colombina	2,334.9	323	2,194.8	84.7	3.6
Guera	1,700.0	259	1,675.1	66.3	3.9
Niña	530.9	162	586.6	25.0	4.7
Lacaya	1,163.0	240	1,250.3	52.1	4.5
Riveña	<u>537.0</u>	<u>88</u>	<u>578.1</u>	<u>24.3</u>	<u>4.5</u>
Average	1,686.3	253	1,755.3	73.1	4.2

\* Animals still in the herd

The average represents data for an unselected group of two distinct origins. All cows mentioned, except the last three were from Hacienda San Rafael in Rivas, Nicaragua; they have proven their distinct superiority, and an effort is being made to preserve this line of breeding. Unfortunately, the old herd in Rivas was found dispersed when the first purchases were studied in 1950. The last three cows are from the 1950 purchase, and all have been eliminated. Some of the other cows not now in the Institute herd were discarded on account of Bangs disease. The incidence of the disease was found to be so prevalent in some of the better animals that the elimination of reactors had to be discontinued for some of the better individuals which are now kept under entirely separate management from the main herd. While no eliminations are planned for 1953 or until all available cows complete two normal lactations, a low limit of one thousand kilos has been set when the first cows are eliminated.

From the preceding table there have been eliminated a number of abnormal lactations which we have termed "lactation failures". This phenomenon is very puzzling and has been observed with other breeds of cattle as well as with Criollos.

Work continues on other lines of breeding in dairy cattle. Some fifteen half-bred Brown-Swiss Costa Rican "Maizol" heifers have been bred to the Brown-Swiss Red Sindhi bull. A similar program is being carried out with a Jersey-Red Sindhi bull used on half-bred Jersey heifers. These lines will furnish valuable comparisons for the levels of production attained through selection of the pure Criollo. Also these various breeding lines give valuable material for breed comparisons in studies to be carried out in the climatological laboratory.

Of the purebred cattle that were obtained at the beginning of these trials only the Jersey representatives remain. Even though the initial numbers were small (six Holsteins, six Brown Swiss, and eight Jerseys), it seems significant that because of breeding difficulties, as well as general inability to endure the humid tropical environment to which they were subjected, little or no increase in numbers could be made in Holsteins or Brown Swiss up to the time the last remaining individuals were sold. The initial Jersey cattle, on the other hand, have left a number of well-developed offspring that are doing very well. Even though they show far less resistance to the tórsalo than the Criollos, they have very decided advantages over them in maturing more quickly. It appears very desirable to improve and expand this initial Jersey purebred herd in order to use it in further tests.

Project No. 237

Studies on Beef Breeding for the Tropics  
(Jorge de Alba)

This project has suffered considerable changes during the year. These can be summarized as follows: The Criollo herd graded up to Santa Gertrudis has been eliminated and merged with the grade herd of Santa Gertrudis cattle donated by the King Ranch. Only selected animals have been left, and both herds now form part of a high-grade Santa Gertrudis herd. The Brangus grade herd, which consisted of two groups of 25 cows and two bulls, has been reduced to 27 cows and one bull. A Brahman herd, consisting of five purebred cows, one purebred bull, and five high-grade cows, has been included in the project.

It is hoped that with these changes the work will be simplified and valuable data can be gathered with a minimum of personnel expenditures. Therefore, a record-keeper has been eliminated, and the monthly weighing of all cattle was discontinued. The type classification was also discontinued. Since no funds are available for any special studies with beef production, the time saved with these reductions in data-taking is considered very essential at present.

However, with little expense it is hoped to accumulate data on breeding efficiency, birth weights, weaning weights, and weights at two years of all heifers and bull calves born to the three herds. Since the low calving percentage is one of the factors which has put beef production in warm humid climates in serious doubt economically, data gathered on this factor alone will be of great value.

The herds are also very valuable in studies of pasture management and tórsalo control.

The number of animals in each herd at the end of 1952 was as follows:

<u>Herd</u>	<u>Cows</u>	<u>Calves</u>		<u>Yearlings</u>		<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	
Santa Gertrudis	42	3	5	4	17	71
Brangus	27	1	3	3	10	44
Brahman	10	3	3	0	2	18
						<u>133</u>

Birth and weaning weights of the Criollo herd graded-up with Santa Gertrudis bull are given below, up to the time this herd was merged with the high-grade Santa Gertrudis. Weights are also given for the Brangus calves born during the same period of time. Mother cows were Criollos in all cases; many of these cows had calves by both types of bulls.

	<u>Santa Gertrudis</u>		<u>Brangus</u>	
	<u>Males</u>	<u>Females</u>	<u>Males</u>	<u>Females</u>
1948 (Birth wt.)	68 lbs.(5)	70 lbs.(3)	65 lbs.(6)	53 lbs.(7)
(Weaning wt.)	358 lbs.(5)	290 lbs.(2)	322 lbs.(6)	312 lbs.(5)
1949 (Birth wt.)	64 lbs.(4)	65 lbs.(10)	68 lbs.(15)	61 lbs.(16)
(Weaning wt.)	382 lbs.(3-)	329 lbs.(7)	349 lbs.(12)	306 lbs.(16)
1950 (Birth wt.)	71 lbs.(6)	67 lbs.(4)	63 lbs.(10)	50 lbs.(12)
(Weaning wt.)	242 lbs.(4)	302 lbs.(2)	296 lbs.(9)	300 lbs.(8)
1951 (Birth wt.)	60 lbs.(6)	70 lbs.(5)	61 lbs.(5)	53 lbs.(8)
(Weaning wt.)	180 lbs.(1)	336 lbs.(3)	272 lbs.(3)	272 lbs.(8)
Average (Birth wt.)	60 lbs.(23)	67 lbs.(22)	65 lbs.(36)	55 lbs.(43)
(Weaning wt.)	314 lbs.(13)	321 lbs.(14)	320 lbs.(30)	298 lbs.(37)



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DEPARTMENT OF ECONOMICS AND RURAL LIFE

Antonio M. Arce

INTRODUCTION

The Department continued its research programs. Some of them are carried on in cooperation with institutions such as Michigan State College, the National Federation of Coffee Growers of Colombia, the Institute of Nutrition of Central America and Panama, the University of Costa Rica, and the Ministries of Education, Health, and Finance of Costa Rica.

The Community Development Program has been highly emphasized, particularly the Home Economics, Education, and Agricultural Economics projects. The Sociology and Anthropology project remained more or less inactive. The Evaluation Project was initiated in a systematic way in September, and therefore it is too early to present any definite conclusions.

An analysis of such variables as health, leadership, and occupation revealed that with regard to such facilities as source of water, bath rooms and toilets, day laborers were at an advantage over small farm holders. With regard to other facilities, small farm holders were at an advantage over laborers. In general, leaders of both laborers and small farm holders were in a relatively better position than non-leaders.

An analysis of the Diet Study revealed that the average diet of a group of 137 families—evaluated on the basis of allowances recommended by the Food and Nutrition Board of the National Research Council and the calories requirements of the Food and Agriculture Organization of the United Nations was satisfactory in calories, total protein, iron, thiamin, and niacin. It was, however, deficient in animal protein, calcium, vitamin A, riboflavin, and ascorbic acid. Consumption of vitamin A was very low. An analysis was made of the relationship between economic position, family size, type of community, leadership, and diet.

Special attention was given to an analysis of the Medical-Nutritional Study with emphasis on the medical and laboratory examinations. It was found that 98% of the persons who had been medically examined had some form of parasitic infection and 56% had three or more types of parasites. There was no significant difference—so far as parasitic infection is concerned—between members of families containing leaders and those with no leaders. The same relationship exists between large hacienda families and small farm holders. In regard to the quantity of vitamin A and carotene in the blood it was observed that members of families with leaders had significantly larger quantities than families with no leaders. The same relationship was observed between families of large haciendas and small farm holders.

The second training course for rural teachers, which lasted six weeks, was carried out in December 1951 and January 1952. Thirty teachers participated. The teachers had received another course previously and had worked in the experimental area of Turrialba. Emphasis was put on food preparation, manual work, health, agriculture, and community organization. These teachers were placed in the eight experimental communities and were periodically visited by members of the Department. A seminar was conducted every month in which common experiences were discussed. In December 1952 the third course for teachers was conducted. Twenty-six teachers attended.

During the school year 1951-52 the complete programs for the Development of Skills for Rural Life—with special emphasis on Cacao and Livestock—were tested. The new course started in November 1952.

A great deal of time was spent on the Economic Study of Coffee Farms. Emphasis was given to the following two projects: "The Effect of Coffee Tree Formation on the Efficiency of Coffee Pickers", and "Cost of Production and Farm Management Study of Coffee Farms". These two projects were undertaken in cooperation with the "Centro Nacional de Investigaciones de Café" of the National Federation of Coffee Growers in Colombia. The former project was carried out with 200 plants, 100 of which were of "free growth" type, the other 100 being of the "Colombia Poda" type. Significantly higher production resulted from the "free growth" type. The efficiency of the coffee picker was significantly higher with the Colombia type. With respect to the second project it was found that the efficiency of labor is the fundamental variable which affects costs and returns; next in importance came yield per manzana.

The Evaluation Project was initiated in September. A great deal of time has been spent in the planning stage of designing tools for measuring social change.

Thirty-nine students received training in the Department. Of these, seven are post-graduate students.

#### ORGANIZATION AND ADMINISTRATION

Julio O. Morales, Head of the Department, went to Chinchiná, Colombia, in March. His trip was made in connection with the cooperative projects between the Department and the National Federation of Coffee Growers of Colombia. In July he traveled to the United States on his sabbatical leave but returned to Turrialba in November for a short period of time.

Antonio M. Arce, Assistant Rural Sociologist, returned from the United States in September after finishing his studies at Michigan State College. Eduardo Arze, Assistant Rural Sociologist, traveled to Mexico, the United States, and Canada to observe experiences in rural education and extension for about two months. In December he

traveled to Bolivia on leave. Juvenal Valerio, Assistant Educationist, attended the Inter-American Seminar on Vocational Education held at the University of Maryland in the United States. He also visited Puerto Rico. He was absent from Turrialba for about six weeks.

Margaret Moen Fiester, Nutritionist, ended her contract with FAO in October and ceased her work in the Department. Vithinia Rojas de Sasso, Assistant in Statistical Analysis, terminated her contract with the Department in May. Roberto Sasso, Assistant in Statistical Analyses, began to work with the Department in February, and Rodrigo Umaña, Assistant in Statistical Analyses, started working in November. Olen E. Leonard, Sociologist, has been collaborating with the Department since September. Nevin Scrimshaw, Director of the Institute of Nutrition for Central America and Panama, has been collaborating with the Department.

### TRAINING

Thirty-nine students received training in the Department classified as follows: Applied Rural Science, 14; Agricultural Extension, 5; Vocational Agriculture, 9; Special Students, 2; Post-graduate Students, 9. Some were working for their Master's degree and some on their Ph.D. theses.

### RESEARCH

#### Community Development Program

(Julio O. Morales and Charles P. Loomis)<sup>1/</sup>

#### Sociology and Anthropology (Sasso and Umaña)

Emphasis has been placed on a detailed analysis of questionnaires which were filled out in previous years. Since there are 667 questionnaires, each containing a great deal of information, it was thought wise to analyze them using IBM machines. At present IBM cards are already punched, and a decision has been reached as to the factors that will be correlated.

Home Economics (Margaret Fiester, Nevin Scrimshaw, Julio O. Morales, Antonio M. Arce, Roberto Sasso, Rodrigo Umaña, Narciso Arce, and Edwin Murillo)

1. Health. One of the members of the Department (A. Arce) undertook at Michigan State College an analysis of some health factors in

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<sup>1/</sup> Names in parenthesis refer to persons primarily responsible for each aspect of work. Nevertheless, all the personnel of the Department work as a team.

relation to leadership and occupation. It was found that with regard to water supply and bathroom and toilet facilities laborers were at an advantage over small farm holders. In general leaders in both occupational groups were in a relatively better position, so far as these factors are concerned, than non-leaders. This was also true with respect to the average number of persons per family who wore shoes daily. It was also found that the father's age, the mother's age, the mother's age at marriage, and the length of time which the mother and father had lived together were on the average, higher among small farm holders than among laborers. These factors were also higher among leaders of both occupational groups.

The analysis of the Health Study was concluded this year (Sasso and Umaña). With respect to feeding the youngest child during his first year of life, it was observed that as a general rule breast-feeding is practiced. Ninety percent of the mothers breast-fed the youngest child; 40% did so for a year or more. Thirty four percent of the 126 mothers who gave water to their youngest child did not boil it. This no doubt accounts for the high incidence of parasitic infection which was observed in a later study.

Only one of the 132 families studied regularly took the youngest child to a doctor. Fifty-two percent of these families said that their youngest child had never been examined by a physician. The remaining 47% said that their youngest child had been examined only when he was sick.

Eighty-six percent of the mothers interviewed said that their youngest child had never been vaccinated. Of the families interviewed 72% had never given cod liver oil to their youngest child.

2. Nutrition. Much time and effort was spent in the analysis and interpretation of material already available in the Department. This analysis (M. Fiester, N. Arce, R. Sasso, and R. Umaña) shows, among other things, that the average diet of the group—evaluated on the basis of recommendations of the National Research Council and FAO calorie requirements—was adequate in calories, total protein, iron, thiamin, and niacin; it was deficient, however, in calcium, animal protein, vitamin A, and ascorbic acid. The consumption of vitamin A was very low. The relationship between economic position, size of family, type of community, leadership, and diet has been explored.

In spite of dietary deficiencies, 70% of the families interviewed seemed to be satisfied with their diet. Fifty-seven percent of the informants had some knowledge of vitamins. Seventy-eight percent thought that skimmed milk has no food value; eight-two percent would not use it. These results show that dietary education would contribute to improving the food habits and thus the health of the rural population.

It was observed that landless day laborers consume significantly lower amounts of vitamin A, ascorbic acid, and animal protein than

small land holders and laborers with land. Small farm holders consume greater quantities of animal protein than laborers. This is probably true because the former consume more milk and eggs than the latter. However, consumption of these foods is low in both groups. This shows that the possession of land has a significant influence on the diet.

The diet of those families containing leaders is significantly higher in vitamin A content than that of families with no leaders. With respect to other vitamins (B<sub>1</sub>, B<sub>2</sub>, and ascorbic acid), protein, calories, iron, and calcium, no significant difference was found between "leader families" and "non-leader families".

3. Medical-nutritional study. With respect to the physical examinations and laboratory tests conducted on 140 families in 1951, the factors of parasitic infection and quantity of vitamins in the blood were analyzed during 1952. The rest of the information will be analyzed by the Institute of Nutrition of Central America and Panama since the study was made with the cooperation of that institution.

Ninety-eight percent of the persons examined were infected with parasites; fifty-six percent had three or more types of parasites. No significant differences were found between the sexes as regards parasitic infection. Age was a significant factor until age ten. There were no significant differences with regard to leadership and type of community. However, in relation to occupational status there were differences; small landholders were, in general, less affected by parasitic infection than day laborers and artisans.

Quantities of vitamin A in the blood, riboflavin, ascorbic acid, vitamin E, vitamin C, and carotene were related to such factors as leadership, occupation, and type of community.

Education (Eduardo Arze, Juvenal Valerio, Narciso Arce, and Cristóbal Vega)

In January 1952 the second training course for rural teachers, which had begun in November, was completed. This course was organized by the Institute and the Ministry of Education of Costa Rica. Special emphasis was given to group analysis of the experiences which the teachers had had in their community work. The experimental communities were periodically visited by personnel of the Department and the school inspector of the Ministry of Education. The guiding philosophy was to have the teacher stimulate any local movement for community betterment. It was expected that people would solve their problems by themselves, that is, with a minimum of outside help.

Monthly seminars were conducted in which teachers communicated their experience in the community. Some of the activities displayed are related to the organization of clubs for music, sewing, carpentry, sports, recreation, and agriculture. The teachers lead campaigns on health, the construction of latrines, elimination of parasitic infection, use of boiled water, improved housing, food handling and diets, home gardens, smokeless stoves, etc.

The third training course for rural teachers was started in December, 1952 with emphasis to be placed on methodological conclusions drawn from the last two years of experience.

A new project, tentatively called "Raising Standards of Living of Rural Areas through the Projects Method" is in its preliminary stage (Narciso Arce). A review of literature, organization of material in the Department, and visits to the communities have been made.

With respect to the Project Method in the Development of Skills for Rural Life, (Juvenal Valerio) the complete programs with special emphasis on Cacao and livestock, were submitted to test. Two students, Dimas Martínez Ponce and Victor Salazar Moreno, worked especially on the former, carrying out their practice work at La Loda. Five students, Carmelo Sánchez B., Diego Correa R., Francisco Tosta R., Pánfilo J. Rondón, and Julio Contreras Mejía, worked on the livestock program, doing part of their work at the Animal Industry Department of the Institute and part at the animals experiment station "El Alto" of the Ministry of Agriculture of Costa Rica. All of these students have obtained certificates for completion of their studies.

Two new projects, Coffee and the General Development of Skills for Rural Life, are being tested in the new course for 1952-53 which began in November.

Evaluation. (Antonio M. Arce, Edwin Murillo, Linda Nelson, Manuel Alers-Montalvo, Charles Proctor; Advisor: Olen E. Leonard)

This project has been going on for the past three months. The point of departure in evaluation has been the Education Project which has been functioning for the last two years; however, other agencies of social change will also be considered.

Emphasis has been given to the designing of two questionnaires, one for the head of the family and another for the housewife. Information is asked about practices in the following fields: (a) agriculture, (b) nutrition, (c) health, (d) housing, (e) clothing, and (f) communal organization.

The purpose of these questionnaires, as well as other field techniques, is to inquire about the What, When, How, and Why for changes in practices in the above-mentioned fields. A graduate student (M. Alers-Montalvo) is working on an analysis of the process of social change; this will be the basis for his Ph.D. thesis at Michigan State College. Another student (Linda Nelson) is working on "Levels and Preferences in Kitchen Facilities"; this will be the basis for her Master's thesis at Iowa State College.

Economic Study of Coffee Farms

(Julio O. Morales, Francisco Gómez, Davis L. Rainhard)

Work was done on the project, "The Effect of Coffee Tree Formation on the Efficiency of Coffee Pickers", and "Cost of Production and Farm Management Study of Coffee Farms". These projects have been carried out in cooperation with the "Centro Nacional de Investigaciones de Café" of the National Federation of Coffee Growers in Colombia.

Findings of the first project tend to confirm previous observations and conclusions which were arrived at in 1948: (1) Labor efficiency is the primary factor which affects costs and returns in coffee enterprises. This factor is followed in importance by yield per manzana. (2) Labor represents the most important component of the total cost in the production of coffee. This is followed by land rent.

With respect to the second project, 200 plants were used, 100 of which were of "free growth" type. The remaining 100 were of the "Colombia Poda" type. A preliminary analysis of this experiment was made. The principal findings were: (1) There was significantly higher production in the "free growth" type of plants. (2) The efficiency of the coffee pickers was significantly higher in the "Colombia" type; however this difference was smaller than had been anticipated and probably is not of sufficient magnitude to compensate for the advantage of higher production in the free growth type. (3) The production of the plant had little influence on the efficiency of the coffee picker. (4) Slope of the land had no influence on the efficiency of the coffee picker. (5) The major crop was harvested in 5 pickings. The amount harvested in each picking had a pronounced influence on the picker's efficiency.

A new study was initiated this year. Coffee picking in Turrialba (170 plants) will be compared to coffee picking in the Meseta Central (58 plants) to determine efficiency. Another study is being carried on dealing with cost of labor in eight methods of coffee cultivation which are used in Latin America and Africa.

The data pertaining to the two previous studies are being analyzed by a student (Davis L. Rainhard) as the basis for his Master's thesis.

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SCIENTIFIC COMMUNICATIONS SERVICE<sup>1/</sup>

Armando Samper

INTRODUCTION

The most important developments that took place during the year were the installation of the photocopy laboratory, the increased volume of photocopies sent to Latin American technicians, the preparation of a greater number of abstracts, the improvement of bibliographical services, the initiation of the new series of publications Comunicaciones de Turrialba, the publications of the text Administración Rural, the initiation of a new series of extension publications, and the installation of multilith equipment.

The number of abstracts published in Turrialba increased from 248 in 1951 to 395 in 1952. The number of photocopies increased from 10,600 pages of references in 1951 to 16,013; 275 technicians from 82 institutions in 29 countries used this service. Publications regularly received in the library increased from 700 to 1,100, of which 500 are reviews. Thirty-six bibliographical lists were prepared with a total of 942 references.

The regular delivery of the journal Turrialba by exchange, courtesy to libraries, and subscriptions increased from 754 to 813. The Information Bulletin was sent to 2,756 addresses (combined list of Spanish and English editions sent) in comparison with 2,403 in 1951. Publication of the bulletin Cacao was renewed, and the bulletin was sent regularly to 1,335 addresses (combined lists of English and Spanish editions mailed). Distribution of reprints increased from 1,476 in 1951 to 2,074.

In collaboration with the Field Service Unit of Project 39 of the Technical Cooperation Program of the Organization of American States, the program of extension publications and audiovisual aids was continued. Two extension publications were issued in an effort to determine the problems that arise in the preparation of extension publications for use in more than one country and in order to help extension agents and extension information specialists to perform their work more easily and efficiently. For the purpose of studying corresponding techniques, 11 exhibits were placed on the bulletin board of the Service. Thirteen editorial revisions of extension publications were made, and 25 visual aids items were completed.

The Advisory Board held its Third Session at the Pan American Union in Washington on October 6 and 7.

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<sup>1/</sup> Fourth annual report, 1 January to 31 December 1952. The first report covers the period from July 1 to December 31, 1949; others cover complete calendar years.

## ORGANIZATION AND ADMINISTRATION

### Advisory Board

The Third Session of the Advisory Board took place in the Pan American Union on October 6 and 7, with the following members attending: Ralph R. Shaw (Chairman), R. E. Buchanan, Walter E. Bangham, John R. Flynn, Arthur E. Gropp (who replaced Carlos Madrid on March 24), and Victor R. Stephen (invited). Also present were John A. Balenger of the Fiscal Division of the Pan American Union, Armando Samper, and Alejandro Mac Lean. The Board reviewed the work done during the previous year, studied ways of increasing the volume of abstracts published, recommended the incorporation of projects on extension publications and visual aids into the scientific communications program, proposed holding a technical meeting of Latin American agricultural librarians, and recommended the compilation of a directory of agricultural experiment stations in Latin America. Finally, the Board recommended the following order of priority for projects to be carried on during the following year: abstract service, extension publications and visual aids, meeting of agricultural librarians, photocopy service, increasing the number of articles published in Turrialba, directory of agricultural experiment stations, extension of the exchange coupon plan, and study of a plan for the publishing of agricultural texts.

### Publications Committee

The Publications Committee held six meetings to study policy on annual and quarterly reports, the abstract service, the bulletin Cacao, the series Comunicaciones de Turrialba, extension publications, the publication of an internal news letter, an information program, distribution of Turrialba, translations, publications budget, operation of the multilith, approval of manuscripts originating from projects performed in cooperation with other agencies, journal subscriptions for the library, and the Information Bulletin. The publications Committee and the Library Committee were combined into one group. Serving as principal members are Jorge de Alba, Julio O. Morales, and Frederick L. Wellman, and as alternates, Paulo Alvim, Ernest H. Casseres (who replaced Emilio Viale on March 11), and Leslie R. Holdridge.

### Personnel

Victor R. Stephen, who as a Visual Aids Specialist of the Technical Cooperation Program collaborated directly with the Service for a year, returned to his post of Manager of Extension Publications at Cornell University on the first of April.

Rogelio Coto Monge, new Extension Information Specialist, who started to work on May 20, and Lola Fernández, new part-time Visual Aids Assistant, replaced him. Both form part of the Field Service Unit of Project 39 of the Technical Cooperation Program and collaborate directly with the Scientific Communications Service.

Armando Samper, Head of the Service, served as Acting Director of the Institute from 14 April to 31 May and from 23 June to 26 September; he was named Deputy Director on 8 December in addition to his regular duties, and he was in charge of the Director's Office from the 10 December until the end of the year. From 4 to 18 October he was in the United States attending the meetings of the Advisory Board and handling official business of the Service.

Ana María Paz joined the Service as Bibliographer on 17 May, replacing Helen George, Information Assistant, who resigned at the beginning of the year. Miss Paz served as secretary to the Acting Director from the 17 December to the end of the year.

Alejandro Mac Lean, in charge of publications, was transferred to the Pan American Union, in line with his functions, from 4 September to the beginning of 1953. Hernán Granados worked part time as photocopy and multilith operator.

#### Equipment and Installations

The photocopy laboratory was inaugurated on the first of June. The unit has a photocopy room, darkroom, dry locker, and work room. It is equipped with a Photostat No. 1 machine, a Kodak Model A microfilm enlarger portable unit for contact reproduction, and a Griscombe microfilm reader. During the year a Multilith No. 1250 press was installed, in cooperation with the Technical Cooperation Program. The stockroom was reorganized, a new system for recording printed publications was initiated, and plans were made for a reorganization of the photographic file.

#### TRAINING

Lola Fernández, of Colombia, received partial training in visual aids from Victor R. Stephen, Visual Aids Specialist of Project 39 of the Technical Cooperation Program of the Organization of American States. Guillermo Combariza, artist of the National Federation of Coffee Growers of Colombia, began a five-months' period of training in visual aids and extension publications in Turrialba, the United States Puerto Rico, and El Salvador, as a scholarship student of the Andean Zone of Project 39. At the Second Center of Extension Training, which took place in San José, Costa Rica, from 6 to 25 April, under auspices of the Institute and the Food and Agriculture Organization of the United Nations, Victor R. Stephen was in charge of the discussion of visual aids and extension publications, and Armando Samper dealt with the administration of extension information services. Mr. Samper gave a course in Technical Writing to graduate and special students of the Institute from January to May.

## COOPERATION AND CONSULTATION

### Pan American Union--Vocabulary Studies and Testing of Fundamental Education Booklets

(Alejandro Mac Lean and Rogelio Coto Monge)

During March Alejandro Mac Lean collaborated in Washington, D.C. with Seth Spaulding, of the Education Division of the Pan American Union, in the preparation of a basic vocabulary for agriculture. Fundamental education booklets prepared by the Division were tried out in the latter part of August with the cooperation of members of the Department of Economics and Rural Life. This work was accomplished in communities of the Canton of Turrialba under the direction of Dr. Spaulding and Dr. Ermilo Abreu Gómez, Chief of the Pan American Bureau of Fundamental Education of the Pan American Union. The booklets are intended as reading material for uneducated Latin American adults who are losing their ability to read because of a lack of suitable material.

#### Brazil

A cooperative agreement was concluded with the Documentation Service of the University of Sao Paulo for the exchange of photocopies and microfilm.

#### Colombia

Through the Field Service Unit of Project 39 of the Technical Cooperation Program of the OAS assistance was given to the National Coffee Research Center (Centro Nacional de Investigaciones de Café) of Chinchiná, Caldas, in its program of extension publications. Victor R. Stephen was in Chinchiná in February helping to develop this program. Cooperative agreements were continued with the Colleges of Agriculture of Medellín and Palmira for the sale of exchange coupons to Colombian technicians to enable them to acquire photocopies in national currency.

#### Costa Rica

Assistance was given, through the Technical Cooperation Program, to the Publications Section of the Ministry of Agriculture and Industries and to the Extension Service (STICA) of the same Ministry in the preparation of certain publications. Rogelio Coto Monge, Extension Editor of the Technical Cooperation Program, cooperated with the Publications Section and the Library of the Ministry in the organization of radio and press information services for farmers.

#### Chile

Information was prepared on the use of radio in agriculture for Washington González, radio commentator of the National Society of Agriculturists.

### El Salvador

Through Keith Himebaugh, an exchange of information of extension publications was maintained with the National Center of Agriculture.

### Nicaragua

The design was made for the first number in a series of leaflets on entomology which was initiated by the Technical Agricultural Service of Nicaragua (STAN).

### Other Countries

The following institutions joined the plan for encouraging the use of abstract journals: the UNESCO Center for Scientific and Technical Documentation in Mexico City; the Department of Agriculture of the Institute of Technology and Higher Studies of Monterrey, Mexico; the School of Agriculture and Veterinary Medicine of Porto Alegre, Brazil; the Experiment Station of Pelotas, Brazil; the Agricultural Experiment Station of Santiago de las Vegas, Cuba; and the Rural University of Kilómetro 47, Brazil.

## ACTIVITIES

### Research

#### Evaluation of Scientific Communications Services (Alvaro Chaparro and Armando Samper)

Alvaro Chaparro, Rural Sociologist, was in Turrialba in the last week of June preparing a preliminary plan of research on the scientific communications services. This study will probably be conducted by means of questionnaires to be filled out by extension agents, professors of agriculture and veterinary medicine, research workers, and institutions (mainly libraries). The sources of information available to the persons answering the questionnaire and their attitude and suggestions will be tabulated in order to evaluate the services rendered.

#### Frequency of Use of Agricultural Journals (Ana María Paz and Armando Samper)

The tabulation and classification of photocopy requests was begun in order to determine which journals are more frequently used by Latin American technicians and to study the relation between the dates of publication and the frequency of use. In addition an exploratory analysis of the frequency of bibliographical citations in a Latin American technical agricultural journal was initiated for the purpose of studying also the frequency of use of various journals. Mrs. Jean Samper tabulated this data.

Bibliographical and Library Services

Abstract Service (Ana María Paz and Angelina Martínez)

A total of 341 abstracts were received during the year, of which 297 were originally prepared by technicians of the Institute and 4 by collaborators in other institutions. In the 4 editions of Turrialba issued during the year, 395 abstracts and annotations covering 25 subjects were published. During the previous year, 310 original abstracts were received and 248 were published.

The abstracts and annotations published during the year had the following origin:

<u>Journal</u> <u>Vol. II</u>	<u>Original</u> <u>Abstracts</u>	<u>Reproductions</u>		<u>Coffee</u> <u>Ref.</u>	<u>Cacao</u> <u>Ref.</u>	<u>Total</u> <u>1952</u>
		<u>from Other Sources</u>	<u>Translated In Spanish</u>			
N° 1	52	4	14	--	--	70
N° 2	49	1	9	--	--	59
N° 3	81	5	7	34	--	127
N° 4	<u>83</u>	<u>6</u>	<u>3</u>	<u>24</u>	<u>23</u>	<u>139</u>
Totals	265	16	33	58	23	395

Of the total of 265 original abstracts 199 were translated into Spanish, having been written originally in English or Portuguese.

In accordance with recommendations made by the Advisory Board of the Service at its November 1951 session that Turrialba should contain complete coverage of five subjects of major interest for agriculture in the Americas, the publications committee chose coffee, cacao, sugar cane, tropical dairy cattle, and chemical products as the initial subjects. The new service was initiated with Vol. 2, No. 3 of Turrialba in which 19 abstracts and annotations and 34 references on coffee were published. In No. 4 of the same volume, 13 abstracts and 23 references on cacao were published. For the selection of the references, it was agreed to include only recent references and articles written originally in the four official languages of the Institute—Spanish, English, French, and Portuguese. Articles of a local character which appeared in magazines of a popular nature were not to be included. Most of the abstracts, annotations, and references were prepared by the Bibliographer of the Service; members of the staff working on coffee and cacao research and the Institute's library staff also collaborated.

Kenneth L. Olsen, Lucy Hastings Gutiérrez, H. C. Thompson, Arnold L. Erickson, and Guillermo Esteves prepared the largest number of abstracts.

Photocopy Service (Ana María Paz and Hernán Granados)

A total of 16,013 pages of photocopy were sent out filling 1,639 orders received from 275 technicians and 82 institutions from 29 countries. Distribution during the year increased by 5,415 pages over the previous year when 10,958 were distributed. In 1950 the distribution had been 5,284 pages, Comparative semestral figures are the following:

	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>
First semester	—	1,072	6,599	5,742
Second semester	<u>827</u>	<u>4,212</u>	<u>4,099</u>	<u>10,271</u>
Totals	827	5,284	10,598	16,013

The Institute Library placed 30 orders for a total of 1,692 pages. A total of 1,267 pages were ordered by the Service and 2,199 by other Departments and technicians of the Institute. The largest number of requests came from Brazil (2,203 pages), Venezuela (1,960), Colombia (1,389), Peru (1,182) and Chile (539). Also requested were 14,426 pages in microfilm, of which 394 were requested by the Institute's library, 28 by Institute technicians, and 4,254 by the Service to be enlarged to normal size in the photocopy laboratory. The largest number of microfilm requests came from Brazil (4,921 pages), Argentina (3,254), and Peru (329).

The orders were filled using mainly photocopy facilities of the Library of the United States Department of Agriculture in Washington, the UNESCO Center for Scientific Cooperation in Montevideo, Uruguay, and after the first of June from our own photostatic laboratory.

The construction and installation of the photocopy laboratory in the south wing of the attic of the Central Building was completed. H. C. Flemer, Chief of the Photocopy Laboratory of the United States Department of Agriculture, was in Turrialba from the 16 to 21 June to inspect the installation and give additional training to the laboratory operator, Hernán Granados. The laboratory consists of a photocopying room, dry closet, work room, and dark room. The equipment consists of a Photostat N° 1 machine, Kodak Model A microfilm enlarger, equipment for contact photocopying, and a Grisco microfilm reader. Requests for journal articles, pamphlets, or books which are available in the Institute library are copied directly in the laboratory; for the others the microfilm is requested from the United States Department of Agriculture and the enlargement is made in Turrialba. The microfilms are donated to the Institute library, thus increasing the present collection.

In Colombia the system of payment by means of exchange coupons, which has facilitated money exchange operations, was continued. Based on success obtained in Colombia, the coupon system of exchange was also started in Uruguay, beginning in October, with the collaboration of the Southern Zone of Project 39 of the Technical Cooperation Program of the OAS which the Institute administers.



Based on recommendations of the Advisory Board at its meeting in Washington in November 1951, new rates were established to put the service gradually on a self-sustaining basis. The new rates, which went into effect on the first of July, are as follows:

**Photocopy:** In the countries where the Scientific Communications Service has established the system of exchange coupons, a uniform price of U.S. \$0.50 per article was established. In the other countries, each person has a free quota of 25 pages of reference and pays U.S. \$0.05 for each additional page. Photocopies of books, pamphlets, etc. also have a rate of U.S. \$0.05 per page.

**Microfilm:** The price of U.S. \$0.10 per journal article was established for the countries where the Service has the coupon system in operation. In other countries, there is a free quota of 125 pages of reference and each additional page is charged for at U.S. \$0.01 per page. Microfilm of bulletins, books, and other material for all countries is charged for at U.S. \$0.01 per page.

It is possible to take care of larger requests free of charge in special cases and when they are related to projects authorized by a particular experiment station or official institution active in research work. A brief explanation is required, however, of the project or work involved.

Because the United States Department of Agriculture discontinued its free microfilm service, the Department's library is referring all such requests to Turrialba.

#### Library (Angelina Martínez)

Acquisition of materials increased in comparison with the previous year. A total of 390 books were ordered and 338 were received as compared with 293 ordered and 216 received during the previous year. The number of serial publications received regularly reached 1,100 of which 500 are periodicals; in 1951, 700 serials were received, of which 476 are periodicals. Of the periodicals, 158 were paid subscriptions and the rest exchange and complimentary subscriptions. In addition, the Library received 1,728 pages of photocopy and 1,273 of microfilm; these are figures a little below those for the previous year. A total of 98 volumes and 3 parts of back numbers to complete collections were purchased, in comparison with 85 volumes and 84 parts in 1951. The circulation statistics of books, pamphlets, journals, and other material for consultation outside the library increased from 6,629 in 1951 to 7,064. Also the library circulated 650 journals among the technicians for the preparation of abstracts.

In regard to bibliographical work, the volume was more or less maintained with the preparation of 884 references for acquisition lists published in Turrialba and 20 bibliographical lists of references and the answering of about 2,000 reference questions. A total of 473 cards were ordered from the Library of Congress of the United States in comparison with 209 in 1951, but only 405 books were catalogued as compared

with 629 in the previous year. The card catalogue was increased by 1,974 entries in contrast to 3,197 in 1951. The larger volume of the previous year represents mainly cards of books already catalogued but which had not yet been received and were filed during the course of the year.

Abstract Journals and Bibliographies (Armando Samper and María Felicia Carro)

A total of 199 subscriptions to abstract journals and bibliographies were given to 36 institutions in 16 Latin American countries. These include principally the libraries of colleges of agriculture and veterinary medicine, Ministries of Agriculture, and agricultural experiment stations. The subscriptions cover 25 different journals. During the year 6 institutions were added to the program, two of these for two years (1952 and 1953), and the other four to receive subscriptions only during 1953. In all, 40 institutions participate in the program.

The libraries have assumed gradually the payment of the subscriptions. This program, for which a special Rockefeller Foundation Grant was received, will end with the renewals for 1953.

Bibliographical Services (Ana María Paz)

The bibliographer of the Service, with the cooperation of the Institute Librarian, compiled at the request of clients of the service, 21 short bibliographies on specific subjects with a total of 562 titles. Copies of 15 additional bibliographies prepared previously, with a total of 380 titles were also sent out upon request. The preparation of these special bibliographies has resulted in various cases to photocopy requests. In 1951 only 13 bibliographies were prepared.

Publications

Turrialba (Armando Samper, Alejandro Mac Lean, and Rogelio Coto Monge)

Volume 2, of Turrialba with four issues, was published during 1952. The volume contains 19 articles and technical notes, 388 abstracts and annotations, 23 biographical notes on authors, 884 references to publications received in the Institute Library, and 52 news items on agricultural science in the Americas. Ten thousand copies or 2,500 per edition were printed. In addition to material originating in the Institute, contributions were also published from Brazil, Costa Rica, Ecuador, Guatemala, Puerto Rico, the United States, and Venezuela. Although Turrialba covers a variety of agricultural subjects, topics principally treated were feeding of cattle in the tropics, cultivation of vegetables, and pests and diseases of tropical crops. Articles on sugar cane, cacao, vegetables, coffee, kenaf, bamboo, derris, milk cows, and swine were published. During the year, 37 manuscripts were considered as compared with 58 in the previous year. Of these, 12 were published, 9 were

definitely discarded, 3 have been approved for publication in coming issues, and 13 are still being studied. Heavy editorial revision is still required. There is now, however, better orientation as to what kind of articles are appropriate for the journal. Although Turrialba was established to offer an outlet of fairly wide inter-American and international circulation to technical articles written in Spanish, it seems to appeal more to English-speaking writers. Of the 37 manuscripts considered during the year, 28 were written in English. This has created a problem of technical translations.

The number of copies regularly delivered has increased constantly, although slowly. From 233 in January of 1951, distribution increased to 754 in January of 1952 and to 813 in October of 1952. Exchange deliveries have been maintained by the Library at the same level (140); courtesy subscriptions to libraries of institutions increased (467), and paid subscriptions were lower (206). Turrialba continues to be read primarily, therefore, through libraries.

#### Farm Management Text (María Felicia Carro)

The book Administración Rural by John A. Hopkins was published on 15 February by Editorial Atlante, S.A. in Mexico City. The Institute sold 178 copies of the book directly to institutions and technicians and distributed 67 complimentary copies. Editorial Atlante, which is in charge of sales to booksellers, has sold 451 copies as of November 1952.

#### Information Bulletin (Alejandro Mac Lean and Rogelio Coto Monge)

The Spanish edition of the Information Bulletin is published monthly and the English edition quarterly. The Spanish editions carried 37 items, 10 of which pertained to Project 39 of the Technical Cooperation Program of the OAS. The English edition carried 11 items, 3 of which were related to the Technical Cooperation Program.

The November issue of the Spanish edition was sent to 1,768 addresses, which means an increase of 374 over the 1,421 at the end of 1951. The English edition for the third quarter was sent to 1,088 addresses, which constitutes an increase over the 982 addresses in existence at the end of 1951.

#### Carta Aérea

The Carta Aérea is an advance printing of the Spanish edition of the Information Bulletin which is sent by air mail to 46 Latin American newspapers. In 1951 it was sent to 23.

#### Cacao (Paulo Alvim, Alejandro Mac Lean, and Rogelio Coto Monge)

This publication was renewed in the month of March with an edition of 12 pages which covered the 12 numbers corresponding to the year 1951.

Since the publication was suspended one year, in this way its continuity with reference to numbers and dates was not disturbed. During 1952 it was issued three times in English as well as in Spanish (January-March, Vol. 2, Nos. 25-27; April-September, Vol. 2, Nos. 28-33; and October-December, Vol. 2, Nos. 34-36).

One edition, that of April-September, was dedicated in full to a summary of the results of the Fourth Meeting of the Inter-American Technical Cacao Committee which took place in Ecuador from the 9 to 16 June; the other numbers contain all information items pertaining to cacao. The mailing list at the end of the year included 545 recipients of the bulletin in English and 790 in Spanish.

Comunicaciones de Turrialba (Armando Samper and Anna Marie Dye)

This new series of mimeographed publications was begun in the month of March, following a suggestion of Director Allee and after study by the Publications Committee. The Comunicaciones are prepared by the respective Departments in answer to requests which they receive for information. They are not necessarily based on research carried out at this Institute and are usually of a preliminary nature.

During the year, 26 numbers were published, of which 5 were printed in English only, 9 in Spanish only, and 12 in both languages.

The Comunicaciones issued during 1952 correspond to the following administrative units:

Cacao Center	13
Department of Economics and Rural Life	5
Scientific Communications Service	4
Plant Industry Department	3
Office of the Director	<u>1</u>
Total	26

Reprint Series (Alejandro Mac Lean and Rogelio Coto Monge)

Nine titles were added to the list during the year. A total of 2,074 copies was distributed, which signifies an increase of 598 over the year 1951 when 1,476 copies were sent out.

Those which had the greatest demand were: "Chemical Weed Control in Coffee" by Ora Smith, Joseph R. Orsenigo, and Milton E. Gertsch; "Bases económicas para la investigación sobre café y cacao" (Economic Bases for Coffee and Cacao Research) by Julio O. Morales and L. Paul Oechli; "Sequent Occupance, Turrialba Central District, Costa Rica"

by Paul C. Morrison and Jorge León; "La Productividad de las razas Jersey y Holstein en clima tropical húmedo y bajo un régimen de estabilización completa" (Production of Jersey and Holstein Cows in the Humid Tropics under Complete Stabilization) by Guillermo L. Narváez; "Ensayos de engorde de cerdos con raciones a base de maíz, yuca y bananos" (Fattening Pigs on Corn, Yuca, and Bananas) by Jorge de Alba; "Un programa de selección para coffee arabica" (A Selection Program for Coffea Arabica) by Manuel Elgueta; "The Development of Dairy Breeds for the Tropics" by A. O. Rhoad; "Graneros para la América Tropical" by Norton C. Ives; "Un nuevo tomate para los trópicos" (A New Tomato for the Tropics) by Joseph L. Fennell; and "Pruebas de variedades de hortalizas para los trópicos húmedos" (Production of Tomato Varieties for the Humid Tropics) by E. H. Casseres and Pedro J. Linares.

Annual Report (Alejandro Mac Lean, Anna Marie Dye, and Rogelio Coto)

In accordance with the procedure established beginning this year, the Scientific Communications Service edits and publishes the Annual Report in direct cooperation with the Director's Office and the Office of the Secretary at the Pan American Union. Each Department Head prepares his own report following the outline approved by the Publications Committee. The preparation of the 1951 Annual Report was delayed considerably due to the time necessary for translating portions of it. The Spanish edition was published in November, with 1,000 copies printed. A summary in English was included in the series Comunicaciones de Turrialba.

Original Manuscripts Approved by the Publications Committee and Manuscripts Registered (Armando Samper, María Felicia Carro and Ana María Paz)

The Publications and Library Committee approved 9 manuscripts during the year. Of these, five were approved for publication in Turrialba, two for presentation at technical conferences, one for publication in a journal published in the United States, and one for inclusion in the rural sociology manual under preparation by the Department of Economics and Rural Life. This marked a decrease in comparison with the previous year during which 18 originals were approved.

Seventy-one manuscripts were received for registration in the Service during 1952. Sixty-two were received in 1951. These manuscripts are annual and quarterly reports, papers to be presented at international conferences and meetings, reports on research, and other reports prepared by members of the technical staff of the Institute.

Information Service

Press (Rogelio Coto)

A press release service was initiated on 31 May. The releases are mimeographed on special paper with a green masthead designed to attract the attention of the newspaper editors when it reaches their desks.

From May to December a total of 13 releases covering 20 items was sent out. Twelve of these items refer to activities of the Research and Teaching Program and 8 to the Technical Cooperation Program. The list of newspapers in the Americas receiving these reports in the month of December totaled 202 addresses.

Publications Folders (Alejandro Mac Lean and Rogelio Coto Monge)

These folders, designed especially to distribute information on the Institute and samples of publications to visitors, have proved to be very useful. A total of 293 had been handed out by December.

Illustrated Booklets (Lola Fernández, Rogelio Coto Monge, and Armando Samper)

Illustrated booklets, with little text, were prepared on the functions of the Scientific Communications Service and on Project 39 of the Technical Cooperation Program. They were reproduced in photocopy and distributed to members of the Administrative Committee of the Institute and to the delegates of the Inter-American Economic and Social Council of the Organization of American States all of whom were in Turrialba in the latter part of September. They were also distributed to the members of the Advisory Board of the Scientific Communications Service which met in October. A folder containing samples of the extension publications prepared by national agencies in cooperation with specialists of Project 39, with explanatory texts, was also prepared and distributed.

Registry of Visitors (Anna Marie Dye)

A registration desk for visitors was placed in the Central Office and cards were begun to be used in place of the registration sheets previously used. During the year 314 visitors from 27 countries and 6 international agencies were registered.

Correspondence

The volume of letters and cards mailed out increased from 2,345 in 1951 to 2,634 in 1952. These may be itemized as follows:

	<u>Letters</u>	<u>Cards</u>	<u>Total</u>
First semester	960	234	1,194
Second semester	<u>992</u>	<u>448</u>	<u>1,440</u>
	1,952	682	2,634

A registry of letters received was initiated as a further measure to gauge the demands on the Service. From August to December, 612 letters were received.

### Extension and Visual Aids<sup>1/</sup>

#### Publications (Victor Stephen, Rogelio Coto Monge and Lola Fernández)

Distribution was made of the leaflet "La semilla desinfectada aumenta sus ganancias" (Disinfected Seed Increases Profits) with a sheet of instructions on the different ways in which it could be used and reproduced. With it was sent a circular "Recommendations for the Disinfection of Seeds" (Comunicaciones de Turrialba No. 13) prepared for this purpose by Lucy Hastings Gutiérrez. This was a trial intended to determine to what extent it is possible to prepare an extension publication for use in several countries and what difficulties are encountered. The Ministry of Agriculture and Industries of Costa Rica and the Technical Agricultural Service of Nicaragua printed the leaflet, and requests for the mats have been received from other countries.

With the publication of Extension Bulletin No. 1, "Como se hace una exhibición portátil" (How to Make a Portable Exhibit Case), a new series was initiated. This series is intended to give extension agents, extension editors, and other interested parties ideas on how to handle their work more easily and more effectively. The bulletin was sent to all the extension agents of the Ministry of Agriculture of Costa Rica, through STICA, with a brief questionnaire to determine the applicability of the information given. Several extension agents built their own portable cases and are using them in their work.

#### Exhibits (Lola Fernández and Rogelio Coto Monge)

The presentation of exhibits was begun on the Scientific Communications Service bulletin board with the double purpose of giving information and accumulating experience. It is thought that extension agents can develop a serviceable educational medium by way of simple bulletin boards. Eleven exhibits were presented during the year.

#### Editorial Services and Visual Aids (Victor Stephen, Rogelio Coto Monge, and Lola Fernández)

Two extension publications of the Ministry of Agriculture and Industries of Costa Rica and 11 miscellaneous items were edited. Five announcements of regular and international courses were designed and printed, and 25 different visual aids items such as assorted designs, posters, illustrated graphs, flash cards, and illustrations, were completed.

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<sup>1/</sup> This work was conducted in cooperation with the Field Service Unit of Project 39 of the Technical Cooperation Program of the Organization of American States which is administered by the Institute.

PUBLICATIONS

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Samper, Armando. Administración de los servicios informativos de extensión. Segundo Centro de Entrenamiento de Extensión. Comunicaciones de Turrialba No. 24, November 1952.

\_\_\_\_\_, Conferencias sobre redacción técnica. January-May 1952. (Mimeographed)

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ORTON MEMORIAL LIBRARY

Catherine Noël James  
(Acting Librarian)

INTRODUCTION

A review of the work accomplished during 1952 shows definite progress in the growth of the services provided to our personnel and students. All the library routines proceeded as usual with emphasis on the main objectives of the library services as pointed out in our report for 1951.

ORGANIZATION AND ADMINISTRATION

Personnel

Catherine Noël James, Assistant Librarian, went to England and the United States in August-September on her vacation. The Librarian started on her vacation in the latter part of December and was away when this report was prepared.

Improvements and Equipment

New Stack Room

After the collection was moved over to the new stack room, it was found necessary to order 4 more stacks to be made in the carpentry shop to furnish additional space for the publications.

Reading Room

A plan is under consideration whereby new magazine racks could be made to accommodate the journals in the Reading Room; the racks now in use are too small to hold all the current issues being received in the Library. It is proposed to place these racks in the center of the Reading Room and thus allow the much-needed space along the walls for extra reference shelves.

A set of Mitten's Display Letters was purchased and is proving most useful for all Library notices, etc.

TRAINING

During the latter part of 1952 the Librarian gave a course on the Use of the Library and Preparation of Bibliographies. The principal aim of this course was to familiarize the graduate students with the organization of the library collection, the literature in their subject fields, and bibliographic methods.

## COOPERATION AND CONSULTATION

The Librarian prepared a statement regarding the means of cooperation that the Institute Library could render to the Zone Offices of the Technical Cooperation Program (Project 39 of the Organization of American States). This statement was discussed at the meeting of the Executive Committee and the Zone Directors, and the recommendations presented were approved in principle.

Requests for photostatic copies of scientific articles were received from the Ministry of Agriculture and the College of Agriculture in Costa Rica. These requests were verified and passed to the Scientific Communications Service for attention. The Library is actively cooperating with the Photostatic Laboratory of the Scientific Communications Service by supplying many of the publications needed to fulfill the requests for photostatic copies.

## ACTIVITIES

### Circulation

Some 7,064 bound and unbound publications were borrowed for use outside the Library in 1952. The annual circulation statistics subdivided by types of publications, are as follows:

Books	3,171
Pamphlets	1,170
Photocopies	368
Theses	309
Journals	<u>2,087</u>
Total	7,064

Eighty-six publications were placed on reserve for the courses on Plant Pathology, Plant Physiology, Tropical Dendrology, and Use of the Library and Preparation of Bibliographies. These publications were used in the Library during the day and could be borrowed for overnight use.

Although no actual figures can be quoted, it was observed that there was a definite increase in the number of publications consulted in the Library during the year.

Six hundred and fifty journals were circulated to the members of the staff for the preparation of abstracts for the journal Turrialba.

### Reference Work

About 20 bibliographical lists were prepared by the Librarian during the year. Some of these were prepared at the request of staff members and students. Selected lists of accessions totaling 884 .

entries were prepared for inclusion in Vol. 2, numbers 1, 2, 3 and 4 of Turrialba. Bibliographic citations to 341 abstracts for inclusion in Turrialba were also prepared.

About 2,000 reference questions were handled by the Librarian and her Assistant.

### Acquisitions

#### Books

During the year orders were placed for 280 book titles, comprising 390 volumes. Of these 190 titles (207 volumes) were received. From previous orders 148 titles (152 volumes) were received, making a total of 338 book titles received in 1952.

Several fiction and non-fiction books were donated to the Library by the Turrialba Book Exchange Club. Several volumes (some complete, others incomplete) of publications of the now extinct International Institute of Agriculture were given to the Library by the United States Department of Agriculture Library and the Pan American Union in Washington. A number of miscellaneous publications were given to the Library by the United States Department of Agriculture Rubber Station in Turrialba.

#### Photostatic Copies

Thirty-five orders for photostatic copies comprising 1,728 pages and 24 orders of microfilm comprising 1,273 pages were placed during the year.

#### Serials and Subscriptions

About 1,100 serials were received in the Library by the end of 1952, of which over 500 were journals. Five new paid subscriptions were received in 1952, bringing the total number of paid journal subscriptions to 158. Thirteen new subscriptions were also added to the number of paid subscriptions to be received in 1953. The rest of the serials are received on exchange and on a complimentary basis.

#### Back Files of Journals

Ninety-eight volumes and 3 parts of back files of journals were ordered as follows:

Bibliography of Agriculture	10 vols.
Helminthological Abstracts	18 vols.
International Bibliography of Agriculture	8 vols.
Journal of Dairy Science	22 vols.
Journal of Economic Entomology	20 vols.
Nutrition Abstracts & Reviews	8 vols. and indexes to vols. 18 & 19
Plant Breeding Abstracts	1 vol.
Review of Applied Entomology (Series B)	1 part
Soil Science	11 vols.

Each year we are able to report some progress in filling the gaps of our incomplete journal collection and have managed in some cases to acquire complete sets of journals.

### Pamphlets

Several thousand pamphlets, from experiment stations, colleges of agriculture, departments of agriculture, etc. were received from all parts of the world during 1952.

## Preparation of the Material

### Library of Congress Cards

Four hundred and seventy-three sets of Library of Congress cards were ordered through the Library of the Pan American Union.

### Classification and Cataloging

Four hundred and five books were cataloged and 1,974 cards were added to the records.

### Binding

One hundred and thirty-four volumes were bound in San José, and about 500 pamphlets, reprints, theses, and photocopies were bound in the Library using stiff cardboard covers.

## TRAINING PROGRAM

Luis Carlos Cruz Riascos

### INTRODUCTION

The educational activities of the Inter-American Institute of Agricultural Sciences increased considerably this year. To the students regularly trained at Turrialba there were added those participating in the international and national courses given by the Technical Cooperation Program (Project 39 of the Organization of American States).

This year 960 students from the Western Hemisphere and other parts of the world received training in various scientific disciplines. Of this total 234 were students of the international courses and 650 of national courses given in Chile, Costa Rica, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Puerto Rico, and Uruguay; 25 were graduate students resident in Turrialba working toward the Magistri Agriculturae degree given by the Institute; 1 was a graduate student who came for six months' special training and did not seek a degree; 24 were vocational agricultural students; 17 were special students; 5 were registered in universities in the United States and came to Turrialba to work on their theses for graduate degrees; and 4 who had received training at the Institute were sent to the United States for further studies. These 960 students came from 29 countries and territories of the world.

Sixteen different institutions contributed fellowships for the majority of the students, and 23 staff members of the Institute served as their advisors and directed the national and international courses presented during the year. The tables presented in this report give a clearer picture of the students trained and the courses offered by the Institute.

### ORGANIZATION AND ADMINISTRATION

The following were members of the Admissions Committee: Paulo de Tarso Alvim, William Q. Loegering, Mario Gutiérrez, Emilio Viale, the Head of the Department under which the student concerned will study, and the Registrar.

The graduate Study Council was composed of the following staff members: H. C. Thompson (Chairman), William Q. Loegering (replacing Frederick L. Wellman who was absent on a world trip), Paulo de Tarso Alvim, Jorge de Alba, Emilio Viale (replacing Julio O. Morales who was on sabbatic leave), Armando Samper, and the Registrar who served as secretary of the Council.

The Student Council was composed of Gerardo Budowski, President; Guillermo Esteves, Vice President; Octavio Fernández, Secretary; Julio Bielich and César Pérez, Members; and Rafael González and Alfonso Bullón, Alternates. Representatives of the Institute on the Student Council were Emilio Viale and Paulo de Tarso Alvim.

The staff of the Registrar's office consisted of Luis Carlos Cruz Riascos, Registrar and Molly Fonseca, Secretary.

**STUDENTS REGISTERED IN THE INSTITUTE 1946-1952**

(By Countries and by Years)

<u>Country or Territory</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>
Argentina							10
Bolivia	1						4
Brazil					2		11
Canada			1				
Chile							29
Colombia	2	1		4	1	3	9
Costa Rica		1	5	2	1	15	26
Cuba							1
Dominican Republic	1						
Ecuador			2	3	3	2	10
El Salvador						5	11
Finland				1			
French Guiana							1
Guatemala	1		1	3		14	10
Haiti		2		2	1	2	11
Holland							1
Holy See							1
Honduras			1		1	4	14
Liberia - Africa							1
Mexico	2	1	4	4	2		35
Nicaragua	1	1			2	6	11
Panama				1		3	5
Paraguay						1	13
Peru				1	2		6
Philippine Republic				2			
Surinam				1			
United States of America		2	8	5	7	3	8
United States - Puerto Rico							5
Uruguay							24
Venezuela		1	24	17	5	32	53
Totales	8	9	46	46	27	90	310

In this table the number of students registered each year is indicated without considering those who registered in previous years and may have stayed over for an additional period of study, except in the case of 1952 in which there appear students registered during the year as well as those registered during a prior year but still studying under the Institute. For the years 1951 and 1952 there are included students of the international courses offered by the Technical Cooperation Program (Project 39 of the Organization of American States).

Students Registered in the Various Courses Offered by  
the Institute

(By Fields of Study and by Years)

<u>Field of Study</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>
Economics		1	29	21	10	54	39
Plant Industry	5	7	14	24	15	9	33
Animal Industry	1	1	3		1	1	3
Agricultural Engineering	2						
Scientific Communications				1	1		1

International Courses

Preservation and Storage of Food Crops Costa Rica, Nov.6-Dec.19/51						13	
Forestry Guatemala, Nov.12-Dec. 8/51						13	
Agricultural Extension Costa Rica, Nov.1/51-March 22/52							16
Agricultural Extension Center Costa Rica, Apr.6-Apr.25/52							21
Livestock and Range Management Mexico, Jun.8-Jun.28/52							44
Home Economics Puerto Rico, Feb.15-Jul.19/52							21
Vocational Agriculture Costa Rica, Nov.5/51-Aug.20/52							14
Agricultural Extension and Rural Sociology Uruguay, Sept.1-Oct.30/52							38
Study, Management, and Conserva- tion of Soils Chile, Aug.25-Nov.25/52							44
Tropical Forestry Honduras, Nov.11-Dec. 6/52							21
Irrigation and Drainage Costa Rica and El Salvador, Oct.27-Dec.20/52							<u>15</u>
Totals	8	9	46	46	27	90	310

Note: Students of national courses are not included.

GRADUATE STUDENTS REGISTERED DURING 1952

Candidates for the Doctor of Philosophy Degree

Alvaro Chaparro (Colombia) - Finished his studies in Rural Sociology at Pennsylvania State College. In June 1952 he returned to the Institute to review his thesis project which will be carried out in Colombia. Assigned to the Department of Economics and Rural Life of the Institute, upon completion of his thesis work, he will receive the Ph.D. degree from Pennsylvania State College.

Cristóbal Navarrete (Colombia) - Obtained his Magistri Agriculturae degree from the Institute in 1951 and will continue his studies in Plant Physiology at Iowa State College to obtain the Ph.D. degree. He is assigned to the Plant Industry Department.

\*Manuel Alers-Montalvo (U.S.A.-Puerto Rico) - Is doing his thesis work in Rural Sociology to obtain the Ph.D. degree from Michigan State College. He is assigned to the Department of Economics and Rural Life.

William Neel (United States of America) - Is doing his thesis work on the tórsalo (Dermatobia hominis L. Jr.) to obtain the Ph.D. degree from Texas State College of Agriculture and Mechanical Arts. He is assigned to the Plant Industry Department.

Oliver Newton (United States of America) - Finished his thesis work in Plant Physiology to obtain the Master of Science degree from Howard University, Washington, D.C. During his stay at the Institute he was assigned to the Plant Industry Department. Returning to the United States in May, 1952, he entered the University of Southern California to study for his Ph.D. degree.

Charles Proctor (United States of America) - Is doing his thesis work in Rural Sociology to obtain the Ph.D. degree from Michigan State College. He is assigned to the Department of Economics and Rural Life.

Candidates for the Master of Science Degree

Carlos Montañéz (Colombia) - Is continuing his studies in Rural Economics at the University of Wisconsin in order to obtain the M.S. degree. He is assigned to the Department of Economics and Rural Life.

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\* Those marked with \* arrived at the Institute for the first time in 1952.



Carlos Manuel Castillo (Costa Rica) - Is continuing his studies in Economic Land Use at the University of Tennessee in order to obtain the M.S. degree. He holds an Institute fellowship sponsored by the Northern Zone of the Technical Cooperation Program and is assigned to the Department of Economics and Rural Life.

\* Linda Jean Nelson (United States of America) - Is doing her thesis work in Home Economics in order to obtain the M.S. degree from Iowa State College. She is assigned to the Department of Economics and Rural Life.

Candidates for the Magistri Agriculturae Degree  
of the Institute

<u>Name</u>	<u>Country</u>	<u>Department</u>	<u>Advisor</u>
* Remberto Herbas	Bolivia	Plant Industry	William Loegering
* Armando Huerta	"	"	Paulo de Tarso Alvim
* Marcial Machicado	"	"	Paulo de Tarso Alvim
* Carlos Montellano	"	"	Charles Batchelder
* Geraldo Chaves	Brazil	"	John R. Havis
* Idelbrando Nascimento	"	"	Paulo de Tarso Alvim
* Rafael González	Colombia	"	Emilio Viale
* César Pérez	"	"	Leslie Holdridge
Octavio Fernández	"	"	Rodrigo Orellana
** Eddie Echandi	Costa Rica	"	Frederick Wellman
Jorge Quirós	"	Animal Industry	Jorge de Alba
Walter Rivero	"	Plant Industry	Charles Batchelder
* Sócrates Bermúdez	Ecuador	"	Donald Fiester
* Jaime Díaz	"	Economics and Rural Life	Fernando del Río
* Jorge Soria	"	Plant Industry	Mario Gurtiérrez
* Germán Valenzuela	"	Economics and Rural Life	Fernando del Río
* José Villafuerte	"	Plant Industry	Paulo de Tarso Alvim
* Carlos Tapia	Mexico	Animal Industry	Jorge de Alba
Jaime Basadre	Peru	"	Jorge de Alba
* Julio Bielich Nash	"	Plant Industry	B. B. Robinson
* Oscar Bullón	"	"	John R. Havis
Donald Fiester	United States	"	Pierre Sylvain
John Reark	"	"	Leslie Holdridge
* Davis L. Rianhard	"	Economics and Rural Life	Julio O. Morales
Guillermo Esteves	United States Puerto Rico	Plant Industry	Kenneth L. Olsen
* Gerardo Budowski	Venezuela	"	Leslie Holdridge

\* Those marked with \* arrived at the Institute for the first time in 1952.

\*\* Upon leaving the Institute, he went to the University of Wisconsin to work for his Ph.D. degree.

Students Who Received the Magistri Agriculturae  
Degree in 1952

Eddie Echandi Z. (Costa Rica) - Worked under the direction of Frederick L. Wellman and wrote a thesis entitled "Determinación y estudios de los organismos causantes de dos enfermedades de papa, La Maya (Pseudomonas solanacearum) y podredumbre suave (Bacterium carotovotum). He took his final examination on 21 May 1952.

Donald R. Fiester (United States of America) - Worked under the direction of Pierre G. Sylvain and wrote a thesis entitled "Some Aspects of the Asexual Propagation of Coffee by Cuttings". He took his final examination of 23 November 1952.

John Reak (United States of America) - Worked under the direction of Leslie R. Holdridge and wrote a thesis entitled "The Forest Ecology of the Reventazón Valley". He took his final examination on 21 March 1952.

SPECIAL STUDENTS REGISTERED DURING 1952

<u>Student</u>	<u>Country</u>	<u>Department</u>	<u>Advisor</u>
*Guillermo Combariza	Colombia	Sci. Com. Service	Rogelio Coto
*Francisco Montoya	Costa Rica	Economics and Rural Life	Ralph Loomis
Ma. Eugenia Peralta	"	Plant Industry	Paulo de Tarso Alvim
**José A. Trejos	"	Economics and Rural Life	Fernando del Rfo
**Julio Valerio	"	"	Juvenal Valerio
Cristóbal Vega	"	"	Julio O. Morales
Homero Castro	Ecuador	Plant Industry	Paulo de Tarso Alvim
Rodrigo López	"	"	William Loegering
Servando Rivera	Guatemala	"	B.B. Robinson
*Tom van der Zwet	Holland	"	Donald Fiester
*John Maximore	Liberia	"	Members of the Institute Technical Staff
José Maricevich	Paraguay	"	" "
*Manuel Lescano	Peru	"	Members of the Staff of the USDA Rubber Station
*Carlos Ruiz	"	"	" "
*Thomas Liles	United States	"	Alto Royer
*José A. Briceño	Venezuela	Economics and Rural Life	Juvenal Valerio
**Fortunato Colmenárez	"	"	Fernando del Rfo

\* Arrived at the Institute for the first time in 1952.

\*\* Attended international courses given in Costa Rica by the Northern Zone of the Technical Cooperation Program.

VOCATIONAL STUDENTS REGISTERED DURING 1952

<u>Student</u>	<u>Country</u>	<u>Department</u>	<u>Advisor</u>
*Eladio Andrade	Venezuela	Economics and Rural Life	Juvenal Valerio
*Francisco José Acosta	"	"	Fernando del Río
*Juan Acosta Falcón	"	"	" "
*Maximiliano Arellano	"	"	" "
*Eulogio Báez	"	"	" "
*Jesús Berro	"	"	" "
*Antonio Castillo	"	"	Juvenal Valerio
*José A. Castillo	"	"	" "
*Torcuato Colmenárez	"	"	" "
Julio C. Contreras	"	"	Fernando del Río
Diego Rafael Correa	"	"	Juvenal Valerio
*Ana D'Arthenay	"	"	Fernando del Río
*Domingo D'Arthenay	"	"	" "
*Gonzalo García	"	"	" "
*Francisco González	"	"	Juvenal Valerio
*Simón Linares	"	"	Fernando del Río
*Carlos Maldonado	"	"	" "
*Domingo Márquez	"	"	" "
Dimas Martínez	"	"	Juvenal Valerio
Juan Pastor Silva	"	"	Fernando del Río
*Pánfilo Rondón	"	"	Juvenal Valerio
Víctor M. Salazar	"	"	" "
Carmelo Sánchez	"	"	" "
*Francisco Tosta	"	"	" "

STUDENTS REGISTERED IN INTERNATIONAL COURSES OF THE  
TECHNICAL COOPERATION PROGRAM IN 1952

Agricultural Extension Center

(Course Presented in Costa Rica by the Northern Zone)

Leader: Fernando del Río

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Luis Ciudad	Chile	Lawrence Coen	Holy See
Waldo Parada	"	Manfredo Fajardo	Honduras
Edgar Mata	Costa Rica	José David Matute	"
Víctor Manuel Pérez	"	Rodrigo Salmerón	Nicaragua
Eduardo Montero	El Salvador	Antonio Pérez	U.S.A., Pto. Rico
Telmo R. Sánchez	"	Federico Rolfo	Uruguay
Salvador Velázquez	Guatemala	Juan Acosta F.	Venezuela
Roger Vincent	French Guiana	Jesús Berro	"
Marc Frederic	Haiti	Fortunato Colmenárez	"
Berthony Vieux	"	Domingo D'Arthenay	"
		Juan Pastor Silva	"

\* Arrived at the Institute for the first time in 1952.

\* Attended international courses given in Costa Rica by the Northern Zone of the Technical Cooperation Program

Modern Methods of Livestock and Range Management

(Course Presented in Mexico by the Northern Zone)

Leader: Jorge de Alba

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Adalberto Carrillo	Costa Rica	Jorge Escobar	Mexico
Napoleón Murillo	"	Homero Gaona	"
Atilio Martelli	El Salvador	Dagoberto González	"
Pedro Cuellar	"	Gonzalo González	"
Antonio Velázquez	"	Alberto Güerere	"
Jean Ed Roy	Haití	Manuel Guzmán	"
Tancrede Narcisse	"	Jesús Hernández	"
Francisco Matamoros	Honduras	Jaime Leal	"
Hernán Pinel	"	Genaro Morales	"
Edgar Acevedo R.	Nicaragua	Mario Narro	"
Raúl Prado Ruiz	"	Jacobo Ortega	"
César Santamaría	Panama	Arnulfo Pérez	"
Isidro Vergara	"	Gaetano Rebonato	"
Júpiter Barrera	México	Armando Rodríguez	"
Federico Berrueto	"	Roberto Rodríguez	"
Francisco Castañeda	"	Carlos Sáenz	"
Miram Castro	"	César Sánchez	"
Baldomero Córdoba	"	Jorge Santamaría	"
Jorge Corona	"	Florencio Siller	"
Fernando Corostieta	"	Rodolfo Siller	"
Juan de la Torre	"	Carlos Tapia	"
Raúl Díaz	"	Fernando Vásquez	"

Home Economics

(Course Presented in Puerto Rico by the Northern Zone)

Leader: Lydia J. Roberts, University of Puerto Rico

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
*Pilar Valenzuela	Chile	Ma. Ignacia Calero	Nicaragua
Inés Acosta de Ramsay	"	Delia Moreno	Panama
Carmen Sofia Torres	Colombia	Violeta Sarli	Uruguay
Fidelina Sibaja	Costa Rica	Lilia Capobianco	Venezuela
Berta Solera	"	Elda Dupuy	"
Mercedes Morán	El Salvador	Emma Guevara	"
Ana Lauretta Díaz	Guatemala	Clotilde Lizausaba	"
Aura Raquel Girón	"	Cándida Machado	"
*Louise Lerebours	Haití	Lina Rojas	"
Gloria Carvajal	Honduras	Austria Salazar	"
Dina Rodezno	"		

\* Did not complete the course on account of illness.

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Agricultural Extension

(Course Presented in Costa Rica by the Northern Zone)

Leader: Fernando del Río

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
José A. Trejos	Costa Rica	Edgar Acevedo	Nicaragua
Jaime Chacón	El Salvador	Daniel Zamora	"
Rodil Romero	"	Marcelo Augusto Pérez	Panama
José Luis Gómez	Guatemala	Juan Acosta F.	Venezuela
Salvador Velásquez	"	Jesús Berro	"
Lydia de Velásquez	"	Fortunato Colmenárez	"
Max Armand	Haiti	Domingo D'Arthenay	"
Roger Cantavo	"	Ana D'Arthenay	"

Vocational Agriculture

(Course Presented in Costa Rica by the Northern Zone)

Leader: Fernando del Río

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Bolívar Cruz	Costa Rica	Maximiliano Arellano	Venezuela
José A. Trejos	"	Eulogio Baéz	"
Luis R. Barahona	Honduras	Simón Linares	"
León A. Ortega	"	Gonzalo García	"
*José A. Ruiz	Nicaragua	Carlos Maldonado	"
Efrán Rodríguez	Panamá	Domingo Márquez	"
Francisco José Acosta	Venezuela	Juan Pastor Silva	"

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\* Did not complete the course because of reassuming his duties in Nicaragua.

Agricultural Extension and the Fundamentals of Rural Sociology

(Course Presented in Uruguay by the Southern Zone)

Leader: H. C. Ramsower

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Luis A. Castelli	Argentina	Luis Orlando	Paraguay
Carlos D. Cuccioli	"	Marcial Persano	"
Manuel A. Gondell	"	Rogelio Vargas	"
Mario Griot	"	Leonel Arambillete	Uruguay
Antonio Verdejo	"	Luis Alberto Barros	"
Wilson Cardoso Alves	Brazil	Edin Raúl Castro	"
Paulo da Silveira	"	Tomás di Matteo	"
Carmelo Lindoso de Aguiar	"	Galileo Garibotto	"
Eduardo Sefer	"	Tomás Guarino	"
Jorge Boltón	Chile	Mario Jaunicó	"
Ramón Briceño	"	Cirilo Larrosa	"
Hernán Frías	"	Francisco Mosquera	"
Daniel Poblete	"	Atalivar Murialdo	"
Enrique Riveros	"	Omar Odiozabal	"
Emilio Williams	"	Octavio Pérez	"
Ceferino Aranda	Paraguay	José Luis Sala	"
Eustaquio Aguilera	"	Luis A. Sancassano	"
Roberto López	"	José Ma. Torielli	"
Ubaldo López	"	Mario E. Villagrán	"

Study, Management, and Conservation of Soils

(Course Presented in Chile by the Southern Zone)

Leader: Antonio Arena

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Carlos A. Alacid	Argentina	Rubén López	Chile
Mario J. Amor Asunción	"	Mario Peralta	"
Constante G. Bonfils	"	Eufemia Riveros	"
Oscar Julio Guedes	"	Enrique Russi	"
Francisco Rigalt	"	Inés Sotomayor	"
Luis Albano Coelho	"		
de Souza	Brazil	Luis Toledo	"
Waldemar Mendes	"	Armando Vieira Volpi	"
Herculano Penna Medina	"	Alberto José Torres	Costa Rica
Clovis Silva Fernández	"	Mario Hidalgo L.	Ecuador
Joao Wanderley de Costa Lima	"	Julio Peña Herrera	"
Sergio Alcayaga	Chile	Pedro Dávalos	Paraguay
Jorge Astudillo	"	José Gill Estigarribia	"
Luis D. Cantreras	"	Melanio González	"
Luis Stgo. Carvajal	"	Casimiro Segovia	"
Gabriel Cereceda	"	Norberto E. Vuyk	"
Isable S. Cristobal	"	Juan Escobedo	Peru
Benito Cuadrado	"	Angel Barrera	Uruguay
Raúl Davanzo Angulo	"	Carlos Miguel Cussac	"
Juan Diemer	"	Luis de León	"
Oscar Flores	"	Oscar López Taborda	"
Mario Garrido	"	Juan Carlos Molinelli	"
Tomas Lermada	"	Eddie Risso Brum	"

Irrigation and Drainage

(Course Presented in Costa Rica and El Salvador by the Northern Zone)

Leader: Norton C. Ives

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
Guillermo Cabrera	Costa Rica	Emile Corneille	Haití
Yanuario Matamoros	"	Pierre Paul Toussaint	"
Rodrigo Sáenz	"	Julio A. Fasquelle	Honduras
Oscar Vargas Vaglio	"	Andrés Maldonado	Mexico
Victor Manuel Vásquez	El Salvador	Guillermo Rodríguez	"
Roberto Zúñiga Guidos	"	Emilio Morales Cruz	Nicaragua
J. Efraín Guzmán	Guatemala	Hildebrando Padilla	"
		Antonio Fuentes C.	U.S.A., Pto. Rico

Tropical Forestry

(Course Presented in Honduras by the Northern Zone)

Leader: Leslie R. Holdridge

<u>Student</u>	<u>Country</u>	<u>Student</u>	<u>Country</u>
*César Pérez	Colombia	Rafael Castillo	Honduras
Alfonso Campos	Costa Rica	Germán Ferrary	"
Carlos Luis Lizano	"	Fabio Gómez Romero	"
Manuel de San Román	"	Roberto G. Lardizábal	"
Miguel González de Moya	Cuba	Roberto Maas	"
Luis A. Cevallos	Ecuador	Juan Banda Sifuentes	Mexico
Ciro García	El Salvador	Edmundo Saballos	Nicaragua
René A. Arana	Guatemala	Andrés Tercero López	"
Gabriel Arturo Valle	"	Julio Rodríguez Pinán	U.S.A., Pto. Rico
Felix Corneille	Haiti	*Gerardo Budowski	Venezuela
Jean Jacques Honorat	"		

National Courses

The technicians of the Technical Cooperation Program of the Institute collaborated with the national governments in presenting special national training courses as indicated below:

<u>Course</u>	<u>Country</u>	<u>Number of Students</u>
Home Economics	Costa Rica	35
Home Economics and Rural Sociology	Honduras	27
Home Economics	Nicaragua	448
Rural Education	Haiti	80
Home Economics	Costa Rica	37
Forestry	El Salvador	23
	Total	650

\* Graduate Students at the Institute in Turrialba

ENTITIES WHICH SPONSORED FELLOWSHIPS DURING 1952

Abaca Project of the United States  
Department of Agriculture  
American Cocoa Research Institute  
American International Association  
Federation of Coffee Growers of  
Colombia  
Food and Agriculture Organization  
of the United Nations  
Government of Honduras  
Government of Venezuela  
Mexican Institutions  
Michigan State College

Ministry of Agriculture of  
Costa Rica  
Point Four - Government of  
the United States of America  
Rockefeller Foundation  
Shell Oil Company  
Standard Oil Development  
Company  
Technical Cooperation  
Program (Project 39 of  
the Organization of  
American States)

STAFF MEMBERS OF THE INSTITUTE WHO SERVED AS ADVISORS  
FOR STUDENTS AND LEADERS OF INTERNATIONAL COURSES  
IN LATIN AMERICA

In the Institute

Jorge de Alba  
Paulo de Tarso Alvim  
Charles Batchelder  
Fernando del Río  
Donald Fiester  
Mario Gutiérrez  
John R. Havis  
Leslie R. Holdridge  
William Q. Loegering

Julio O. Morales  
Kenneth L. Olsen  
Rodrigo Orellana  
B. B. Robinson  
Alto Royer  
Pierre G. Sylvain  
Juvenal Valerio  
Emilio Viale  
Frederick L. Wellman

In the National and International Courses

Jorge de Alba  
Antonio Arena  
Leslie R. Holdridge  
Norton C. Ives  
H. C. Ramsower  
Fernando del Río

Sarah Rodríguez  
Raymond Scheele  
Lydia Roberts  
through the  
cooperation of  
the University  
of Puerto Rico

All the technical staff members of the Institute in Turrialba and in the Zone offices in Havana, Lima, and Montevideo collaborated directly in the educational program of the Institute and its Technical Cooperation Program in 1952.



SEMINARS 1952

Anna Marie Dye

<u>Date</u>	<u>Topic</u>	<u>Leader</u>
7 January	Report on the Animal Industry Department of the Institute	Robert R. Shrode Acting Head, Animal Industry Dept.
14 January	Laboratory and Field Studies on Potato Wilt ( <u>Pseudomonas solanacearum</u> )	Eddie Echandi Zurcher Graduate student
21 January	Entomological Problems in Nicaragua	Ralph B. Swain Servicio Técnico Agrícola Managua, Nicaragua
28 January	Potato Storage in the Tropics	Alfred R. Edgar Potato Research Center East Grand Forks, Minnesota
4 February	Organization of the "La Molina" National School of Agriculture in Peru	Ramiro Zuleta "La Molina" National School of Agriculture Lima, Peru
4 February	The Livestock Industry in Peru	Alfonso Rodríguez "La Molina" National School of Agriculture Lima, Peru
11 February	Studies on the Transmitters of Leishmaniosis (a tropical dis- ease)	Marshall Hertig Gorgas Memorial Laboratory Panama
15 February	Leaf Cutting Ants in Brazil	A. P. Viegas Instituto Agronómico Campinas, Sao Paulo Brazil
18 February	Plant Parasitic Nematodes	A. L. Taylor Division of Nematology Unites States Dept. of Agriculture Beltsville, Maryland

<u>Date</u>	<u>Topic</u>	<u>Leader</u>
20 February	Studies on Fruit Trees	G. M. Darrow Division of Fruit & Nut Crops and Diseases United States Dept. of Agriculture Beltsville, Maryland
3 March	Impressions on the Institute's Program from a Visit to Ten Latin American Countries	Armando Samper, Head, Scientific Communica- tions Service
17 March	The Danger of Introducing Hemileia Rust of Coffee into the Americas and Problems of Quarantine and Control	Frederick L. Wellman Plant Pathologist United States Dept. of Agriculture staff (assigned to Turrialba)
24 March	Teaching Agricultural Engineer- ing in Latin America	Enrique Elair Agricultural Engineer Andean Zone Technical Cooperation Program, Lima, Peru
31 March	Impressions of a Trip to the Main Agricultural Training Centers of South America	Carlos Madrid, Director, Andean Zone, Technical Cooperation Program Lima, Peru
7 April	Land Utilization in Jayuya Municipality in Puerto Rico	A. B. Lewis, Director, Technical Cooperation Program San José, Costa Rica
28 April	The Effect of Tree Formation and Other Factors on the Efficiency of the Coffee Picker	Julio O. Morales, Head, Department of Economics and Rural Life
5 May	The Role of the School Teacher in Education and the Organization of the Rural Com- munity	Eduardo Arze L., Rural Sociologist, Dept. of Economics and Rural Life
19 May	Preliminary Report on Chemical Weed Control	John R. Havis Horticulturist Plant Industry Dept.
26 May	Some Physiological Studies on Cacao	Paulo de Tarso Alvim Physiologist Plant Industry Dept.
29 May	World Health Organization	Epaminondas Quintana Ministry of Public Health Managua, Nicaragua

<u>Date</u>	<u>Topic</u>	<u>Leader</u>
29 May	World Health Organization	Epaminodas Quintana Ministry of Public Health Managua, Nicaragua
2 June	Chemical Control of the Corn Root Worm, <u>Diabrotica balteata</u> Lec. (Chrysomelidae)	Emilio Viale, Entomologist Plant Industry Dept.
9 June	Major Concepts in Soil Fertility and the Correlation of Crop Content with Soil Tests	Alto E. Royer Soils Specialist USDA Abacá Project (assigned to Turrialba)
23 June	Acceptance of Farm Practices in a Colombian Rural Community	Alvaro Chaparro Sociologist Colombian Federation of Coffee Growers Chinchiná, Colombia
30 June	Studies of the Use of Thiourea as an Aid in the Production of Small Potatoes Suitable for Seed	E. H. Casseres Plant Breeder Plant Industry Dept.
14 July	Fourth Meeting of the Inter- American Technical Cacao Committee	George F. Bowman, Head Inter-American Cacao Center Plant Industry Dept.
21 July	Report on Trip to the Coffee Region of the State of Sao Paulo, Brazil	Donald R. Fiester Horticulturist Plant Industry Dept.
28 July	Studies on <u>Cercospora musae</u> Zimm. Causing Sigatoka Disease of Bananas	Octavio Fernández B. Graduate student
4 August	The Hevea Breeding Program in the Western Hemisphere	Carl N. Hittle United States Dept. of Agriculture Rubber Station Staff Turrialba
11 August	The Non-Tropical Grasslands of Mexico	Jorge de Alba, Head, Animal Industry Dept.
25 August	Disease Problems Associated with Tapping of the Hevea Rubber Tree	John Carpenter United States Dept. of Agriculture Rubber Station Staff Turrialba

<u>Date</u>	<u>Topic</u>	<u>Leader</u>
1 September	Education for the Future of America	Seth Spaulding Pan American Union Washington, D.C.
3 September	For a Better Fed World (with movie)	Robert R. Williams Research Corporation New York, N.Y.
22 September	Factors Affecting Randomness of Mating in Isolated Polycross Plantings of Maize	Mario Gutiérrez Geneticist Plant Industry Dept.
6 October	Resistance of Microorganisms to Antibiotics	Alfonso Trejos San José, Costa Rica
20 October	Manganese Toxicity as a Possible Cause of <u>Café Macho</u>	Paulo de Tarso Alvim, Physiologist, Plant Industry Dept.
27 October	Use of <i>Drosophila</i> in Bio-Analyses	Emilio Viale Entomologist Plant Industry Dept.
3 November	Effect of Herbicide Sprays 2,4-D on the Growth of Young Sugar Cane	John R. Havis Horticulturist Plant Industry Dept.
10 November	Suggestions for Planning Research Programs and Conducting Research on Agricultural Problems	H. C. Thompson, Head, Plant Industry Dept.
18 November	Tour of the United States Department of Agriculture Regional Rubber Station in Turrialba	E. P. Imle, In Charge USDA Rubber Station Turrialba
24 November	The Inter-American Education Program and our Program of Education in Vocational Agriculture	Juvenal Valerio R. Assistant Educationist Economics and Rural Life Dept.
1 December	Bird's-eye View of Liberia	John D. Maximore Graduate student
15 December	The Mechanics of Chemical Control of Fungi and Insects on Plants	George F. Bowman, Head, Inter-American Cacao Center Plant Industry Dept.

## ESTATE MANAGEMENT

George M. Slater

### INTRODUCTION

Both coffee and sugar cane did well this year. The coffee crop was the largest since 1946, and the sugar cane crop was the largest we have handled ourselves.

### COFFEE

Coffee production for the year was 1,769 fanegas as compared with 1,310 fanegas in 1951 and 688 fanegas in 1950. The usual cultivation and replanting was carried on with particular attention to spraying the young trees. A nursery of 50,000 seedlings planted in April and May was severely attacked by disease. It is estimated that 30,000 of the seedlings are too badly diseased to be used. Those free from disease, some 20,000, are large enough now to plant out. Next year's crop is estimated at 1,000 fanegas.

### SUGAR CANE

Sugar cane production for the year was 6,789 tons as compared with 4,159 in 1951 and 5,760 in 1950. The increase in yield is due to the larger area planted in 1951. The planting of the area taken over from the contractor has been completed, and replanting in the future will be about 30 hectares per year instead of 65 for the last two years.

There are 15 hectares of Puerto Rican and Barbados varieties of cane in production. These canes are higher in sugar content and can be harvested in 12 months, but they do not give here the same tonnage as POJ-2878 or MC-666 which take 16 months for a ratoon crop. It will take a few years to find out which is most profitable. In the meantime, if the sugar mills should decide to pay for the cane by sugar content instead of by gross weight, we could be in a good position not only to benefit from the higher price but from having seed cane for planting out and sale to other planters.

The crop for next year is estimated at 10,000 tons. The price paid by the sugar mills was 43 colones per ton, but next year the price is expected to go down perhaps to 40 colones.

### TRANSPORTATION

The transporting of office help and field laborers between Turrialba and the Institute is increasing to a point where another bus will be required and possibly another truck. About 200 people are handled 6 days a week--the field workers making 2 trips and the

office help 4 trips per day. No accidents have occurred, and insurance covering passengers is carried by a United States company.

#### WAGES

Wages are higher. The minimum wage was increased 10% a few months ago. Demands for housing and still higher wages are increasing.

BUDGET OF THE INSTITUTE

SUMMARY OF INCOME - FISCAL YEAR 1952

Income of the Institute

Quotas of the Contracting States		\$218,071.61
Costa Rica	850.66	
Dominican Republic	2,342.08	
El Salvador	2,072.51	
Haiti	2,852.65	
Honduras	1,325.00	
Mexico	49,049.91	
Nicaragua	676.00	
Panama	763.80	
United States of America	153,480.00	
Venezuela	<u>4,659.00</u>	

Sale of Products and Services		190,275.34
Contribution from the Government of Venezuela for the Expense of Scholarship Students		5,407.07
Miscellaneous		<u>839.11</u>

Total Income of the Institute \$414,593.13

Grants and Special Funds

Grants for Special Projects		74,867.73
Sale of Products by the Cacao Center		35,626.59
Technical Cooperation Program		<u>249,950.50</u>

Total Income from Grants and Special Funds \$360,444.82

Grand Total of Income \$775,037.95

Detail of Grants for Special Projects

The Rockefeller Foundation		\$ 16,817.73
Library and Scientific Communications	9,000.00	
Photocopy Laboratory	17.73	
Study of Agricultural Libraries	4,000.00	
Tropical Dairy Project	<u>3,800.00</u>	

Shell Oil Company		20,000.00
Standard Oil Development Company		10,050.00
American Cocoa Research Institute		<u>28,000.00</u>

Total Grants Received in 1952 \$ 74,867.73

SUMMARY OF EXPENDITURES - FISCAL YEAR 1952

Expenditures from Institute Funds

Office of the Director		19,222.52
Washington Office		3,395.80
Departments		
Plant Industry		63,820.56
Animal Industry		62,948.93
Economics and Rural Life		36,429.79
Agricultural Engineering		1,104.61
Scientific Communications		18,633.29
Library		7,453.34
Administrative Services		72,227.08
Administration and Accounting	15,301.56	
Maintenance of Students and		
Personnel	38,586.30	
Other Services	<u>18,339.22</u>	
Operation of the Commercial Farm		96,933.65
Amortization of the Cost of Construct-		
ing Four Residences		5,583.54
Net Loss on Exchanges		<u>3,514.83</u>
Total Expenditures from Institute Funds		<u>\$391,267.94</u>

Expenditures from Grants and Special Funds

Library and Scientific Communications		8,682.47
Photocopy Laboratory and Microfilms		4,877.28
Study of Agricultural Libraries		3,400.08
Tropical Dairy Project		7,918.89
Shell Oil Company		16,620.10
Standard Oil Development Company		10,542.09
Science Service		1,000.00
Technical Cooperation Program		245,768.46
Cacao Center		<u>54,061.19</u>
Total Expenditures from Grants and Special Funds		<u>\$352,870.56</u>
Grand Total of Expenditures		<u>\$744,138.50</u>



## TECHNICAL COOPERATION PROGRAM

### FIELD SERVICE UNIT AND GENERAL SUMMARY

A. B. Lewis, Director of the Technical Cooperation Program

#### Introduction

This Project is known as Technical Education for the Improvement of Agriculture and Rural Life and is conducted under the terms of Project 39 of the Technical Cooperation Program of the Organization of American States. The Institute administers the Project with funds granted by the Inter-American Economic and Social Council out of its special fund for technical assistance. This fund, in turn, is made up of special contributions from the Member Governments of the Organization of American States.

The Project is based on the two following premises:

1. Our direct services to farm, home and rural community are inadequate in respect to the needs of rural people for education in technological advances; to requirements for credit, marketing, farm mechanization, and other services; and to the needs of our central agencies, experiment stations, and schools for more exact guidance as to the nature of the essential problems of farming and rural life.
2. Our human, land, water, and forest resources generally have not been studied with sufficient clarity to orient development of systematic and effective endeavors to foster the improvements required.

Accordingly, the staff of the Project concentrates on aiding in the training of the agriculture and rural life improvement workers of the Americas, and in this training it attempts to improve their appreciation of the human and natural resources of the diverse areas where they work. The agricultural and rural life studies previously made and currently under way at the Institute, as well as special studies made by the Project staff, serve as a source of inspiration and information for teaching and sometimes as a means of in-service training of students.

#### Organization and Administration

The Project is intended to serve all the member countries of the Organization of American States and is administered in three Zones, as follows:

Northern Zone, with headquarters at Havana, Cuba. This Zone includes, Costa Rica, Cuba, the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, and the United States of America.

Andean Zone, with headquarters at Lima Peru. This Zone includes Bolivia, Colombia, Ecuador, Peru, and Venezuela.

Southern Zone, with headquarters in Montevideo, Uruguay. This Zone includes Argentina, Brazil, Chile, Paraguay, and Uruguay.

The central administration of the Project is situated at the Institute in Turrialba, Costa Rica (with some of the offices actually in San José) where a Field Service Unit is maintained for this purpose. Each Zone has a Zone Director in charge and employs a corps of specialists in the improvement of agriculture and rural life. A full corps of specialists in a Zone would include at least one expert in each of the following twelve subjects: ecology and forestry, land-use economics, farm management, rural sociology, soils, home economics, agronomy, animal husbandry, agricultural engineering, agricultural extension, extension information (visual aids, publications, etc.) and agricultural education. Funds have not been sufficient to allow the employment of a complete staff. Supplementary technical personnel are employed for short periods for special purposes, and there are assistant specialists in a few lines.

The Field Service Unit is under the direction of the Director of the Technical Cooperation Program, who reports to the Director of the Institute and administers the Project under a delegation of powers from him.

#### Organization and Function of the Field Service Unit

Until October 6, 1952, the Field Service Unit was administered by the Director of the Institute with the aid of an Administrative Officer (Mr. Maynard E. Baker) and an Executive Secretary (Ing. Luis Carlos Cruz Riascos). On October 6, Dr. A. B. Lewis, until then Director of the Northern Zone, was appointed Director of the Technical Cooperation Program and in charge of the Field Service Unit. It was necessary for him to serve as Acting Director of the Northern Zone until its new Director, Dr. Olen E. Leonard, was appointed on December 1. A reorganization of the Field Service Unit was then effected. By the first of January 1953 it consisted of the Program Director, the Program Comptroller, and specialists in ecology and forestry, in agricultural engineering, and in extension information, besides secretarial and supplementary personnel. The offices of Administrative Officer and Executive Secretary were found to be redundant and were abolished. The former Executive Secretary became Registrar of the Institute.

The function of the three specialists attached to the Field Service Unit was to be to advise and assist Zone Directors in all three Zones in the planning and execution of activities in their respective

special subjects. During 1952 the Field Service Unit acquired a multi-lith machine and subsidiary equipment, and it was planned to use this in making publications for all Zones in 1953 under the supervision of the extension information specialist.

The reorganization of the central direction of the Project was undertaken so the result of recommendations of the Administrative Committee of the Institute and of the Committee on Technical Cooperation of the Inter-American Economic and Social Council. Both of these committees visited the Institute and reviewed the operations of the Project early in October.

#### Personnel of the Field Service Unit

On December 31, 1952, the Field Service Unit contained the following personnel:

Dr. A. B. Lewis, USA, Director of the Technical Cooperation Program  
Ing. Luis Carlos Cruz Riascos, Colombia, Executive Secretary  
Mr. Maynard E. Baker, USA, Administrative Officer  
Mr. Rogelio Coto Monge, Costa Rica, Extension Information Specialist  
Miss Lola Fernández, Colombia, resident of Costa Rica, Assistant in Visual Aids.  
Miss Molly Fonseca, Costa Rica, Secretary  
Miss Eva Gyemant, United Kingdom, Secretary

As of January 1, 1953 the personnel of the Field Service Unit consisted of the following:

Dr. A. B. Lewis, USA, Director of the Technical Cooperation Program  
Mr. Henry Laprade, Costa Rica, Program Comptroller  
Dr. L. R. Holdridge, USA, Ecologist and Forester  
Mr. Norton C. Ives, USA, Agricultural Engineer  
Mr. Rogelio Coto Monge, Costa Rica, Extension Information Specialist  
Miss Lola Fernández, Colombia, resident of Costa Rica, Assistant in Visual Aids  
Mrs. María Schlicker, USA (Puerto Rico), Secretary  
Miss Lidilia Aguilar, Costa Rica, Secretary  
Miss Virginia Pinto, Costa Rica, Secretary  
Mr. Otilio Rojas, Costa Rica, Messenger and Office Boy

#### Purposes, Objectives, and Methods of Work of the Project

In June a meeting of the Executive Committee of the Institute was held in Turrialba under the chairmanship of the Director of the Institute and with the three Zone Directors present among the other members of the Committee. The Executive Secretary of the Coordinating Committee on Technical Assistance of the Economic and Social Council also participated in this meeting. On that occasion, based on experience with the Project to date, a statement of purposes, objectives, and methods of work was agreed upon. This statement has aided in the orientation of the work and in explaining its nature to interested persons. The full statement follows:

"PURPOSES, OBJETIVES, AND METHODS OF WORK OF THE TECHNICAL CO-OPERATION PROGRAM OF THE INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES IN TECHNICAL EDUCATION FOR THE IMPROVEMENT OF AGRICULTURE AND RURAL LIFE (TECHNICAL COOPERATION PROJECT 39 OF THE ORGANIZATION OF AMERICAN STATES)

"The following statement has resulted from extended discussions of the directives of the Inter-American Economic and Social Council and the Coordinating Committee for Technical Assistance, the approved description of Project 39 of the Technical Cooperation Program, the history of this project, and activities under the project to date. It is intended as a guide in preparing our programs and budgets for 1953 and will also be useful in conducting our programs during the remainder of 1952.

"Purposes and Objective

"This Program has the objective of training personnel of the American Republics in the sciences and skills required in directing and conducting agricultural and rural life improvement programs. It is intended that this training will result in an improvement in the efficiency of the public agencies which serve farm people and the rural communities in these countries, and particularly in the development of programs of such agencies that are based on a more thorough knowledge of agricultural and human resources than exists at present. It is expected that the attainment of these objectives will aid the American Republics in achieving an optimum ~~sustained~~ yield from their natural resources, improve the efficiency of production and distribution of agricultural products, and raise the level and standard of living of the people.

"Methods of Work

"1. In each of the three Zones of Project 39 (Northern, Andean, and Southern) a regional training center will be developed. It will be integrated in each case with an existing educational institution and will utilize the cooperation of other national institutions and agencies.

"2. In each Zone, we shall develop and use a demonstration area as an instrument in the field training of agricultural and rural life improvement workers who attend our courses at our training center.

"3. Our program should mainly consist of the provision of training courses at our center, together with the necessary preparatory activities. Preparatory activities include the making of arrangements at the training center whereby courses could be given there, studies of the demonstration area that are necessary in order to provide materials for teaching, and the making of such arrangements in the demonstration area as are necessary

in order that we shall be able to demonstrate to our students the application of knowledge to agricultural and rural life improvement programs in the field (establishment of demonstration plots, teaching programs, etc.). As one result of this program, our students will learn how to use a demonstration area as a means of forwarding the improvement of agriculture and rural life.

"Inasmuch as action programs for the betterment of agriculture and rural life are carried out by governmental and other public agencies and institutions, we shall cooperate closely with such agencies and institutions.

"4. In cases where suitable training facilities and conditions do not exist and cannot be developed by 1953 at our training center, we should plan to conduct or arrange for conducting training courses at other institutions within the hemisphere. Courses given or arranged for at the headquarters of the Institute in Turrialba or at the University of Puerto Rico would come under this heading, for example. In our program we must explain, in each case, why it is necessary to go outside our center to provide this instruction.

"5. We can provide or assist in short training courses within their own country for a group of agricultural and rural life improvement personnel (such as extension workers, farm credit supervisors, home economists, and the like). These short training courses must be an outgrowth of the center program or contribute to it and will be provided only at the request of the government agency concerned and at times when the needed Project personnel are free of other scheduled assignments. The requesting government will make all arrangements for the course, select the trainees, and pay all local currency costs (including the maintenance and local travel of TCP personnel during the course).

"When agreeable to all concerned, we may select and send to the course at the expense of the Program a limited number of trainees from other countries.

"6. Providing for the training of graduate students in our various disciplines is part of our program. All such students will be registered as graduate students of the Inter-American Institute of Agricultural Sciences at Turrialba and will comply with the regulations of the Institute for graduate students. They may be assigned there for training in suitable fields, they may be at least part of the time under the direct supervision of TCP staff members at Zone centers, who in this capacity function as ex-officio members of the respective Departments of the Institute, or they may study in other suitable colleges and universities of this hemisphere.

"7. We may also arrange for students from countries where no college provides the required kind of undergraduate instruction to carry on undergraduate studies in another country of the hemisphere. It is our general policy to assign such undergraduates to Latin American institutions.

"8. The financing of special students (that is, students not studying for any degree) at appropriate institutions in the hemisphere (including the Institute itself) is also a possibility under our Program.

"9. It is a part of our program to assist in the training of students in our lines of specialization who are not financed by us but who are registered at the Inter-American Institute of Agricultural Sciences or at the national institutions with which our Zone training centers are integrated. We may also assist in the training of personnel of government agencies and public institutions with which we cooperate in the course of our training program in the countries where our centers are located.

"10. Studies that are necessary to provide material for our training courses may be made outside the demonstration area only when it is shown that such studies cannot be made within the demonstration area.

"Whenever possible, trainees should cooperate in our studies.

"11. Providing technical assistance to governments of the Zone in establishing or managing technical programs in our disciplines is not part of our program, except as this may be necessary in order to establish the proper facilities for demonstrating the operation of agricultural and rural life improvement programs to our students in our demonstration area. In cases in which our demonstration area does not have the right type of environment or facilities for demonstrating a vital feature of agricultural and rural life improvement work to our students, or has not sufficient capacity, we can give advisory assistance to a government in setting up such improvement programs in a suitable place elsewhere, preferably in our headquarters country; but we must first make sure that these facilities cannot be provided in the demonstration area, either in the right kind or with sufficient capacity for our needs.

"12. The cooperation of specialists in our various disciplines is required in planning and making preparatory studies and other arrangements for training and in instructing students in our courses. At the same time, it is necessary that the central emphasis be given, in certain courses and studies, to the method and subject matter that pertain to a given discipline. The degree and kind of interdisciplinary cooperation that is essential will vary in each case. Provision for this cooperation should be made in our program and budget.

"The TCP staff will also make use of the appropriate facilities of the Inter-American Institute of Agricultural Sciences at Turrialba and freely consult the appropriate Institute staff members on technical problems. Close consulting relationships will also be maintained on technical problems as between staff members of the three Zones. These relationships will be described in the TCP activity plans.

"13. Visits of the staff members to the countries of the Zones are needed for the purpose of keeping in touch with colleagues in our various disciplines and with their programs, particularly where demonstration areas are being used or training centers are being operated, and to make them acquainted with our training program and methods of study. During such visits, staff members will also select students for training courses and advise former students on problems encountered in the utilization of their training.

"While staff members of the three Zones must spend most of their time at their respective centers, this must be balanced by time spent in visits to the other countries of the Zone so that the Program can be kept in line with international needs.

"14. The TCP personnel will seek the cooperation of the FAO, the United Nations itself and its other agencies, United States bilateral technical assistance agencies, and private foundations in the conduct of the Program, and should cooperate whenever possible in related activities initiated by them."

Executive Committee

Turrialba, Costa Rica  
June 14, 1952"

The Project staff are faced with immense diversity in the natural and human resources of the various parts of the Americas, as well as an equal diversity in agricultural and rural institutions, economic advancement, and educational development. Throughout the region many and various efforts are being made by a variety of national agencies to improve the agriculture and rural life of the different countries. The personnel of these agencies and those who expect to join them need and want training in a variety of subjects, at various levels, and in many different circumstances and conditions. Any attempt on the part of the Zone staff to adopt or conform to rigid or narrow standards of procedure in preparing and giving or financing instruction would reduce the effectiveness of the staff, both in the geographic sense of the number of persons and the size of the area served and in the completeness of the service performed. The great variety of ways in which the countries have actually utilized the training services of the Project has been set forth in the Zone reports.

The desirability and necessity of cooperating with other technical assistance agencies, of which there are many, also requires a flexibility of procedure at the same time as it requires discrimination and care to adhere to the aims of this Project.

The Project staff is also fully aware of the fact that agriculture is a most complex way of life and of production, and that its improvement cannot be successfully achieved through any narrow approach, nor can it be based on merely superficial analysis of problems. Every effort is therefore made to approach problems as a team, with each specialist contributing his share of experience, knowledge, and advice. The

fact that training courses are given on more than one aspect of agricultural and rural life improvement is no sign of any scattering of effort but only of a recognition that the problem to be solved is an entity composed of many parts. Almost any agricultural and rural life improvement worker has to deal with many of these parts and is not well trained until he understands what they are and how they fit together.

This Project is aimed to accomplish this ambitious result. Success is important inasmuch as the overwhelming majority of the people of most countries of the region are farmers and will be greatly dependent for their advancement on the degree of skill and enlightenment of the increasing numbers of extension workers and other rural improvement workers of the region.

#### Summary of Training Activities of the Three Zones

The table below summarizes the training provided by the Project during 1952. The details of the courses given are contained in the reports of the three Zones. Names of the students trained are contained in the Registrar's report under Training Program. A considerable number of students attended the courses of the Project at the expense of the governments or institutions of their own countries or at their own expense. The larger number, however, were selected by the Project, which paid their travel and subsistence expenses during the period of instruction.

In the table below, the number of students and student months of training that are listed as supported by the Project include some whose support in Project courses was contributed by FAO. FAO paid one-half of the expense of training 18 students in tropical forestry for a one-month course in the Northern Zone and paid the expenses of training 7 students in soils during a three-months' course in the Southern Zone.

In addition to courses which were planned and supervised by the Zone staffs, the staff assisted in several national courses that were provided by governments for their agriculture and rural life improvement personnel. These courses are described in the report of the Northern Zone.

A number of graduate and special students were selected for advanced training in particular subjects. Only through the provision of such training for its most capable improvement workers will the region ever attain a reasonable degree of self-sufficiency in well-trained technical personnel.



Summary of Training Provided by Project 39 in 1952

	<u>Number of Students Trained</u>		<u>Student-months of Training</u>	
	<u>Supported by the Project</u>	<u>Otherwise Supported</u>	<u>Supported by the Project</u>	<u>Otherwise Supported</u>
<b>International Courses:</b>				
Northern Zone	71 <sup>*</sup>	70	194 <sup>*</sup>	176
Southern Zone	76 <sup>**</sup>	3	192 <sup>**</sup>	7
<b>Graduate and Special Students:</b>				
Northern Zone	4	2	27	6
Andean Zone	<u>15</u>	<u>          </u>	<u>40</u>	<u>          </u>
Total	166	75	453	189
<b>National Courses:</b>				
Northern Zone		656		262

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<sup>\*</sup> Including 18 students and 18 student-months for which FAO paid one-half of the expenses.

<sup>\*\*</sup> Including 7 students and 21 student-months for which FAO paid the expenses.

The 166 Students Who Were Supported by the Project

Came from the Following Countries:

<u>Country</u>	<u>Number of Students</u>
<b>Northern Zone:</b>	
Costa Rica	14
Cuba	1
Dominican Republic	0
El Salvador	8
Guatemala	8
Haiti	7
Honduras	11
Mexico	3
Nicaragua	9
Panama	5
United States	3
<b>Andean Zone:</b>	
Bolivia	4
Colombia	5
Ecuador	7
Peru	1
Venezuela	4
<b>Southern Zone:</b>	
Argentina	10
Brazil	10
Chile	24
Paraguay	10
Uruguay	<u>22</u>
<b>Total</b>	<b>166</b>

### Extension Information Activities of the Field Service Unit

The extension information activities of the Field Service Unit were carried on by Victor Stephen, a specialist in publications and visual aids, during the first quarter of the year and were conducted by Rogelio Coto Monge after May 15. These specialists were situated at the Institute in Turrialba and were closely associated with the Scientific Communications Service of the Institute. Mr. Stephen gave training in extension information to Miss Lola Fernández during the first quarter of the year, who began to be employed part-time during the third quarter of the year as Assistant in Visual Aids. He also gave instruction in the Agricultural Extension Training Center which was conducted by the Northern Zone from April 6 to 25 jointly with FAO and with the cooperation of STICA.

The Extension Information Specialist, Mr. Coto, assisted the Scientific Communications Service of the Institute in preparing a program of training for Guillermo Combariza, a staff artist of the Soil Conservation Campaign of the Federación Nacional de Cafeteros de Colombia, Chinchiná, Caldas, Colombia, who was assigned to the Institute for training on a scholarship from the Andean Zone. Mr. Combariza arrived in Turrialba December 30. According to the plan of his training he will receive instruction at the Institute, in several agricultural colleges of the United States, and in the Extension Services of Puerto Rico and El Salvador, on visual aids for use in extension work.

During the second two weeks in August, Mr. Coto collaborated with Seth Spaulding and Ermilio Abreu Gómez of the Pan American Union in testing reading materials which were prepared by the Pan American Union with the idea of providing reading matter which would be suitable to the educational level of millions of adults of Latin America who are in danger of losing the ability to read through the lack of suitable reading matter.

Mr. Stephen during the first quarter continued to consult with the Ministry of Agriculture and Industries of Costa Rica on the improvement of their mimeographed material, extension leaflets, booklets, and exhibitions. He collaborated with STICA in the organization of a poster contest and in the design of a portfolio of publications in connection with the Tenth Anniversary of the Institute of Inter-American Affairs. He also cooperated with the Centro Nacional de Agronomía of El Salvador, with STICA in Nicaragua, and with the Federación Nacional de Cafeteros de Colombia. He visited the Federación at Chinchiná on February 28 and gave a seminar on visual aids.

Mr. Coto acted as editor in the preparation of a bulletin prepared by Mr. Tosi, Forester of the Andean Zone, entitled "Los Bosques Bien Atendidos Rinden Magníficas Ganancias" (Well Managed Forests Yield Large Returns), which was published by the Costa Rican Ministry of Agriculture and Industries. He also prepared the announcements of the Northern Zone international courses on Irrigation and Drainage and on Forestry.

In collaboration with the Scientific Communications Service, Mr. Coto prepared information on the utilization of radio in agricultural improvement work. Publications and photocopies on this subject were sent to the Sociedad Nacional de Agricultura of Santiago, Chile at their request. Mr. Coto consulted with the Publication and Library Section of the Ministry of Agriculture and Industries of Costa Rica in the organization of a press and radio information service for the farmers. He prepared a plan for this which was accepted in total. On May 31, Mr. Coto began an information service for the press, utilizing a paper attractively illustrated in green, with the purpose of supplying information to newspapers and other periodicals concerning the work of the Institute. Twenty notices were issued to 202 different addresses, of which 8 notices concerned the Technical Cooperation Program.

#### Preparation of Extension Publications

Armando Samper, Head of the Scientific Communications Service, Victor Stephen, and Rogelio Coto prepared a leaflet, entitled "Las semillas desinfectadas aumentan sus ganancias" (Disinfected Seeds Increase Your Profits), which was based on technical information prepared by Frederick L. Wellman, Plant Pathologist of the United States Department of Agriculture stationed at the Institute, and Mrs. Lucy Hastings Gutiérrez of the Institute. This leaflet was intended as a model of an extension publication, being written in clear language with attractive illustrations. It constituted an experiment in preparing extension publications such as would be useful in more than one country. The first reproduction of the leaflet was made by the Ministry of Agriculture and Industries of Costa Rica, which included it in a series of extension leaflets. At the end of the year the Extension Service of STICA of Nicaragua had also requested this material.

A publication entitled "Como se hace una exhibición portátil" (How to Arrange a Portable Exhibit) was prepared by Mr. Stephen and Mr. Coto. This was intended for the use of agricultural extension agents who were interested in using exhibits as a means of agricultural education. This was sent to the field agents of STICA in Costa Rica, accompanied by a brief questionnaire for the purpose of determining how applicable the publication was to their requirements.

Mr. Coto prepared a publication entitled "Radio y la prensa en la agricultura. Recomendaciones para su mejor aprovechamiento" (Radio and the Press in Agriculture - Recommendations for their Best Use). He also prepared a plan for an international course on Agricultural Extension Information which may be conducted by the Northern Zone. This is being studied by the Zone staff. Mr. Coto and Miss Fernández have prepared a number of exhibits for the bulletin board of the Scientific Communications Service in Turrialba with the double purpose of providing information on Institute activities to staff and visitors and of acquiring experience and illustrations for a new extension publication.

Mr. Coto and Miss Fernández have also prepared illustrated booklets, with a minimum of text, on the functions of the Technical Cooperation Program. A similar booklet was prepared on the Scientific Communications Service. These were distributed to the Administrative Committee of the Institute, members of the Committee on Technical Cooperation of the Inter-American Economic and Social Council who visited the Institute late in September and early in October, and the Advisory Board of the Scientific Communications Service. They also prepared a folder of the project's extension publications with the aid of other specialists of the Project.

The specialists in extension information have also assisted the Program in various problems of design, such as in the preparation of letterheads, certificates, etc.

### Cooperation and Consultation

#### Relations with Host Countries

Establishment of Zone Headquarters - An agreement was signed with the Government of Uruguay on January 23, 1952, relative to the operation of the headquarters of the Southern Zone at Montevideo. The Zone has enjoyed cordial and cooperative relations with the authorities of Uruguay during the year.

At the Sixteenth Meeting of COTA, held from August 11 to 18, 1952, Cuba was chosen as the site of the permanent headquarters of the Northern Zone. Since August 1951, the provisional headquarters of the Zone had been at the Institute in Turrialba with most of the offices actually established in San José. On December 13, 1953, an agreement for the operation of the headquarters of the Zone in Havana was concluded between the Institute and the Cuban Government, and most of the staff transferred to Cuba late in December or early in January.

As indicated in detail in the report of the Northern Zone, relationships with both Costa Rica and Cuba have been cordial.

On September 30, 1953, Peru was chosen as the site of the headquarters of the Andean Zone. The personnel who had worked jointly with the personnel of the Northern Zone for most of the year up until that time, transferred to Lima in October. It has not been possible by the end of the year to complete an agreement between the Institute and the Government of Peru and the National School of Agriculture for the operation of the headquarters, but this was expected to be concluded early in 1953. The Director of the Zone has reported cordial relationships with officers of the Government and the School.

Headquarters of the Field Service Unit - The headquarters of the Field Service Unit are at the Institute in Turrialba, but for reasons of space and convenience, some offices continue to be in San José. The Minister of Agriculture and Industries of Costa Rica very kindly consented to allow the Program Director and L. R. Holdridge, Ecologist and

Forester of the Field Service Unit, to continue occupying offices in the Ministry; and Norton C. Ives, the Agricultural Engineer of the Field Service Unit, continues to occupy an office in the Grain Storage Plant of the Consejo Nacional de Producción.

Pending his transfer to Cuba after completing his studies in Costa Rica, probably in March 1953, Arthur W. Peterson, Land-Use Economist of the Northern Zone, continues to occupy office space in the Dirección General de Estadística y Censos. Ernest H. Casseres, Food Crop Specialist of the Northern Zone, who will return to the Research and Teaching Program of the Institute in Turrialba on March 1, will continue to have his office in the Ministry of Agriculture and Industries in San José until that time.

### Relations with Countries of the Three Zones

During the year relations with the member countries of the three Zones have grown steadily closer, and increasing use has been made of the Project by the countries. One or more students from each of all but one of the 21 republics have received training under the Project during the year. One responsibility of the technical staff is to keep in touch with training programs in their various branches of agriculture and rural life improvement in their respective Zones. This has been accomplished through correspondence and through personal visits.

### Relations with Other Technical Assistance Agencies

Details of these relationships are given in the reports of the three Zones. Very close cooperative relationships have been and continue to be maintained with the Food and Agriculture Organization of the United Nations (F/O). FAO has cooperated actively in furnishing technical specialists for several courses of the Program and has contributed financial support to three of these courses. The Program, on its part, has cooperated in lending expert personnel for FAO meetings and studies and is planning to cooperate extensively in an FAO training on Land Utilization Problems of Latin America which will be held in the spring of 1953 in Brazil.

Cooperation between the Project and the bilateral Technical Cooperation Program of the United States, conducted in Latin America through the United States Institute of Inter-American Affairs, has continued throughout the year in a great variety of ways. Technicians associated with the USA Technical Cooperation Program have been trained in project courses, in some cases at the expense of the Project and in others at the expense of the Institute of Inter-American Affairs. Specialists of the Project have assisted in training courses conducted by governments in cooperation with the Institute of Inter-American Affairs while their specialists in turn have served as instructors in international courses conducted by the Project. Activities sponsored by the Institute of Inter-American Affairs have been utilized by the Project for giving practical training and experience to Project students.

Cordial and profitable, though less extensive, cooperation has existed during the year with UNESCO missions and with private technical assistance agencies including the Rockefeller Foundation and the American International Association.

Relations with the Research and Training Program of the Institute in Turrialba

As stated in Article III of the Inter-American Economic and Social Council Resolution of April 10, 1950, the technical cooperation activities of cooperating agencies such as the Institute "should be in accord with the nature and purposes of such agencies and should constitute essentially an expansion or development of the cooperating agencies' regular activities". This requirement has been met during the past year, in that the fundamental point of view of the Institute on training, namely, that agricultural improvement workers should be trained on the basis of a much improved knowledge of rural conditions and the principles determining agricultural and rural development, has been the motive and force of the Project. This principle has been given form by personnel, many of whom were formerly in the Research and Teaching Program of the Institute.

Although the Project itself must carry out certain studies, it will continue to derive information, inspiration, and advice from the Institute, and the Project depends for its success on the continuation and strengthening of the regular research and teaching work of the Institute. The Project has sent a number of graduate students to the Institute during the year, since they could obtain there advanced training given in the Spanish language and administered from the viewpoint of assisting the student to become a leader in the practical agricultural development of his country. In order to serve more fully as a training institution for such leaders, it would be highly desirable for the Institute to be able to expand both its physical facilities for the training of students and the number of advanced courses available for their instruction. It is hoped that ways and means can be found to strengthen and round out the Research and Teaching Program of the Institute so as to enable it to constitute the strongest possible foundation for and resource of Project 39.

## NORTHERN ZONE

Olen E. Leonard, Director<sup>1/</sup>

### Introduction

The activities of the Northern Zone of the Technical Cooperation Program in 1952 consisted mainly of making studies of its Special Area for Study and Training in Costa Rica designed to obtain data for use in later training activities, giving international training courses, and providing assistance to Zone countries in their training activities. In mid-August the Coordinating Committee on Technical Assistance of the Inter-American Economic and Social Council of the Organization of American States decided to establish the permanent headquarters of the Zone in Havana, Cuba. The provisional headquarters until that time had been in Costa Rica. Zone activities continued to center in Costa Rica until the end of the year, since plans already made could not be changed, studies underway had to be finished, and the necessary agreements with the Government of Cuba for the establishment of the Zone had to be made. It was necessary to make plans for operations in 1953 before any decision on the location of the Zone Headquarters had been made, and these plans were necessarily made on the assumption that the headquarters would remain in Costa Rica, where foundations had been built during the previous months, beginning in August 1951. When the decision was made to establish the headquarters in Cuba, these plans were necessarily abandoned and very provisional plans made, to be perfected later, for building new foundations in Cuba and developing a program there.

### Organization and Administration

The Zone activities were carried on by a group of experienced specialists in various phases of technical education for the improvement of agriculture and rural life. Insofar as possible, they worked as a team, but senior specialists were in particular charge activities in their own field of specialization. The Zone Director served as coordinator of Zone activities and plans and as administrator of Zone funds.

All personnel were members of the staff of the Inter-American Institute of Agricultural Sciences, and the Zone Director reported to the Director of the Institute. During January and March, Leslie R. Holdridge, also ecologist and Forester of the Zone, served as Director. A. B. Lewis was Director from March 1 to October 5, and Acting Director from October 6 to November 30. Olen E. Leonard, who had been Sociologist and Anthropologist of the Zone beginning September 1, was appointed Director of the Northern Zone as of December 1.

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<sup>1/</sup> Because the Director took office December 1, 1952, and had to spend the next two months shifting headquarters to Cuba, this report was prepared by A. B. Lewis, Director of the Technical Cooperation Program



### Training

The total number of student months of training provided by the Northern Zone staff in 1952 in Technical Cooperation Program courses was 403, of which 221 represented training for which the Project paid travel and subsistence expenses and 182 represented training for which other agencies paid these expenses. A total of 147 different students were trained, 75 of whom were supported by the Project during the period of training and 72 of whom were otherwise supported. The large number of persons attending Project courses at the expense of their own governments or other local institutions or at their own expense indicates that the subjects chosen for instruction met a felt need on the part of the agriculture and rural life improvement workers of the Zone.

#### International Training Courses<sup>1/</sup>

Seventy-one students from 16 countries attended the 7 international courses completed by the Northern Zone in 1952 at the expense of the Program.

Methods of Agricultural Extension, Costa Rica - This course began in November 1951 at the College of Agriculture of the University of Costa Rica with two month of basic instruction provided by the Zone staff and others. During 1952 the students were assigned to agencies of the Extension Service of Costa Rica, which is operated cooperatively by the Ministry of Agriculture of Costa Rica and the United States Institute of Inter-American Affairs as the Servicio Técnico Interamericano de Cooperación Agrícola (STICA). In these agencies the students were supervised by the STICA extension agents and the Zone staff and obtained practical training in actual extension operations. Some students were also assigned to agricultural lending agencies of the National Bank of Costa Rica, which has a program of supervised agricultural credit.

In addition to 12 students from 6 countries of the Zone (Costa Rica, El Salvador, Guatemala, Haiti, Panama, and Nicaragua) five Venezuelan students took this course. They did not terminate in March but continued receiving practical field training until December 31, 1952. They were supported by the regular program of the Inter-American Institute of Agricultural Sciences through funds received from the American International Association. Fernando del Río, Extension Education Specialist, and his assistant, José Pérez Casanova, were in charge of this course.

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<sup>1/</sup> Names and countries of the students attending each course appear in section IX TRAINING PROGRAM of the regular Institute report, pages 87-91.

Methods of Teaching Vocational Agriculture, Costa Rica - This course also began with two months of classroom training administered in 1951 at the College of Agriculture, University of Costa Rica, by the Zone staff and others. Early in 1952 the students were assigned as teachers of vocational agriculture to boys of the 4th, 5th, and 6th grades in three primary schools of El Tejar and Pacayas in the Reventazón Area for Study and Training and San Joaquín de Flores. This was possible under a cooperative arrangement with the Ministry of Education of Costa Rica and with the cooperation of the school directors, the other teachers and the local school boards (Juntas de Educación) of each community.

With the aid of the local boards and Ministry of Agriculture, each of these three centers was equipped with a poultry house and rabbit hutch, gardening tools, poultry, rabbits, seeds, and plants. Part of the tools were also provided by the Program. A large school garden was established at each school by the Program student-instructors and their pupils. Fernando del Río, with the aid of Mr. Pérez, was in charge of supervising the students.

The introduction of improved methods of teaching vocational agriculture was utilized by the Ministry of Education in demonstrating methods of teaching to teachers of other subjects and to normal school students in Costa Rica. During eight such demonstrations, 252 school teachers, 40 normal school students, and 42 University students observed and participated in an analysis of the teaching methods used by our student-instructors. Officials of UNESCO's educational mission to Costa Rica assisted informally in these demonstrations.

Four students from three countries (Costa Rica, Honduras, and Panama) completed this course on August 31, 1952. In addition, 8 Venezuelan students took this course at the expense of the regular program of the Institute with funds supplied by the American International Association.

All four of the TCP students who completed this course now occupy responsible positions related to vocational agricultural education in their respective countries.

Home Economics, Puerto Rico - Students of all three Zones participated in this course, but the selection of students was under the direction of Miss Sarah Rodríguez, Home Economist of the Northern Zone. The course was given in the College of Agriculture of the University of Puerto Rico at Río Piedras and was directed by Dr. Lydia J. Roberts assisted by Miss Carmelina Capó. The Program assigned funds to the University sufficient to pay the salary of the assistant and to provide secretarial assistance, other out-of-pocket expenses in connection with the course, and funds with which to pay the monthly stipends of 100 dollars to each of the TCP students. The University contributed the services of Dr. Roberts and other staff members as well as their facilities for teaching.

During six months instruction was provided in the practical and scientific aspects of home economics extension for the betterment of rural homes and communities. Outstanding advantages of conducting this course in Puerto Rico were that a completely equipped Department of Home Economics was available there, large numbers of qualified home economists (mostly graduates of this Department) are actively engaged in home economics extension work and various rural community improvement agencies throughout the island, scientific studies of home conditions in Puerto Rico provide reliable data for teaching, the language of the course is Spanish, and the economic level and cultural background of Puerto Rico are similar to those of the countries from which the students came.

Fourteen students from 10 countries (Costa Rica, Guatemala, Honduras, Nicaragua, El Salvador, Panama, Colombia, Venezuela, Chile, and Uruguay) completed the course at the expense of the Program. Two students, because of serious illness, had to leave the course before it was finished. In addition, one student from Honduras, was sent to the course on a fellowship of the Banco Nacional de Fomento, Tegucigalpa; and four Venezuelan students, were sent to the course by the Nutrition Institute, Caracas.

Modern Methods of Livestock and Range Management, Mexico - This course was given at the Antonio Narro School of Agriculture at Saltillo, Mexico from June 8 to 28 inclusive. It was intended for extension workers in semiarid range livestock areas or for students being prepared for this work. Saltillo was chosen as the site of this course because it is the only semiarid range area in the Zone where modern management methods had been introduced and could be shown.

Jorge de Alba, Animal Husbandry Specialist of the Zone staff, planned and led the course. At the request of the Government of Mexico, FAO supplied the teaching services of A. H. Walker, Extension Range Specialist, and Frank W. Gould, Range Ecologist, both of the Texas Agricultural and Mechanical College, College Station, Texas.

Guillermo L. Narváez, Head of the Department of Animal Husbandry, and Roberto Rodríguez Dávila, Veterinarian, both of the Antonio Narro School of Agriculture, cooperated in giving instruction during the course. Román Cepeda Flores, Governor of the State of Coahuila, and Lorenzo Martínez Medina, Director of the Antonio Narro School of Agriculture, gave valuable aid in arranging for the course. Governor Cepeda Flores showed a very personal interest in the initiation of range studies in Coahuila and greatly stimulated the interest of students by offering four prizes of 400 Mexican pesos each to the men placing highest in livestock judging, grass identification, herbarium collection, and for the best notes taken during the course.

In addition to 31 Mexican students, 12 students from 6 countries (Costa Rica, El Salvador, Haiti, Honduras, Nicaragua, and Panama) outside Mexico attended the course at the expense of the Program. One additional student attended at the expense of the Government of El Salvador. Thirty-one Mexican students attended at their own expense or that of their respective institutions.

This course emphasized practical instruction in the modern methods of range and livestock management that depend on an accurate knowledge of the characteristics of the various species of grass that are present in the range, as well as recent advances in principles of livestock feeding and management. Several field trips were made during which the students had an opportunity to learn through first-hand observation the principles that were discussed.

The students indicated a great interest in the instruction which they received during the course, and it is expected that this course, directly or indirectly, will have a very great influence on livestock and range management in many parts of the Northern Zone.

As a direct result of the activities of the course, the Agricultural School at Saltillo expressed the desire to continue systematic studies of the range ecology of Northern Mexico. They have expressed an intention to create a new position for this purpose in their staff. The Saltillo school is also initiating an herbarium utilizing some of the material collected by students of the course.

Irrigation and Drainage, Costa Rica and El Salvador - This course was given for extension workers or other agricultural improvement workers of the Zone who are called upon to assist farmers with irrigation and drainage problems on their farms. The first five weeks of the course, beginning October 27, were given in Costa Rica and emphasized drainage, and the last three weeks, given at the Centro Nacional de Agronomía, Santa Tecla, El Salvador, emphasized irrigation.

Twelve students from 8 countries (Mexico, Guatemala, El Salvador, Haiti, Honduras, Nicaragua, Costa Rica, and the United States) attended the course at the expense of the Program. In addition 3 students from 2 countries (Costa Rica, and Haiti) attended at the expense of their respective governments.

The course was directed by Norton C. Ives, Agricultural Engineer of the Northern Zone, specializing in the drainage phases. He was assisted by Enrique Blair, Agricultural Engineer of the Andean Zone, specializing in irrigation. FAO contributed the expert services of their Irrigation Specialist, Alder Molinaar of the Land Water Use Branch of the Agriculture Division, who came from Rome and devoted three weeks to the course.

In addition 17 other persons assisted in the instruction. The staff of the Northern Zone, the Research and Teaching Program of the Institute in Turrialba, STICA, the Costa Rican Ministry of Agriculture and Industries, and the Centro Nacional de Agronomía of El Salvador

(joint institution of the government of El Salvador and the United States) contributed their services. The Compañía Bananera de Costa Rica cooperated in receiving the students on field trips to their plantations, where modern methods of irrigation are in use.

The course was designed to train the students in the engineering phases of drainage and irrigation design, development, operation, and maintenance. However, some orientation was given in the basic aspects of agricultural development with drainage and irrigation. With this in mind subject matter in extension methods, sociological considerations, economics, land-use planning, soils, and mapping was presented by various specialists in these respective fields.

Three methods of training were employed: (1) classroom lectures and discussions, (2) laboratory exercises and demonstrations, and (3) field trips to actual drainage and/or irrigation projects or problem areas.

On major field trips the students visited the following places:

1. Abaca plantations at Bataan, Costa Rica - Drainage and flood control.
2. Banana plantations, Palmar Sur, Costa Rica - Drainage and overhead irrigation.
3. Guanacaste, Costa Rica - Small irrigation development and projects--flood irrigation for rice and pasture.
4. Lempa Dam, El Salvador.
5. Izalco experimental station irrigation system, El Salvador.

In preparation for the course, which was the first international training course in Central America in irrigation and drainage, the engineers of the Northern and Andean Zones prepared a series of lectures, organized in such a way as to have each lecture or topic form a chapter in a manual treating the engineering phases of irrigation and drainage. These have been mimeographed with line-drawing illustrations. However, it was decided that several of the chapters would be revised before being bound into manual form. Twenty-eight chapters were prepared with over 60 line-drawing illustrations.

Several commercial pamphlets of an educational or instructional nature and several publications of the United States Department of Agriculture and of State Experiment Stations were obtained in quantity and distributed to the trainees. At the end of the course, each student hands a portfolio of the best literature in the field.

Tropical Forestry, in cooperation with FAO, Honduras - On November 11 an international course in tropical forestry was inaugurated by the Northern Zone at the Pan American Agricultural School at Zamorano,

Honduras. This course lasted four weeks. The first week consisted of lectures and seminars conducted at Zamorano. During this period the school furnished the members of the course with room and board free of charge. The first half of the second week was taken up with a trip to the north coast of Honduras to visit and study the extensive forestry activities carried on by the Tela Railroad Company with valuable tropical hardwoods. The remainder of the second week and the third week consisted of field practice in naval stores, mensuration, silvicultural and management operations in the pine forests of the highlands of Honduras. The last week was utilized for a field trip to the south coast of Honduras to visit the dry forest of that region.

This short course was co-sponsored by FAO, which not only paid one-half of the transportation and subsistence cost of the students but also provided the services of two technicians, John Schroeder and William Sanderman, who had been assigned to work in Honduras under the expanded Technical Assistance Program of FAO. Other organizations which collaborated wholeheartedly to make the course a success were the Ministry of Agriculture of Honduras, the Pan American Agricultural School at Zamorano, STICA (Servicio Técnico Interamericano de Cooperación Agrícola) and the Tela Railroad Company of La Lima, Honduras.

The course was directed by Leslie R. Holdridge, Ecologist and Forester of the Northern Zone, assisted by Joseph A. Tosi, Jr., Forester of the Andean Zone.

Twenty-one students from 12 countries (Guatemala, Mexico, Costa Rica, Colombia, Ecuador, Honduras, El Salvador, Cuba, Haiti, the United States, and Nicaragua) completed the course. Of these, 18 were selected and supported by the Northern Zone in the usual way. The Ecuadorian student was studying at the Pan American Agricultural School and could therefore be admitted to this Northern Zone course at small expense to the Program. In addition, two graduate students in forestry, from Venezuela and Colombia respectively, supported at the Institute at Turrialba by the Andean Zone and under the direction of Dr. Holdridge, attended the course at an additional expense to the Program. The Government of Costa Rica sent one student to the course at its own expense.

Because the students experienced the great value of the interchange of information among each other, over and above the value of the training, during the latter part of the session they formed a new forestry society of Latin America for the purpose of keeping alive and increasing the international contacts among the technical forest workers of the region.

Agricultural Extension Training Center, in cooperation with FAO and STICA, Costa Rica - This training center was planned and held by the Technical Cooperation Program in cooperation with FAO and STICA and with contributions of assistance from the Institute at Turrialba and the University of Costa Rica. The delegates paid their own travel and subsistence expenses to attend the Center. Nevertheless, the

Zone staff made the arrangements and took the lead in planning and giving much of the instruction. A. H. Maunder of FAO drafted the original outline of the course and helped to perfect the final plans and lead the course. Adolfo Moyoral Reinat, 4-H Club Leader for Puerto Rico, was employed by FAO for the course. For the Northern Zone, Fernando del Río was in charge of the course, assisted and advised by Raymond Scheele. Other TCP staff members who participated in planning and providing instruction were Sarah Rodríguez Chacón, Leslie K. Holdridge, Enrique Blair, Norton C. Ives, Ernest H. Casseres, Joseph A. Tosi, Jr., and Arthur W. Peterson. The cash costs of the Center were divided equally between FAO and the Zone.

A major cooperater in the Center was the Costa Rican Extension Service (STICA). The College of Agriculture of Costa Rica contributed the meeting place and aided in the instruction. The non-TCP staff of the Inter-American Institute of Agricultural Sciences assisted in providing instruction, as did members of the Costa Rican Ministry of Agriculture.

Sixteen delegates from 10 countries (Chile, Costa Rica, El Salvador, Guatemala, French Guiana, Haiti, Honduras, Nicaragua, the United States, and Uruguay) and the Holy See participated as students.

These participants in the Center were experienced persons in responsible positions in extension and closely related activities in their respective countries. They included one extension director, three vice-directors and the director of an agricultural school and experiment station as well as other supervisory and extension personnel. In addition four Venezuelan students who were enrolled in the course in Methods of Agricultural Extension also attended the Agricultural Extension Training Center. One Venezuelan student enrolled in the Vocational Agriculture course also attended. Observers present were His Excellency, the French Ambassador to Costa Rica, Monsieur Levay Beaulieu, and Carlos Madrid, Director of the Andean Zone.

The course was divided into three sections, namely, Organization and Administration of Extension Services (led by Dr. Maunder of FAO and Mr. Summers of STICA), Building Programs of Work (led by Mr. del Río and Dr. Scheele of the Zone), and Extension Services for Rural Youth (led by Mr. Mayoral of FAO and Mr. Arias of STICA). In all, 26 specially qualified persons provided instruction and led discussions during the course.

The benefits of the Center consisted of the ideas received by the participants through the instruction and exchange during the discussions. Only one recommendation, to the effect that extension workers should receive more training in applied social sciences, was made by the Center.

As one result of the Center, an Association of Latin America Extension Workers was formed with headquarters in Costa Rica, and a Chilean Society of Extension Workers was formed in Chile as a part of the general association. These organizations were formed by and on the spontaneous

initiative of the students of the Center and are designed to help maintain and extend the international contacts between extension works such as the Center provided.

### Graduate Students

Throughout the year, Carlos Castillo of Costa Rica has been a student in the Department of Agricultural Economics of the College of Agriculture, University of Tennessee, a candidate for the degree of Master of Science in Farm Management and Land-Use Economics. His training will be concluded in February 1953. His scholastic record is outstanding.

At the end of the first quarter John Reark of the United States completed the requirements for the degree of Master of Science in ecology at the Institute in Turrialba, under the direction of Leslie R. Holdridge. His thesis study was an ecological study of the Upper Reventazón Area for Study and Training. This illustrates how studies of graduate students may contribute to the understanding of the study and training area of a Zone headquarters.

Francisco Montoya of Costa Rica received training from the Northern Zone staff as a special student in Farm Management beginning August 19. This training was undertaken as a means of preparing him to become a member of an agricultural economics section which is to be established in the Ministry of Agriculture and Industries early in 1953. Mr. Montoya is a graduate of the University of North Dakota. Arthur W. Peterson and Ralph Loomis (FAO) of the Zone staff were in charge of his special training.

José A. Trejos Dittel of Costa Rica was a special student in Methods of Teaching Vocational Agriculture from the close of the Extension Course in March, in which he was a student, to the end of the year, under the direction of Fernando del Río and José Pérez Casanova of the Zone staff. He assisted in collecting and tabulating data in the study of the Pacayas and Tierra Blanca communities in the Upper Reventazón Area for Study and Training and in the operation of the three vocational agricultural teaching centers in El Tejar, Pacayas, and San Joaquín de Flores. He is to be employed beginning early in 1953 by the Costa Rican Ministry of Education.

Two students, Isabel Alvarenga and Martha Betancourt of El Salvador, were given training in Home Economics from September 8 to December 12 for the Centro Nacional de Agronomía of El Salvador, a joint agency of the Government of El Salvador and the United States. The Centro paid the travel and subsistence expenses of these two students, who were being trained to become home demonstration agents in the agricultural extension service of the Centro. They attended the national training course for teachers of cooking and sewing in the schools of Alajuela Province and also received special instruction in extension methods. For part of the time they were assigned to



STICA home demonstration agents of Costa Rica for field instruction. Their training was conducted by Sarah Rodríguez and Dolores Morales, who reported very favorably on their progress.

### National Training Courses

The Northern Zone assisted five Zone Governments to conduct six national training courses. In all cases these courses were a logical outgrowth of or a contribution to the international training program of the Zone.

Training Teachers and Officials of Rural Experimental Schools in Principles of Rural Home Improvement, Costa Rica - The Home Economist, Sarah Rodríguez, assisted in a joint course of the Ministry of Education of Costa Rica, the Department of Economics and Rural Life of the Institute in Turrialba, and the Northern Zone of the Technical Cooperation Program, for 35 rural teachers, directos, and supervisors in charge of the Experimental Rural Schools of Costa Rica in the Reventazón Area, beginning November 26, 1951 and ending January 31, 1952. This instruction was given in the Turrialba Elementary School. The participants were taught how to use the results of nutrition studies that had been made in the Turrialba area in promoting improved nutrition; how to plan, prepare, and serve better meals; how to organize cooking laboratories in their schools; and how to provide for group planning, pupil participation, and better homemaking practices.

The Home Economist was assisted by the teacher of "Education for the Home", of the College of Education of the University of Costa Rica and thus provided in-service training in home economics for her.

Training Rural Credit Supervisors of the Banco Nacional de Fomento, Honduras - The home economist, Sarah Rodríguez, assisted in the training of 3 special students, 15 rural home supervisors, and 9 rural farm supervisors of the Banco Nacional de Fomento of Honduras, Tegucigalpa, from February 28 to March 30. These workers were being trained to start work in the Home and Farm Supervised Credit Program of Honduras. Raymond Scheele, the Rural Sociologist, also assisted in this training program in Tegucigalpa, giving a course (with the Home Economist) for one week ending March 30 in Rural Sociology, or Social Factors in Extension.

Besides the 27 persons who attended this training course officially, two extension agents of STICA and several officials of other government agricultural programs attended unofficially.

In addition, the Home Economist, during the course, gave teacher-training in home economics to the Supervisor of the Rural Home Supervisors of Honduras, to their teacher of Clothing, and to their teacher of Cooking. The Rural Sociologist gave teacher-training in social factors to the Chief of Supervised Agricultural Credit, who is giving and will continue to give Social Factors Courses to Rural Farm Supervisors of the Banco Nacional de Fomento of Honduras. An outline of the course was mimeographed and a set of notes and references was provided.

The Technical Cooperation Program paid the salaries of the Home Economist and Rural Sociologist and their travel to and from Tegucigalpa. All other expenses including maintenance were paid by the Banco Nacional de Fomento of Honduras.

Training Forestry Agents of the Ministry of Agriculture, El Salvador- Dr. Holdridge and Mr. Tosi, at the request of the Ministry of Agriculture of El Salvador, cooperated in a short course which was given by the Ministry from April 20 to May 3 for 29 forest agents of the Ministry's Natural Resources Section. The Centro Nacional de Agronomía, in which the United States Government cooperates on a bilateral basis, provided space for the course and specialists who gave instruction in pathology, entomology soils, and extension methods.

The two Salvadorian foresters who were in charge of the course had been students in an International Course in Forestry given by the Zone in Guatemala in 1951. They came to Costa Rica to consult Dr. Holdridge and Mr. Tosi on plans for their national course. This illustrates how a national course sometimes develops from an international one and demands for the services of the Zone staff arise as a result of their qualifications becoming known during international courses.

The Ministry paid the local travel and subsistence expenses of Dr. Holdridge and Mr. Tosi in El Salvador.

Training Rural Teachers in Home Economics, Nicaragua - At the invitation of the Director of the Rural Education Division of the Institute of Inter-American Affairs in Nicaragua (the Servicio Técnico Agrícola de Nicaragua) cooperating with the Nicaraguan Ministry of Education, Miss Rodríguez visited Nicaragua from May 19 to May 31 to assist in training activities of the Ministry in the field of home economics. She met with four groups of rural teachers, totaling about 400, who were attending seminars in four departments of the country. Lectures were given on the school curriculum as a means of stimulating the improvement of living conditions. With officials of the Ministry of Education Miss Rodríguez discussed ways and means by which supervisors should follow up the seminars and assist the rural teachers in the home economics aspects of their work and how the supervisors should be trained for this phase of their supervisory work.

Another activity of Miss Rodríguez in Nicaragua was to spend six afternoons with 5 teachers of the School of Industrial Arts and Education for the Home and 2 students in textiles of the Normal School, giving instruction on how to develop a curriculum based on the living conditions and needs of the community and discussing the type of nutrition education needed in Nicaragua. Appropriate teaching materials were provided and references cited.

Miss Rodríguez also met with a class of 41 senior Normal School students three half days and gave lessons on foods and on the improvisation of household equipment. Other home economics instruction

incidental to the foregoing activities was provided on this visit. The Servicio Técnico Agrícola de Nicaragua (STAN) paid all local travel and subsistence expenses of Miss Rodríguez in Nicaragua.

Training Members of the Agricultural Extension Services, Haiti -

As a result of the Northern Zone-FAO-STICA International Training Center in Agricultural Extension, held in San José, Costa Rica from April 6 to 25, the Director of Extension of Haiti, Ing. Berthony Vieux, who was a student at the center, organized a training meeting of all extension workers of Haiti from July 18 to August 2, in which the instruction received in the International Center was passed on to these workers. Fernando del Río of the Zone staff went to Haiti at the request of the Haitian Government and at the expense of SCIPA in Haiti (the Institute of Inter-American Affairs) to lead a section on the philosophy and methods of extension in this national training course. About 80 extension agents of Haiti participated in the course.

The Haitian Government on this occasion presented Mr. del Río with an official decoration in token of his services to the cause of agricultural education.

Training Teachers of Home Economics in the Rural Schools of Alajuela Province, Costa Rica - This national course was the largest given during the year and represented an interesting outgrowth of the international training program. The Ministry of Education of Costa Rica employed the two Costa Rican students, Berta Solera and Fidelina Sibaja, who completed the International Home Economics Course in Puerto Rico, to conduct a training course for all the teachers of cooking and sewing in the schools of Alajuela Province. This course is to be the first of a series for the whole country.

The Ministry requested the guidance of the Zone Home Economist in planning and conducting this very difficult training task. In the absence of Miss Rodríguez because of illness, the Zone arranged with the Extension Service of Puerto Rico to borrow the services of Dolores Morales, Home Demonstration Agent Leader of Puerto Rico, for the initial period of the course, for about six weeks beginning September 8. Miss Rodríguez returned late in October and continued to guide the course until it closed on December 12 and then assisted the Costa Rican home economists in planning subsequent courses. Thirty-seven teachers completed the course and were given certificates by the Ministry of Education.

This course was of great importance for the educational and rural home development of Costa Rica. The teachers of cooking and sewing (one of each in each school) had had little or no previous training in the science of practical home economics, their efforts had mainly been directed to pupils of the first and second grades, and little equipment was available to them. As a result of the course the teachers have received a much broader and more useful comprehension of the subject which they teach and its connection with the improvement of rural homes and living, they have learned to improvise homemade equipment and set up a

teaching room, they will receive more support from the Ministry and their schools, and they will devote their efforts to teaching the higher grades. Berta Solera, one of the graduates of the International Course, has been appointed technical director of home economics education for the Ministry and will follow up the results of the course and direct future training courses in other provinces. The Zone staff considers that the opportunity to assist in such an important forward step in education in Costa Rica was worth the very great effort which was given to it by them.

As one feature of the course, the school teachers planted and raised a school garden, under the direction of José Pérez Casanova of the Zone staff. The products were used in meals prepared as a part of the training course.

#### Courses Taught at the Institute in Turrialba

In addition to their other duties certain members of the Zone staff were able to supervise or give special instruction to graduate students who had been assigned to the Institute in Turrialba by the Program. All Technical Cooperation Program staff retain their status as ex-officio members of the academic staff of the Institute. Dr. Holdridge, the Ecologist and Forester, supervised the studies of two graduate students of the Andean Zone in forestry, César Pérez of Colombia and Gerardo Budowski of Venezuela, from July 22 until the end of the year. Mr. del Río, the Extension Educationist, supervised the studies of two graduate students of the Andean Zone, Jaime Díaz Moreno in Extension Education and Germán Valenzuela in vocational agricultural methods, both from Ecuador. Dr. Peterson, Land Use Economist, and Mr. Loomis, Farm Management Specialist, aided in teaching these students. Their studies began on September 20.

During the first quarter of the year Dr. Holdridge taught a course in Ecology to 13 graduate and special students of the Institute. During the last quarter of the year he taught a course in Tropical Dendrology to 11 students of the Institute, three staff members of the Costa Rican Ministry of Agriculture interested in forestry, and one student of the University of Costa Rica. He also taught a course in Economic Botany to ten students of the Institute, two of the employees of the Ministry, and the University student.

#### Consultation and Cooperation

##### Consultation Services

During the provisional tenure of headquarters of the Northern Zone in Costa Rica, the Zone staff assisted or advised the Government and the University in building agriculture and rural life improvement activities that were expected to be of value in future training courses of the Zone. Zone staff also were consulted by agencies of other Zone countries in reference to their training programs in this field.

The following were the major types of consultation furnished, but there were many other instances in which Zone staff members were consulted and gave advice in the fields of their specialization.

1. Ernest H. Casseres, Food Crops Specialist, assisted the Ministry of Agriculture of Costa Rica in making the beginnings of a potato seed inspection service intended to develop eventually into a seed certification service. A first phase of this development was successfully completed in 1952; and plans were made for the second phase. In-service training was given to Rodolfo Quesada, Chief of the Crop Sanitation Section of the Ministry, and his assistants, Carlos Bianchini and Roberto Francis. Dr. Casseres also assisted the Ministry and STICA in determining how to break the dormancy period of seed potatoes through the use of ethylene chlorhydrin and thus enable the farmers to plant a new crop within a very short time after the harvest of the old one.

2. Leslie R. Holdridge, Ecologist and Forester, provided in-service training during the year, as well as actual instruction in his courses at Turrialba, for the personnel of the Forestry Section of the Ministry of Agriculture, Carlos Luis Lizano, Mario López, and Alfonso Campos, and advised them in respect to forestry development programs. The work of Dr. Holdridge, assisted during much of the year by Mr. Joseph Tosi, also laid the foundation for an extension program in forestry in Costa Rica to be conducted by STICA. Such a program would have been of value as a means of training extension agents in Forestry.

3. Raymond Scheele, Sociologist of the Zone until replaced by Olen E. Leonard on September 1, advised the University of Costa Rica in the establishment of a Department of Rural Sociology.

4. Fernando del Río performed consulting services for the Ministry of Education of Costa Rica and its teachers on plans and methods of agricultural vocational education in the schools as an outgrowth of the Program's courses in vocational agricultural teaching methods. At the request of the Director of the Practical School of Agriculture of Montevideo, Uruguay, who was a delegate to the FAO-TCP Agricultural Extension Training Center, Mr. del Río prepared an outline of an extension orientation course to be given at the School.

5. The Dirección General de Estadística y Censos has consulted A. W. Peterson, Land-Use Economist, Quentin West, Land-Use Economist of the Andena Zone, and Ralph Loomis, Farm Management Specialist, on devising less expensive sampling procedures and more effective field techniques in gathering data for making periodic estimates of crop acreage and production, and on other problems of agricultural or land-use statistics. The Dirección published maps of agricultural regions prepared by these specialists and cooperated in many ways in their farm economic investigations, also providing office space and equipment for their use.

6. As noted in connection with national training courses, Sarah Rodríguez, Home Economist, has advised and assisted the Ministry of Education of Costa Rica in developing plans for teacher training in home economics.

Miss Rodríguez visited Panama from April 26 to May 4 to explore their training facilities for homemaking education and to determine their training needs in this field. She was able on this visit to assist a number of different agencies who are engaged in home economics work in Panama to become acquainted with one another's activities and to organize a steering committee. She made many contacts which should insure that Project 39 will be utilized for training in this field. She has recently been requested to prepare a statement on incorporating home economics into the curriculum of the University of Panama and to recommend methods of training for teachers of domestic economics of the Panamanian Ministry of Education.

### Relations with Host Countries

Costa Rica - Up until the time of the decision of the Coordinating Committee on Technical Assistance to establish the permanent headquarters of the Zone in Cuba, the Zone had enjoyed full cooperation from the Government and other institutions of the provisional host country, Costa Rica. Office space and most of the office equipment were provided by the University of Costa Rica College of Agriculture for Mr. del Río and Mr. Pérez as well as lecture halls for short courses; by the Ministry of Agriculture and Industries for the Zone Director and Drs. Holdridge and Casseres; by the Dirección General de Estadística y Censos, Ministry of Economy, for Drs. Peterson and West and Mr. Loomis and their aides and students; and by the Consejo Nacional de Producción for Mr. Ives and his assistants and for general meetings of the Program staff. The Ministry of Education furnished schools as vocational training centers, while STICA and the Banco Nacional de Costa Rica lent the use of their agencies for training extension workers. The Program benefited greatly from these and numerous other cooperative arrangements and from the contributions made to training programs by the personnel of these agencies in Costa Rica. The scientific and progressive spirit animating agriculture and rural life improvement programs in Costa Rica furnished an ideal setting for an international training program such as that of Project 39.

Cuba - After the choice of Cuba as permanent site of the Northern Zone headquarters had been announced and before the preliminary agreement between the OAS and Cuba for the establishment of the headquarters had been completed, the Director of the Zone became Director of the Technical Cooperation Program of the Institute and remained as Acting Director of the Zone. Shortly after the Cuba-OAS agreement was concluded he went to Cuba with Mr. del Río to work out the terms of an operating agreement between the Turrialba Institute and the Government for the operation of the headquarters. The signing of the agreement was postponed until detailed plans for the transfer could be made and until a new Zone Director had been appointed. Olen E. Leonard, having been appointed as Zone Director on December 1, proceeded to Cuba with Mr. del Río and Dr. Casseres, as soon as arrangements could be made, for a week beginning December 9. The operating agreement with the Cuban Government was signed at the end of this visit, and the actual transfer of staff members, to Cuba began at the end of December 1952 and in the first days of January 1953.

The Cuban Government has appointed a committee, representing agencies interested in the Program, to cooperate with the Director and his staff. The Cuban Government arranged to provide and equip central offices for the Zone in the Ministry of Agriculture in Havana and field offices at the central agricultural experiment station at Santiago de las Vegas outside Havana. The chairman and members of the Cooperating Committee were most helpful in aiding the Zone Director to establish his new headquarters.

#### Relations with Other Zone Countries

During the year the relations of the Program with Zone countries constantly broadened, and increasing use was made of the Program. Students from Cuba and the United States (Puerto Rico) attended Zone courses for the first time in the last quarter of the year, and of the eleven countries only the Dominican Republic failed to send any student during the year. Visits were made to all countries of the Zone by one or more staff members on request or in preparation for courses of training. Details of the relations with Zone countries can best be determined by referring to the section of the report on training activities.

#### Relations with Other Technical Assistance Activities

Relations with FAO were of great importance. The Farm Management Specialist of the Zone was an FAO employee, with the Zone paying his housing allowance in Costa Rica. FAO contributed specialist instructors and one-half the cash cost of the Extension Training Center, and of the Tropical Forestry Course, and specialist instructors for the courses in Irrigation and Drainage and Livestock and Range Management. A. W. Peterson attended the FAO Seminar on Credit Problems of Central America, which was held in Guatemala in September, and presented a paper and discussions on the relation of the productivity of land to agricultural credit. He attended as an official delegate of OAS. The Zone loaned the services of Dr. Peterson to FAO for the month of October so he could participate in a meeting of the European Working Committee on Land and Water Utilization and Conservation held in Rome entirely at FAO expense for salary and travel. FAO also paid the travel and subsistence expenses of Dr. Peterson for two weeks to enable him to visit El Salvador and complete a land-use classification map of the International Demonstration Area of that country. This map will be used in summarizing a study of farm management which is being made in this area by Fritz Loenholdt, a specialist of FAO. This study is expected to be of much value in Program training courses in land use and farm management for rural improvement workers. Plans are being made for the Program to co-sponsor a training center on land utilization problems which will be held by FAO in Brazil in May and June of 1953. The Land-Use Economist of the Zone, as Technical Adviser of the Program in this field, is in charge of preparation for this joint training effort.

The Program has fulfilled requests from several countries for Zone specialists to assist in training activities of joint agencies within the program of the United States Institute of Inter-American Affairs and

trained a number of students in its courses who were affiliated with such agencies. These agencies, in turn, have cooperated in a number of training courses of the Zone, notably in the Agricultural Extension Course, the Extension Training Center, the course in Tropical Forestry in Honduras, and the Irrigation and Drainage course in Costa Rica and El Salvador.

The Zone has maintained informal cooperation in the agricultural education field with the UNESCO educational mission to Costa Rica. Scientific and policy discussions have been held with officers of the Rockefeller Foundation in Mexico.

### Research

One of the two premises on which Project 39 is founded is that the agriculture and rural life improvement work of Latin America is not generally based on a sufficient knowledge of the human and natural resources on which rural life depends and that agricultural and rural life improvement workers in this region are not familiar with methods of studying such resources or with the use of the results of studies. During 1951 and early 1952 the Zone therefore initiated certain studies in Costa Rica, mainly in the Reventazón Area for Study and Training, which were designed to demonstrate how resources should be studied and to produce results for use in training courses.

#### Study of Agricultural Regions of Costa Rica

This study was made by Arthur W. Peterson with the aid of Quentin West of the Andean Zone and Ralph Loomis, partly based on a study of the ecological regions of Costa Rica prepared by Leslie R. Holdridge. The Agricultural Census of Costa Rica furnished much basic data for the study. Ten thousand copies of the map of the regions were published by the Dirección General de Estadística y Censos and the Ministry of Education. The report, which describes and explains the differences between regions, was completed but not yet published at the end of the year.

#### Mapping Economic Land-Use Classes

Dr. West and Mr. Loomis, under the leadership of Dr. Peterson, completed a preliminary map of economic land-use class areas in the Upper Reventazón Area, and copies of the map were published by the Ministry of Agriculture and Industries. The final map is to be finished early in 1953. This map outlined and describes those differences in land resources which explain geographic variations in the ability of farmers to earn an income and accumulate capital on the land and which are of basic importance in all agricultural and rural life improvement programs.



### Farm Management Study

Ralph Loomis began in 1951 a farm management study of farms in the Upper Reventazón Area, obtaining data by systematic personal interviews (the so-called survey method) from about 200 farmers. Data cover receipts, expenses, and capital transactions on each farm for a year, including data on crops and livestock. The study was expected to be finished within the first quarter of 1953.

### Social and Economic Study of Two Communities

A social and economic study of the Pacayas and Tierra Blanca communities in the Upper Reventazón Valley Area, was started and the field work was well begun by the end of the second quarter. This study was under the direction of Dr. Scheele. It involved obtaining information by personal interview questionnaires from both heads of households and their wives in two communities. The purpose was to provide a means of evaluating the progress which it was hoped would be made by a special educational and extension program that would be conducted in one of the communities, the other, in which no special program would be conducted, serving as a check or basis of comparison.

The two directors of the schools of these communities cooperated in planning and directing the work and were instructed in the survey techniques. Twenty teachers of the two schools, both men and women, aided in the enumeration, as did also several of the TCP students in Agricultural Extension and Vocational Agricultural Teaching. This enterprise constituted an important part of their training.

The following staff members contributed to the design of the interview questionnaires, or supervision and training of enumerators, or both: Miss Rodríguez, Mr. del Río, Mr. Pérez C., Mr. Tosi, Dr. Peterson, Mr. Loomis, Dr. West, and Miss Price (Home Economist, Andean Zone).

The results of the study, when available, will be of much importance in training students in methods of improving agriculture and rural life. The study is likely to serve as a model for similar studies of rural communities by other agencies in the region. Because of delays resulting from the decision to move the Zone Headquarters from Costa Rica to Cuba and the appointment of the former Rural Sociologist and Anthropologist of the Zone to be Zone Director, it was not possible to finish the study in 1952 as planned. The data, however, have been prepared for analysis, and it is hoped to complete the report in the first half of 1953. While the study will not have so much direct value to the Program as was expected, because of the change of Zone Headquarters, it is expected to be of much indirect or informational value.

### Drying and Storage of Crops

In undeveloped countries, a much larger share of grain and other food crops is lost through poor storing and handling facilities and methods than in the more developed countries. In the tropics the problem of losses of grain through spoilage and insect infestation in storage is

very great. The Agricultural Engineer, Norton C. Ives, gave a Zone course on grain drying and storage in 1951, and this course probably will be repeated in other Zones in the near future.

In order to obtain further data on drying problems in connection with food storage and processing in the tropics for use in future courses for agriculture and rural life improvement workers, Mr. Ives and his assistant, Alvaro Jenkins, set up a trial demonstration of a column-batch fast-type grain dryer during the third quarter of the year and have run drying tests with several varieties of rice, with shelled corn, and with beans and coffee. The data are as yet incomplete but indicate that the design used has many advantages for tropical regions where relatively small quantities of different kinds, varieties, and qualities of grains must be dried quickly at the lowest possible cost.

The pilot model provides for reversal of the direction of flow of the drying air, cooling in tandem with the change in direction of the drying air, recirculation of the drying air, sampling of the drying grain at various depths, and complete temperature records using thermo-couples. A better understanding of the grain-drying process under moist tropical conditions is being produced by the tests and should gradually result in better and more economical grain drying throughout the tropics. The tests will be completed in the first half of 1953.

#### Plant Ecological Study

John Reark, the graduate student who completed his requirements for the Magistri Agriculturae degree at the Institute in Turrialba at the expense of the Program at the end of the first quarter of the year, made a thesis study of the forest ecology of the Reventazón Area. This study utilized principles of ecological analysis developed by Dr. Holdridge. The report has not yet been published.

#### Publications

Much teaching material was prepared and duplicated for use in connection with the Extension Training Center, the International Course on Irrigation and Drainage, the Home Economics Course for schoolteachers of Alajuela Province, Costa Rica, and the other courses given by the Zone. In the last quarter Miss Rodríguez prepared a suggested outline of the content of courses in home economics (Bosquejo de contenido que puede incluirse en Programas de Educación para el Hogar) which probably will be of use in several Program countries.

Publications of the following subjects were completed but have not yet been duplicated. They will be mimeographed or multilithed.

Peterson, Arthur W., and A. B. Lewis. A Method of Studying Land Use as Illustrated in Costa Rica.

\_\_\_\_\_, and Quentin West. Agricultural Regions in Costa Rica.

\_\_\_\_\_, Potato Production in Costa Rica (illustrating the value of the map of agricultural regions in analyzing the geography of production of crops).

It is hoped that these publications will be issued early in 1953.

## ANDEAN ZONE

Carlos Madrid S., Director<sup>1/</sup>

### Introduction

The Andean Zone of the Technical Cooperation Program includes the countries of Bolivia, Colombia, Ecuador, Peru, and Venezuela. On September 30 Lima, Peru was chosen by the Coordinating Committee on Technical Assistance to be the headquarters of the Zone. The personnel of the Zone was employed for or assigned to the Zone early in 1952 and until the headquarters was chosen devoted most of their time to assisting the Northern Zone in conducting international training courses and in making studies. Considerable time was also devoted, particularly by the Director, to visiting the countries of the Zone in order to promote the choice of a Zone headquarters and make plans for future activities.

When the headquarters had been established, the personnel moved to Lima in October and in the last week of November were assigned temporary offices in the Ministry of Agriculture in Lima. The agreement between the Government of Peru and the Organization of American States for the establishment of a Technical Cooperation Project headquarters in Peru was concluded on November 12. The Director of the Zone then began negotiations with the Government of Peru for an operating agreement between the Inter-American Institute of Agricultural Sciences and the Ministry of Agriculture and the National School of Agriculture "La Molina" for the establishment of the headquarters. These negotiations could not be completed in 1952, but it was expected that an agreement would be signed within the first two months of 1953. Under these circumstances, it was not possible to develop a complete program of studies and training in the Zone in 1952, but the Zone personnel were fully occupied in the program of the Northern Zone, where they made a vital contribution and received experience, and in becoming acquainted with the training requirements of their Zone. A number of graduate students were selected and sent outside the Zone for advanced study.

### Organization and Administration

During the year the staff of the Zone consisted of the Director and one specialist each in forestry, agricultural engineering, land-use economics, and home economics. Efforts were made to find a highly qualified specialist in methods of agricultural extension, but these efforts had not yet been successful because of the small number of available Spanish-speaking experts in this field.

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<sup>1/</sup> This report was compiled by the Program Director, A. B. Lewis, on the basis of reports of the Zone Director, Carlos Madrid S.

All personnel were members of the staff of the Inter-American Institute of Agricultural Sciences. The Zone Director acted as coordinator of Zone activities and plans and as administrator of Zone funds. He reported to the Director of the Institute and after October 6 to the Director of the Technical Cooperation Program of the Institute.

### Training

#### International Training Courses<sup>1/</sup>

Because of the headquarters of the Zone had not been selected until September 30 and the necessary operating agreements for the headquarters could not be completed within the year, no international courses were actually given in the Zone. However, the Zone assisted in several training courses given in the Northern Zone.

Home Economics, University of Puerto Rico - The Andean Zone contributed to the cash costs of the international courses in Home Economics that was given by the University of Puerto Rico in cooperation with the Program, as described in detail in the report of the Northern Zone. In addition the Zone paid the travel and fellowship costs of one student from Colombia and 4 from Venezuela. Four additional Venezuelan students attended this course at their own expense.

Irrigation and Drainage, Costa Rica and El Salvador - Enrique Blair, Agricultural Engineer of the Andean Zone, assisted extensively in making plans and preparing materials for this course. He went to Costa Rica and El Salvador and assisted in the conduct of the course, being particularly concerned with its irrigation aspects. The course began October 28 in Costa Rica and ended December 20 in El Salvador.

Tropical Forestry, Honduras - Joseph A. Tosi, Jr., Forester of the Andean Zone, assisted L. R. Holdridge, Ecologist and Forester of the Northern Zone, in making preparations for and giving instruction in this course held from November 11 to December 6.

Extension Training Center, Costa Rica - Mr. Blair and Mr. Tosi of the Andean Zone participated in planning and providing instruction for this center which was conducted jointly by the Program, the Food and Agriculture Organization of the United Nations (FAO), and the Servicio Técnico Interamericano de Cooperación Agrícola (STICA) from April 6 to 25.

International Course in Soils, Chile - Julio Peña, Chief of the Soils Laboratory in Ecuador and Professor of the College of Agriculture of the University of Quito, attended this course for three months, August 25 to November 25, at the expense of the Andean Zone.

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<sup>1/</sup> Names and countries of the students attending each course appear in section IX TRAINING PROGRAM of the regular Institute report, pages 87-91.

Graduate Students

The following graduate students have been chosen for fellowships of the Zone for advanced study:

<u>Name of Student</u>	<u>Major Subject</u>	<u>Country</u>	<u>Institution</u>	<u>Months Studied in 1952</u>
Armando Huerta	Coffee	Bolivia	Institute, Turrialba	1-1/4
Marcial Machicado	Cacao	"	" "	2
Ramberto Herbas	Plant Pathology	"	" "	3/4*
Carlos Montellano	Entomology	"	" "	1/4*
César Pérez	Forestry	Colombia	" "	5-1/4
Cristóbal Navarrete	Plant Physiology	"	Iowa State College, Ames, Iowa	12
Guillermo Combariza	Extension Information	"	Institute, Turrialba	0
Margarita Montoya	Home Economics	"	University of Ohio Columbus, Ohio	1/2*
Jaime Díaz Moreno	Agricultural Extension	Ecuador	Institute, Turrialba	3-1/4
Germán Valenzuela	Vocational Ag. Extension	"	" "	3-1/4
José I. Villafuerte	Coffee	"	" "	1-1/2
Sócrates Bermúdez	Coffee	"	" "	2
Jorge A. Soria	Corn	"	" "	1
Jaime Basadre	Animal Husbandry	Peru	" "	3
Gerardo Budowski	Forestry	<u>Venezuela</u>	" "	<u>5-1/4</u>
<b>Total**</b>		15		40

All of the above students were studying at the Inter-American Institute of Agricultural Sciences at Turrialba except two, as indicated. The Institute had arranged a travel-study scholarship for Mr. Combariza whereby he would visit several institutions in the United States during the course of his training. Mr. Pérez and Mr. Budowski were being trained at the Institute under the supervision of L. R. Holdridge, Ecologist and Forester of the Northern Zone, while Mr. Díaz and Mr. Valenzuela were under the direction of Mr. del Río, Education and Extension Specialist of the Northern Zone, until he went to Cuba about January 1, 1953.

Mr. Navarrete was studying for an advanced degree in plant physiology at Iowa State College, Ames, Iowa, being financed in part by the Andean Zone. In December, Miss Montoya received a scholarship from Altrusa

\* The Zone paid only travel costs in connection with these fellowships.  
 \*\* The Zone paid a part of the fellowship cost.

International Incorporated, at the instance of Miss Price, to study Home Economics at the University of Ohio at Columbus. The Zone paid her travel expenses.

During the year these 15 advanced students were financed for a total of 40 months of study. In most cases their studies will continue in 1953. These students are expected to make outstanding contributions to the agricultural advancement of the Zone when they have completed their work.

#### Participation in National Courses in the Northern Zone

El Salvador, Training Forestry Agents of the Ministry of Agriculture - Mr. Tosi assisted Dr. Holdridge in giving instruction in this national course held from April 20 to May 3 in Santa Tecla, El Salvador, as indicated in the Northern Zone report.

#### Research

#### Participation in Research Activities of the Northern Zone

Agricultural Regions of Costa Rica - Quention West, Land-Use Economist of the Andean Zone, participated extensively in the classification and analyses of census data for the various agricultural regions of Costa Rica in connection with this study and was co-author of the report.

Economic Land-Use Classification and Farm Management Studies of the Upper Reventazón Area in Costa Rica - Dr. West also assisted and advised Dr. Peterson and Mr. Loomis of the Northern Zone in various aspects of these studies, particularly in reference to techniques of statistical analysis.

Study of the Tierra Blanca and Pacayas Communities in the Reventazón Area, Costa Rica - Minnie Price, Home Economist of the Andean Zone, assisted in the collection of data on rural home conditions from the housewives who were interviewed in connection with this study. The Home Economist of the Northern Zone being absent, Miss Price had charge of all of the household enumerators who were collecting these data. Mr. Tosi and Dr. West contributed to the design of the questionnaires which were used in collecting data in this study.

The foregoing studies will be of value in the Andean Zone, as well as in the Northern Zone, and the experience gained by Zone members in helping to conduct these studies will be of value when similar studies are made in the Andean Zone.

## Cooperation and Consultation

### Consultant Services and Surveys of Zone Resources and Programs

Joseph A. Tosi, Jr., Forester of the Andean Zone, before the Zone personnel were transferred to Lima, assisted Dr. Holdridge, Ecologist and Forester of the Northern Zone, in establishing and supervising woodland demonstration plots which were used in training students. This constituted part of a foundation for extension work in forestry in Costa Rica. This foundation was being established by the Northern Zone with the expectation that STICA would take up and carry on this work.

Quentin West, Land-Use Economist of the Andean Zone, participated in consultations with the "Dirección General de Estadística y Censos" of Costa Rica before he was transferred to Lima. These consultations were on improved methods of collecting and analyzing agricultural and land-use statistics.

Minnie Price, Home Economist, made a careful analysis of extension and home economics programs in Ecuador, Colombia and Peru during the final quarter of the year. Her visits to these countries helped to establish liaison with agencies which will be interested in participating in Zone training activities and helped provide a basis for planning such activities.

Requests were received for consultations and training services from the following organizations in Peru, Ecuador and Colombia on the subject of forestry, and Mr. Tosi has initiated such consultations:

#### Peru

- a. División de Colonización y Silvicultura, Ministerio de Agricultura. (General problems of forestry)
- b. Programa Cooperativo de Experimentación Agrícola, Agricultural Experiment Station at Tingo María. (Forestry research)
- c. Servicio Cooperativo Interamericano de Producción de Alimentos (SCIPA). (Forestry extension, methods and materials)
- d. Escuela Nacional de Agronomía "La Molina". (Assistance in organization and content of forestry instruction at the undergraduate level)

#### Ecuador

- a. Departamento Forestal del Ecuador, Ministerio de Economía de Ecuador. (Research in problems of lowland forest exploitation and economy and training for their technical personnel)



- b. Servicio Interamericano de Agricultura. (Forestry extension methods and materials)

Colombia

- a. División de Recursos Naturales, Ministerio de Agricultura. (Training for some of their technical personnel)
- b. Departamento Forestal, Instituto de Parcelaciones. (Watershed forestry, also aid in the training of both sub-professional and professional-grade forest technicians)
- c. Instituto Forestal, Facultad de Agronomía, Medellín. (Content and organization of a forestry curriculum for a professional-grade undergraduate school)

Enrique Blair, Agricultural Engineer, has consulted with the Dean of the Facultad de Agronomía of Palmira, Colombia, on programs of study in agricultural engineering, particularly in hydraulics, irrigation and drainage, including a plan for the installation of a hydraulic laboratory.

The Director of the Zone attended the First National Congress of Ingenieros Agrónomos of Colombia which was held in Medellín from November 20 to 24. Three hundred and forty delegates and 39 observers participated. The Director took the occasion to explain to numerous delegates the Technical Cooperation Program for the Andean Zone.

Mr. Tosi together with Dr. Holdridge of the Northern Zone attended an International Conference for the Protection of Nature held in Caracas, Venezuela from September 3 to 10. They also represented the Organization of American States on this occasion.

During the second quarter Mr. Blair visited the agricultural organizations in Bolivia, Peru, and Colombia in preparation for the work of the Zone in agricultural engineering; Dr. West visited Colombia, Ecuador, and Peru to familiarize himself with their land-use problems and to attend part of an FAO course on agricultural statistics which was given in Quito; and the Director of the Zone visited Bolivia, Colombia, Ecuador, and Peru to establish liaison with appropriate agricultural programs of these countries in preparation for the training program of the Zone.

Relations with the Host Country

The officers of the Ministry of Agriculture, the National School of Agriculture, and other national and international agencies with whom the personnel of the Zone have been in contact in Peru have provided every assistance to the Zone to facilitate the installation of the headquarters and the planning of the Zone activities.

### Relations with Other Zone Countries

During the year the Zone has financed training for students from every Zone country. Cordial relationships have been established with the appropriate organizations of such countries in spite of the fact that the Zone headquarters was not chosen until September 30 and could not be completely arranged before the end of the year.

### Relations with Local Cooperation Agencies and Other Technical Assistance Activities.

The Zone specialists in forestry and home economics had already begun to cooperate in their respective fields with the Ministry of Agriculture, the National School of Agriculture, technical schools, and other organizations in the vicinity of the headquarters that are concerned with the improvement of agriculture and rural life.

In Colombia, Ecuador, and Peru the Director and all members of the Zone have been in contact with officers of the United States bilateral program of Technical Assistance, the United Nations, FAO, and UNESCO in an effort to establish a good basis for cooperation in future activities.

### Publications

No publications of the Andean Zone were issued during the year, but substantial contributions were made to publications which were prepared in the Northern Zone and are expected to be issued in the early part of 1953. Substantial contributions were also made to the materials prepared for the Extension Training Center and the Irrigation and Drainage Course that were conducted in the Northern Zone.

Mr. Tosi, while in Costa Rica, prepared a bulletin entitled "Los Bosques Bien Atendidos Rinden Magnificas Ganancias" (Well Cared for Forests Yield Excellent Returns) which was published by the Ministry of Agriculture of Costa Rica and widely distributed among interested persons. It will be useful in the Andean as well as in the Northern Zone.

## SOUTHERN ZONE<sup>1/</sup>

Manuel Elgueta, Director

### Introduction

In the Southern Zone the Technical Cooperation Program is aiming to carry out its objectives by means of graduate courses and the development of a Demonstration Area in Uruguay. The courses are given for employees of the governments or recognized institutions of the countries of the Zone, and their purpose is give training in agricultural extension and subject matter fields related to extension programs. They are given in the various countries of the Zone.

The Demonstration Area, which includes two sections of the Department of Canelones and one of the Department of Florida, contains about 60,000 hectares and 1,800 farms. Its center, the city of San Ramón, has an agricultural school and an industrial school which are part of the Labor University (Universidad del Trabajo). In this area studies of natural resources and an integral program of agricultural extension are being carried out. The area will also be used as a permanent center for training and will receive students from the different countries for periods of approximately four months.

### Organization and Administration

The Zone's program of work is organized around a nucleus of specialists who are in charge of the training courses and the project of the Demonstration Area. For the courses additional professors from the country in which the course is given are also used for the duration of the course. The field projects of the Demonstration Area are carried out with the use of supplementary personnel supplied by the Government of Uruguay who receive some extra pay for the additional work which they render to the Southern Zone program.

The students who receive training in the Demonstration Area carry out various projects and receive an opportunity to learn different methods of work.

The Director of the Zone administers the project with the assistance of an administrative assistant who keeps a record on the movement of funds and is in charge of the account. Two secretaries assist in the preparation of material for the courses and the projects of the Demonstration Area.

The Soils Specialist was in charge of the Soils Course given in Chile, and he was assisted in the management of funds by a budget official of that country.

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<sup>1/</sup> This is an extract from the Annual Report prepared by the Director of the Southern Zone.

### Training

Two international courses were given during the year, one on Agricultural Extension and the Fundamentals of Rural Sociology in Montevideo, Uruguay, and the second on the Study, Conservation, and Management of Soils in Santiago, Chile. Ten scholarships were offered to each of the five countries in the Zone, with the exception of the host country to which 15 were offered. These included transportation to and from the course and a monthly stipend of \$100.00 for the duration of the course.

In order to select the students the Zone Director visited Argentina, Paraguay, and Chile, and the Soils Specialist, Antonio Arena, visited Brazil. Both established contact with the respective Ministries of Agriculture and other organizations, explained the purposes and plans for the courses, and asked the countries to select ten professionals--five specialists in extension and five specialists in soils. Special emphasis was given to securing students who had had some experience in the subject matter of the courses. An announcement was prepared describing each course. The names of the participants in both courses can be found in the section of this report on the Institute's Teaching Program on page 90.

#### International Course on Agricultural Extension and the Fundamentals of Rural Sociology

The course took place from 3 September to 24 October 1952. At the College of Agriculture and Veterinary Medicine in Montevideo, several lectures by outstanding Uruguayan technicians were also given at the Agrupación Universitaria del Uruguay. Its purpose was to gather together representatives of each of the five countries of the Zone and to give them an intensive presentation and discussion of the principles concerned in the development of an extension education program for a rural population. Some fundamentals of rural sociology were added since this knowledge is thought necessary for the adequate comprehension of the problems and needs of farmers and since this field is not taught in the colleges of agriculture of these countries.

Participants - Thirty-eight professionals attended the course, as follows: 5 from Argentina, 4 from Brazil, 6 from Chile, 7 from Paraguay, and 16 from Uruguay. The Ministry of Agriculture of Paraguay also sent two STICA officials without cost to the Southern Zone. Uruguay requested permission to increase its quota of participants to 16, and one additional student from the College of Agriculture of the Catholic University of Chile was also accepted. The ages of the participants ranged from 24 to 53; 23 held the "Ingeniero Agrónomo" degree; 5 were veterinarians; 3 had degrees from other universities, and the 7 participants from Paraguay were "agrónomos" without a degree since the country does not have a college of agriculture. Thirteen were extension agents; 1/4 were supervisors or specialists in Departments of Extension; 5 were veterinarians; one was an inspector of rural schools; one was a director and one a professor of a vocational agricultural school; two were officials of the Colonization Institute, and one was an official of an agricultural society.

Professors - The professors of the course included the following:

H. C. Ramsower (Director and Professor of the Course) - Former Director of Agricultural Extension of Ohio State University, holds a Ph.D. from Harvard University.

Cannon C. Hearne - Head, Division of Extension, Education, and Training, Technical Collaboration Branch, Office of Foreign Agricultural Relations, United States Department of Agriculture, Washington, D.C.; is a graduate of the University of Missouri.

Olen E. Leonard - Professor of Sociology and Anthropology, Michigan State College, East Lansing, Michigan; at present on leave from the College and Director of the Northern Zone, Technical Cooperation Program; holds a Ph.D. from Louisiana State University.

W. J. Timmer - Graduate of the University of Holland; holds a Ph.D. from the University of Indonesia; was for several years Extension Official and Professor of Social Agronomics at the University of Indonesia; at present Extension Specialist of FAO in Brazil.

Collaborators in the course were:

Federico Rolfo - Graduate of the College of Agriculture, University of Montevideo, and present Director of the College of Agriculture at Paysandú.

Santiago Antufia - Graduate of the College of Agriculture, University of Montevideo, with additional training in extension in the United States; at present an official of the Ministry of Agriculture of Uruguay assigned to the Southern Zone of the Institute where he is in charge of extension programs.

Jorge Ramsay - Graduate of the College of Agriculture, University of Chile with a year's extension training in the United States; at present a Rural Agronomist of Aconcagua, Chile.

Material Covered by the Course - The first part of the course covering agricultural extension included the following:

1. Objectives and philosophy of extension (Ramsower)
2. Organization of extension (Ramsower)
3. Planning extension programs (Timmer)
4. Extension methods and procedures (Hearne)
5. Evaluation of extension methods and programs
6. Work with children and rural youth (Federico Rolfo, Santiago Antufia & Jorge Ramsay)
7. Training extension agents.

The second part of the course dealing with the fundamentals of rural sociology gave emphasis to the methods to be used by the extension agent in his contacts with the rural communities and covered the following material (Leonard):

1. Preliminary social studies of a region
2. Analysis of the problem of an area
3. Determination of the forms of intercommunication in an area.

Presentation of Classes - Each professor presented his subject matter by means of lectures, discussions, and demonstrations with active participation of the students. The material was presented in Spanish, Portuguese, and English; in the case of English, interpreters were used. Mimeographed summaries of each lecture were distributed to the students at the beginning of each class.

Little bibliographic material could be secured in Spanish; nevertheless, some excellent bulletins were obtained from Puerto Rico, Peru, and Costa Rica. To these were added many publications of the Extension Service of the United States Department of Agriculture and from various States of the United States. Roy A. Clifford, Sociologist of the Southern Zone, prepared a summary of the census data available on the Demonstration Area. A map of the area was also prepared. These were mimeographed and distributed to the students.

In order that the participants could put into practice the concepts and fundamentals presented in the course, each was assigned a project to develop on some aspect or problem related to the agricultural or social activity of the San Ramón Demonstration Area or to some area of the country from which he came. These projects, presented at the end of the course, were very valuable to the students. They covered various aspects of agricultural activity and production including the planning and study of programs of agricultural and social improvement in rural areas.

Almost every Saturday and one Sunday excursions were made to some point of interest near Montevideo. These included visits to a cooperative dairy, and oenology school, a forestry school, dairy exposition in San José, beer factory, and the Punta del Este resort.

A one-week trip was made to the richest agricultural area of Uruguay on the litoral side of the Uruguay River. During this 1,600 kilometers trip the participants visited the Estanzuela Experiment Station in Colonia, the Dairy School in Colonia Suiza, the School of Agriculture at Paysandú, the agricultural services of Dolores, the sugar beet industry of Azucarlito, the cold storage plant of Casablanca and the sugar mill of Espinillar.

Evaluation of the Course - This course and the Soils Course constituted the first initiative of the Southern Zone in training activities. It was, therefore, considered valuable to use them as experiences from which to draw conclusions and correct deficiencies in future courses. In order to evaluate the Extension Course, a questionnaire was prepared

which could be analyzed statistically and on which various questions were presented, the answers to which would permit the formulation of a criterion not only of the personal reaction of the student but of the cause of this reaction. A summary of the questions and answers is given below:

1. In your future activities, will the work of this course be very useful, useful, somewhat useful, or of no use to you?

Of the 36 answers, 29 replied that the course would be very useful and the rest, useful.

2. In order to give an idea of your opinion on the various phases of extension and rural sociology given in the classes in terms of their value for extension agents, please mark the following in the order of their value for extension workers:

- a. Philosophy, Objectives and Organization
- b. Program Planning
- c. Methods and Techniques
- d. Evaluation
- e. Club Work
- f. Rural Sociology
- g. Special Lectures

The result was the following: 30 or more thought that the first four subjects had the greatest value; 28 thought that the fifth subject had the greatest value. Only 6 considered g to be of great value, the rest of the subject material was rated as of some value, but 11 answers indicated that the special lectures were of little value. The point of view of the students was to consider the subjects in relation to their value for extension training.

3. Using the division of time followed in the course, indicate the amount of time you believe should have been spent on each of the subjects indicated in question 2 above.

Seven thought that more time should have been given to a; 13 to b, 19 to c, 9 to d, 9 to e, 7 to f, and 1 to g. Four suggested that less time should be given to a, 1 to b, 5 to c, 12 to d, 10 to f, and 17 to g. The other replies considered the time equal.

4. Considering that the course is designed especially for extension agents, please indicate the time you believe should be dedicated to the study of extension.

Nineteen suggested that more time should be given to a through e in No. 2 above, 14 the same, and 3 less. For other courses 6 answered more time, 23 the same, and 19 less.

5. If you are in favor of giving other subject matter besides extension, such as rural sociology, in a future course, please indicate the subject matter that you think is most important for extension agents.

Twelve mentioned farm economics, 9 psychology, and 4 rural sociology. Other subjects mentioned were economic geography, marketing, pedagogy, rural legislation, and home economics.

6. Considering the convenience of the students, how long do you think the course should last?

Six preferred six weeks, 15 eight weeks, 9 ten weeks, and 6 twelve weeks.

7. Based on a two-months' course, which months of the year do you think would be most appropriate for the course?

Twenty-two favored the months of September and October or October and November (spring months).

8. What suggestions would you offer to improve the general disposition of the course given in Montevideo?

Twenty-two different suggestions were made. At least 20 suggested a more central location. Ten suggested that the classes be given in the mornings leaving the afternoons for practical and special work. Some suggested that more study material, such as books and bulletins, be obtained.

9. Give suggestions for improving the classes.

The majority were of the opinion that the classes should be given in Spanish but by professors who know the language well, or if given in English, interpreters should be used. Many suggested that the courses should be mimeographed or otherwise duplicated. Other suggestions were to devote more time to practical work, include more examples and ~~illustrations~~ and use the Demonstration Area more.

Observations and Conclusions - The experience obtained from this first course and the analysis of the students' replies to the questionnaire led to the following observations and conclusions:

1. The maximum number of students should not exceed 35, and 30 would be preferable.
2. All the participants should have a real interest in agricultural extension and be working in this field.



3. The students should be allowed to attend the course while free from any other duties. This is particularly important in the case of students from the site of the course.
4. It is important to make use of the Demonstration Area for practical application of the course material, and facilities should be developed in order to allow the students to spend some time in San Ramón.

The advantages of an international course were very evident. The students presented the experiences of their own countries, and the resulting discussions were profitable not only for the students but for the professors as well.

#### International Course on the Study, Conservation, and Management of Soils

This course took place at the School of Agriculture of the University of Chile from 25 August to 25 November 1952. Students from the five countries of the Zone participated, and by special arrangement with the Northern and Andean Zones, one Ecuadorean and one Costa Rican also attended. The course was sponsored jointly by the Inter-American Institute of Agricultural Sciences and the Food and Agriculture Organization of the United Nations. FAO paid the salary and transportation for one professor, José Marull, and the transportation and monthly stipend for 7 students.

The purpose of the course was to train extension agents in the rational use of the soil, which is a basic natural resource. The solution of land-use problems requires a knowledge of the fundamental principles of soil management particularly with regard to fertility and productive capacity. It is evident that there is a need to form groups of "Ingenieros Agrónomos" in each country who have a knowledge of applied soil science and are capable of helping the extension agents and the farmer to solve problems, to make soil surveys, and to plan land-use programs which include maintenance of fertility and protection against erosion.

This course dealt with soil conservation as an integral part of soil science and covered edaphological principles which determine the adaptability of the land and the agricultural techniques such as cultivation, rotation, amendments, fertilizers, irrigation, and other factors upon which the success of productive agriculture depends. Thus the participants in the course were asked to consider the regional problems of their respective countries and suggest solutions using appropriate standard techniques, which are applicable to Latin American programs of extension and soil conservation.

For a thorough course in soils, it is desirable that it be given in an area possessing a great variety of geological and topographical conditions. These conditions prevail in Chile where are found within short distances soils developed under deserts and forests and from alluvial, glacial, old marine terrace, and volcanic materials of various ages. This great variety of soils presents many interesting

problems with regard to their use, erosion, irrigation, fertilization, management, rotation, etc. A considerable amount of systematic research with the use of fertilizers, rotation, etc. has also been carried out in Chile for the last 12 years, and a soil survey has been made of an area of five million hectares which is yielding basic data on soil classification and use. At various experimental stations in Chile there is also a soil conservation program under way, which includes erosion control, better management, introduction of grasses, reforestation, etc. There exist some positive results of regaining soil productivity by solving problems of erosion control, applying better agronomic practices rather than engineering. The Chilean Government attempted to provide special funds for laboratory equipment for the course, but unfortunately these did not come through in time.

Participants - The participants in the course included the following: 5 from Argentina, 6 from Brazil, 17 from Chile, 5 from Paraguay, 6 from Uruguay, 1 from Ecuador, and 1 from Costa Rica. One of the Uruguayans came at the expense of the Labor University (Universidad del Trabajo). The students from Costa Rica and Ecuador were given scholarships by the Northern and Andean Zones respectively. All the participants were "Ingenieros Agrónomos" except the student from Ecuador and one of the Uruguayans, who were chemists, and the Paraguayan students, who were "Agrónomos". Eight of the students teach courses at universities; 16 work on soils for agricultural research institutions; 9 work for development sections of Ministries of Agriculture; and 8 work for colonization or fertilizer organizations. All of them work in their respective countries on problems related to soils, that is, teaching or doing research and development work.

Professors - The professors of the course included the following:

Antonio Arena (Director and Professor of the Course) - Ing. Agr. degree from the University of Buenos Aires; former Professor of the University of Buenos Aires and former Director of the Soils and Agricultural Institute of Argentina, now Soils Specialist of the Southern Zone staff of the Technical Cooperation Program of the Inter-American Institute of Agricultural Sciences.

José Marull - Ing. Agr. degree from the University of Chile; Ph.D. from Cornell University; former University Professor and former Director of the Experiment Station of the National Society of Agriculture in Chile.

Manuel Rodríguez - Ing. Agr. degree from the University of Chile; Head of the Soils Conservation Section of the Ministry of Agriculture and Assistant Professor of the School of Agriculture of Chile.

Collaborators in the course were:

Antonio Piñeiro - Ing. Agr. degree from the University of Buenos Aires; in charge of the Edaphology Course, College of Agriculture, University of Tucumán, Argentina.

Antonio Garbosky - Ing. Agr. degree; in Charge of the Colloidal Laboratory, Soils and Agricultural Institute, Ministry of Agriculture, Argentina.

Carlos Díaz Vidal - Ing. Agr. degree; works for the Soil Conservation Section, Department of Agricultural Research, Ministry of Agriculture, Chile.

Material Covered by the Course - The course was divided into six parts as follows:

1. Edaphology or soil science as pertains to the knowledge of the soil as a natural body. (Arena)
2. Survey and classification of soils considering the geographic distribution and mapping of soils and the techniques of exploration and cartography. (Manuel Rodríguez)
3. Fertility and the use of fertilizers, considering the soil in relation to the vegetative nutrition and the cultivation of economic plants, in order to determine, diagnose, maintain, and improve fertility. (Marull)
4. Agrotechniques, management, and agricultural technology of soils, capacity of agricultural lands, and their improvement by amendments. (Arena)
5. Soil conservation, principles, plans, and techniques for the prevention and control of soil erosion. (Manuel Rodríguez)
6. Economic use of soils including the relation between the soil and agricultural economics considering the soil as a permanent physical factor in productivity and the fundamental basis for agriculture. (Marull)

Presentation of Classes - Since it was desired that this should be a real training course rather than merely an informative course, emphasis was placed on the method of discussion seminars in which the students participated actively. The theoretical classes were given for three hours in the mornings, and the afternoons were devoted to laboratory practice or soil survey trips. A rather ample bibliography was issued; much of it was brought from Buenos Aires by the Director of the course. The library of the School of Agriculture, the Experiment Station of the National Society of Agriculture, and the Ministry of Agriculture of Chile also supplied material for the use of the course.

Antonio Pifreiro, Antonio Garbosky, and Carlos Díaz were in charge of the laboratory practices related to edaphology and soil chemistry, which consisted of analytical procedures for the separation and determination of clay fractions; the separation of mineral and organic colloids; the determination of organic matter, humus and nitrogen; alkalinity and soluble salts; conductometric titration (chemical physical);

determinations of P.H. with the potentiometer; determination of lime requirements, anion exchange capacity, and diagnosis of fertility levels by rapid quantitative chemical methods.

Manuel Rodríguez was in charge of the field practices. Short field trips were made to various farms and side roads in the vicinity of Santiago. In each place trial pits were dug in order to study the mineral content and profiles of the soils, and relations were established between the mineral content of the soil and its use capacity and fertility problems.

A four-day trip was made to the cities of Los Andes and San Felipe in the Aconcagua Valley which contains the most fertile sedimentary soils in the territory. The province of Valparaíso in the Quillota Valley, which raises fruits and vegetables, and the coastal area of the province of Santiago, which raises wheat and livestock, were also visited. An eleven-day trip was made through the Central Valley to Cauquenes, some 350 kilometers south of Santiago, toward the end of the course. Here the group visited an experiment station of the Department of Agricultural Research, where on a farm with serious erosion problems an integrated program of conservation is being carried out through terracing, rotation planting, and reforestation. From this point the group took the train to Puerto Montt, stopping in three cities, Temuco, Osorno, and Puerto Varas. Several experiment stations were visited, and various kinds of agricultural enterprises based on different types of soils were observed. On all the trips trial pits were dug in order to study the soil profiles. Soil surveys were carried out on the property of the School of Agriculture. The School of Agriculture of the University of Chile provided ample facilities for the course, including a classroom, permanent office space, the school bus, and facilities for the field practice at its farm "La Rinconada". Two professors of the school assisted Rodríguez in leading the field practices.

Evaluation of the Course - As in the case of the Extension Course, upon completion of the Soils Course, each student was asked to fill out a questionnaire expressing his opinion of the course with regard to its influence on his own activities. The questions and answers are summarized as follows:

1. What importance will this course have on your future activities?

Twenty-three considered it very useful and 9 useful.

2. With respect to the various subjects given in this course, please check the value that they have for you.

The answers are given below:

	<u>Great Value</u>	<u>Some Value</u>	<u>Little Value</u>
Edaphology	18	17	2
Survey	28	8	
Soil Classification	29	6	
Fertility and Use of Fertilizers	32	5	
Agrotechniques	16	17	1
Conservation	27	7	
Economic Use	27	5	4

3. Considering the distribution of time in this course, please indicate the time you believe should be devoted to each of subjects.

With regard to theoretical classes the answers were as follows:

	<u>More Time</u>	<u>The Same Time</u>	<u>Less Time</u>
Fertility and Use of Fertilizers	27	8	1
Soil Classification	20	13	1
Economic Use	19	17	2
Survey	18	15	2
Conservation	16	16	2
Agrotechniques	14	19	
Edaphology	10	20	5

As regards the field practices, the answers were:

Fertility	32	5	1
Conservation	26	10	
Survey	19	15	
Laboratory	12	18	5 and 1 none

4. Considering that the course is for "Ingenieros Agrónomos" in their field of work, indicate the amount of time, based on this course, which should be devoted to the different types of study:

The answers were:

	<u>More Time</u>	<u>The Same Time</u>	<u>Less Time</u>
Theoretical classes	6	16	7
Laboratory practice	13	14	5
Field practice	28	6	

5. Considering the interest of the students, how long do you think the course should last?

Sixteen replied 4 months, 12 six months, 8 three months, and 1 two months.

6. This year's course was too short to completely develop the program. If you think it should be shorter, on which subjects would you concentrate the training?

Sixteen said on Fertility and Use of Fertilizers, 14 on Conservation, 12 on Classification and Economic Use, 10 on Survey, 9 on Edaphology, and 7 on Agrotechniques.

7. Which months of the year would be most appropriate for a three-month's course?

Twenty-six said that the months of September to November (the spring) would be best; only 4 preferred March to May, and two preferred December to February.

8. Classify the various practices in relation to their utility for acquiring knowledge.

The answers were as follows:

	<u>Great Value</u>	<u>Some Value</u>	<u>Little Value</u>
Survey excursions	33	3	
Period at La Rinconada	25	7	
Trips	25	9	
Discussion of methods	14	17	4
Laboratory analysis	12	17	5

9. What comments can you make on the value of the practices and what suggestions do you have for their improvement?

The majority were of the opinion that the field practices were the most important part of the course and suggested that the course be divided into small and homogeneous groups to make them more effective.

10. If this course were to be repeated, what professionals in what activities would be preferred for it?

The majority mentioned professionals who work on soil conservation and utilization programs and extension agents.

11. Which methods of conducting classes do you prefer, taking into consideration the fact that the method of questions and discussions permits covering less material than the method of lectures?

The answers were as follows:

	<u>Very Desirable</u>	<u>Desirable</u>	<u>Undesirable</u>
Lectures with questions only at the end of the class	8	14	3
Lectures with questions and discussions during the entire class	24	4	4
Lectures with group discussions, seminars, etc.	20	10	
Informative classes on techniques and methods	9	13	4

12. What suggestions would you make for improving the course?

The following were among the numerous suggestions made:

Divide the students according to interests  
Increase the practice time  
Reduce the number of subjects  
Distribute summaries of each class  
Hold seminars and classes among the students  
Have weekly questionnaires filled out

13. How many students should be accepted?

Thirteen thought there should be 30, 9 twenty-five, 4 twenty, and 1 thirty-five.

14. Do you think each participant should receive a certificate of attendance at the course?

Thirty-three believed that this is important, and 4 were indifferent.

Observations and Conclusions - The replies to the questionnaire indicated that the emphasis given on the planning of the field practices was worthwhile. The main objective of the course was to give an applied knowledge which the "Ingenieros Agrónomos" could put into practice in the field. The twenty short trips, the two long trips, and the period at La Rinconada gave the participants ample opportunity to develop an adequate criterion for the determination of the characteristics of soils.

The lesser value obtained from the laboratory practices is explained by the lack of equipment to carry them out satisfactorily. The preference for theoretical classes of the seminar type with the participation of the students confirms the general objectives of these courses which is to form a basic criterion rather than to give out simple information. The number of students in the course was excessive and should

be reduced to 25 in the future. It would also be convenient to organize the field practices on the basis of groups. It is also evident that the program was too broad and should be reduced and concentrated in the future. However, it is still believed that a similar course could not be given in less than three months.

### San Ramón Demonstration Area

The work of organizing and applying agricultural extension programs in the San Ramón Demonstration Area was initiated in October 1952 when a Central Collaboration Committee was selected and established to serve in a consultative and advisory capacity. This Committee consists of 15 members chosen from among agricultural producers, housewives, business men, and technicians, outstanding individuals of the Demonstration Area, and is presided over by Antonio Mallarino, producer. The first projects developed in the Demonstration Area were the Cultivation of Corn and Agricultural Youth Clubs.

In the first part of 1952 Roy A. Clifford finished the study of the agricultural census data of 1951 on the three sections which make up the Demonstration Area. He prepared a report in English which includes a general description of the area and a detailed discussion of the systems of land tenure, size of the properties, populations, land use, crops grown, and other important data. An abstract of the report was prepared in Spanish for the students of the Extension Course.

Although no aerial photographs of the Demonstration Area are available, the military regiment of San Ramón has some good maps which contain a great many important details. An officer of the regiment was asked to prepare a basic map giving the following details: (1) location of all houses and ranches of the area and all roads, streams, railroad stations and lines, schools, kilometer posts, villages, recreation areas, etc. (2) boundaries of the properties, and (3) contour lines and crops grown. This map will be a useful guide to carrying out field work and completing the ecological study of the community. It was possible to prepare for each piece of property in the area a card containing the name of the farmer, locality, postal address, principal enterprise, area, and kind of tenancy.

Access to the school records was obtained during the vacation period. Official copies of the complete records obtained in a school survey in 1947 on school attendance, matriculation, general school conditions, etc. were made available. They have been only partially analyzed, but the matriculation is low, and the attendance is much lower than the matriculation. It was noted that after the first year of school, the number of students attending school diminishes sharply, and it is extremely low in the rural areas after the third year. School conditions vary from good in some cases to very poor in others.



### Cultivation of Corn

Corn cultivation is very widespread in the Demonstration Area although its development is profoundly affected by such limiting factors as poor cultivation practices, inferior seeds, lack of knowledge of the economic use of fertilizers, etc. Considering the importance of this crop, in giving general orientation to the extension program being developed in the Demonstration Area which is devoted to intensive small farming, it was thought advisable to set up some comparative demonstrations of corn cultivation using the fields of five selected farmers, and different planting distances, "Flint" and "Dent" seed varieties, different types and amounts of fertilizers, etc.

These trials have had surprising results and a positive demonstration value. Each demonstration consisted of sowing a plot of a top-cross corn produced by Ancap and a plot of the farmer's corn without fertilizer and then repeating both with fertilizers, one with a commercial fertilizer based on phosphorus (2-9-3) and the other with more nitrogen (10-8-3). By the end of December in all five demonstrations the fertilized plots had developed more than twice as much as the unfertilized plots and were of a dark green color as contrasted with the yellow color of the check plots. The check plots correspond to the normal corn fields of the Zone with respect to appearance and color.

The demonstration plantings were made one meter apart, in contrast to the local plantings which are a half meter apart, in order to demonstrate the possibility of clean cultivation using a cultivator. The results of the demonstrations have been very evident, and the neighboring farmers have come to see the plantings.

### Agricultural Youth Clubs

For the past seven years the agricultural youth clubs of the country have been conducted by a private entity, Agricultural Youth Movement, which receives an official subsidy and handles about ninety clubs scattered throughout the nation. For the purpose of establishing the bases for organization and functioning of the clubs to be founded in the Demonstration Area as part of the extension program of the Zone, an agreement was drawn up with the Agricultural Youth Movement to the effect that the organization and direction of the clubs in the area would remain in the hands of the technical personnel now working with them.

To date eight agricultural youth clubs have been organized in the Demonstration Area, strategically distributed and functioning in seven rural schools. Their members include 56 boys and 71 girls between 10 and 19 years of age, and all the clubs are under the supervision of an adult leader. The most popular projects of these clubs are the raising of chickens and poultry; gardening; the raising of corn, potatoes, and squashes; and home economics.

A series of bulletins has been prepared on the various activities of the clubs. These are written in a simple and objective manner which the young people can understand and give instructions on how to develop the various projects. A series of projects in home economics is being prepared by Violeta Sarli, who had a fellowship to the Home Economics Course in Puerto Rico, assisted by Myriam Parra, a student of the Industrial School of San Ramón

### Projects with the Government of Chile

The Chilean Government set aside two million Chilean pesos for projects to be developed in Chile by the Inter-American Institute of Agricultural Sciences. Since these funds must be spent in Chile, an agreement was drawn up to develop the following projects in that country:

#### Center of Training in Rural Administration

The purpose of this project is to train "Ingenieros Agrónomos" from Chile and the other four countries of the Southern Zone in modern methods of administration and organization of agricultural properties. This project will be carried out cooperatively with FAO, which will be directly responsible for its development, the Ministry of Agriculture of Chile, and the Institute of Agricultural Economics. The center is located in the vicinity of Temuco on a 200-hectare farm which belongs to the Chilean Government. An "Ingeniero Agrónomo" of the Ministry of Agriculture will administer the project. Dr. R. McG. Carslaw of FAO will serve as technical advisor in farm administration. A diversified type of commercial enterprise will be carried out, and the income from the sale of the produce will be used to further the project. The farm will also be used for studying the problems of organizing and exploiting farms of similar characteristics in the entire Zone.

Once the administration of the center has been well established, professionals will be accepted for a period of about four-months' training under the direction of Dr. Carslaw. Fellowships to be granted to "Ingenieros Agrónomos" from the four other countries of the Zone will be provided from the funds granted by the Chilean Government. Although the present funds are available only for one year starting in November 1952, the Government of Chile has included in its 1953 budget funds which will permit the project to continue.

#### Training in the Analysis of Soils

As was noted previously, one of the handicaps of the Soils Course was the lack of adequate laboratory facilities for the practice sessions. For the purpose of correcting this defect, a project was prepared by which 440,000 Chilean pesos of the funds provided by the Chilean Government would be used for the acquisition of laboratory equipment. The objective of the project was to train Chilean "Ingenieros Agrónomos"

and participants in the International Soils Course in the basic principles of analyzing soil samples obtained from the soil survey of Chile. Unfortunately these funds were not available in time for the Soils Course, but the project is being carried out and the laboratory will be equipped for a future course.

### Coöperation and Consultation

#### Relations with the Host Country

The contract with the Uruguayan Government was signed in January of this year by the Minister of Livestock and Agriculture representing the Uruguayan Government, and by the Director of the Southern Zone representing the Inter-American Institute of Agricultural Sciences. In accordance with the agreement, the Government appointed Ing. Agr. Angel Nufiez as Uruguayan Coordinator of the program. He took up his duties in March. A Coordinating Committee, composed of the following members, was also established in the Ministry of Livestock and Agriculture:

Federico Rolfo (Chairman) - Representative of the College of Agriculture.

Miguel L. Galain (Vice Chairman) - A veterinarian and representative of the Division of Livestock (Dirección de Ganadería).

Cirilo Larrosa (Secretary) - Representative of the Agricultural Youth Movement.

Alfredo L. Weiss - Representative of the Ministry of Livestock and Agriculture.

Luis E. Pérez Castells - Representative of the Bank of the Republic.

Tomás Claramunt - Representative of the National Colonization Institute.

Luis Fernández (later replaced by Francisco Secco Ellauri) - Representative of the Labor University (Universidad del Trabajo).

Manuel Gaggero - Representative of the College of Veterinary Medicine.

Romeo Arnaboldi - Representative of the Division of Agriculture (Dirección de Agricultura).

The Committee held several meetings during the year and studied the various aspects of the program. Its members helped greatly in the selection of Uruguayan students for both courses and in the cordial reception accorded to the Extension Course by Uruguayan institutions.

The relations with the Government and with the Uruguayan institutions have been excellent. The Minister of Agriculture offered a cocktail at the initiation of the Extension Course; the Colleges of Agriculture and Veterinary Medicine provided classrooms; and the Ministry of Agriculture gave a dinner at the close of the course.

#### Relations with Participating Countries

The Soils Course given in Chile contributed to the variation of the activities in that country and to making the program known. The Government was very much interested in the program and set aside special funds for it, as was indicated previously. On 14 August 1952 an agreement was signed with the Minister of Agriculture representing the Government of Chile and the Director of the Southern Zone representing the Institute. The School of Agriculture provided the classroom and office space for the Soils Course and the bus which was used for the field trips.

The Zone Director visited Argentina several times during the year, and a Course in Pasture Management is being planned for 1953. Both Antonio Arena and the Zone Director visited Brazil several times. The country has demonstrated its interest in sending students to both courses and increasing its quota for the Soils Course to 6. Paraguay sent 7 students to the Extension Course and 5 to the Soils Course. The Zone Director visited Asunción to assist with the selection of students, and the quota of these to the Extension Course was increased to 7 at the request of the Minister of Agriculture so that two employees of the Institute of Inter-American Affairs might attend.

#### Relations with Other Technical Assistance Programs

Close collaboration was maintained with FAO especially in connection with the courses that were given during the year. The Soils Course was given jointly by the two institutions, and FAO paid for one professor and seven students. Dr. W. J. Thumer of FAO came from Brazil to give lectures for two weeks at the Extension Course. This collaboration has extended also to the project of the Center on Training in Farm Administration, which is being developed and administered by FAO, but with the collaboration of the Institute in providing funds assigned to it by the special quota of the Chilean Government. The Zone Director visited the Center in December, and close contact is being maintained with it since it is expected to offer very valuable training in a field which is given in only a very rudimentary form in the schools of agriculture of Latin America and which is essential for extension programs. The Southern Zone is also maintaining close contact with the regional offices of FAO in Santiago, Chile, and Rio de Janeiro, Brasil.

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