

FISCAL YEAR 1944-45

HANNUAL REPORT
OF
THE INTER-AMERICAN INSTITUTE
OF AGRICULTURAL SCIENCES



Main Office

**Pan American Union Building
Washington, D. C.**

Field Headquarters

Turrialba, Costa Rica

Panama Rubber Substation

**P. O. Box 146
Gatún, Canal Zone**

**Pan American Union
Washington, D. C.
July 1, 1945**

REPORT OF THE INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
TO THE BOARD OF DIRECTORS

In fulfillment of the provisions of Article III of the Convention of the Inter-American Institute of Agricultural Sciences, I have the honor to submit herewith the Annual Report setting forth the work of the Institute during the fiscal year 1944-45 and containing a budget and statements of the general condition and financial status of the Institute.

The Director of the Institute wishes to express to the Members of the Board of Directors as well as to the other officers of the Institute his grateful appreciation of the unfailing assistance given to him.



Earl N. Bressman
Director

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INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES

Earl N. Bressman
Director

José L. Colom
Secretary

The Inter-American Institute of Agricultural Sciences, organized October 7, 1942, is an international organization, which up to date comprises fourteen of the American Republics, whose purpose is to encourage and advance the development of the agricultural sciences in the American Republics through research, teaching and extension activities in the theory and practice of agriculture and related arts and sciences.

It is particularly interested in laying the foundation for a scientific approach to the development of important strategic and local agricultural products. In a broader sense it will serve to promote friendship and better understanding by fostering constructive cooperation in the agricultural field among the republics of the American continent.

It is the aim of the Institute to offer to adequately trained students facilities for advanced study and for research, with the twofold purpose of providing each student with a comprehensive view of a field of knowledge and of training him for independent investigation in that field. A high grade of scholarly work, as distinguished from the fulfillment of routine requirements, is expected of every student.

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Republic of Panama

INTRODUCTION

This is the third annual report of the Institute for the fiscal year 1944-1945. Previous reports have indicated the progress made in establishing a physical plant at Turrialba, Costa Rica and a substation for rubber on Gatún Lake in the Republic of Panama. Also they have carried reproductions of important documents such as contracts with the governments of Costa Rica and Panama for operation in those countries, programs for students and fellowships, five-year development plan, reports of progress in agricultural research, and financial statements and budgets.

Agricultural research is well under way at both stations and the Institute is ready to receive students at Turrialba. Minimum facilities and staff are provided. More than fifty different structures, ranging from the large dormitory structures down to small offices and houses are in use. More than thirty of these have been constructed in the present program. Water, sewage, electricity, roads, telephone and other services have been provided. The establishment of an institution of this type calls for the provision and acquisition of a tremendous number of different buildings, services, equipment, plants, animals, etc. Time and a considerable outlay of funds are necessary to meet all requirements.

Staff Assembled

A large staff has been assembled during the past three years and during this time only two changes have been made -- Rex A. Pixley, Business Manager, resigned in August 1943 to accept a position in Iran and Virgil C. Pettit, Purchasing Engineer, resigned in March 1945 to

accept a similar position in the United States Department of Agriculture. The staff at present, all located at Turrialba unless otherwise indicated, is as follows:

Earl N. Bressman	Director - Turrialba and Washington
José L. Colom	Secretary - Washington
Albert O. Rhoad	Dean of Faculty
Lowell Curtiss	Treasurer - Washington
Rice B. Ober	Business Manager
Mariano Anderson	Lawyer
Hernán Montealegre	Superintendent
George Slater	Superintendent, Gatún Lake, Panama
Albert O. Rhoad	Chief, Animal Industry Department
Norton C. Ives	Chief, Agricultural Engineering Department
Robert A. Nichols	Act. Chief, Plant Industry Department
Earl N. Bressman	Act. Chief, Agricultural Economics and Rural Sociology Department
Robert L. Squibb	Animal Husbandman (Nutrition)
Joseph L. Fennell	Chief, Food Crops Section
Oscar Echandi	Asst. Animal Husbandman
Jorge Granados	Asst. Agricultural Engineer
Mario Gutiérrez	Asst. in Plant Industry
Dorothy Rahn	Teacher
Manuel Aguilar	Social Security Officer
Alejandro Molina	Dormitory Manager

CONVENTION OR TREATY

The Inter-American Institute of Agricultural Sciences has been a permanent inter-American organization since December 1, 1944, the date on which the Convention of the Institute became effective. Since that date the Institute has been able to offer permanent employment to its staff members and make guarantees not only to the personnel but also to the student body.

The Institute is the only inter-American organization of its kind in existence, and to date fourteen countries, namely, Costa Rica, Nicaragua, Panama, the United States, Cuba, Ecuador, Honduras, the Dominican Republic, El Salvador, Guatemala, Uruguay, Chile, Bolivia, and Venezuela, have signed the Convention, and seven countries, Costa Rica, Nicaragua, the United States, Honduras, the Dominican Republic, El Salvador and Guatemala, have ratified it. All the latter republics contribute to the support of the organization.

Conference Endorses Institute

During the meeting of the Third Inter-American Conference on Agriculture, the Institute played an important part (Six representatives were present.) particularly in outlining future agricultural policies in the American Republics, especially those affecting the progress of research and educational work. Several countries indicated publicly that their governments were interested in joining hands with the others to support the Institute since they recognized the importance of the work conducted in Turrialba and the importance of the organization as an inter-American institution. Among the most significant considerations of this kind was

the expression made by the Argentine Republic in the plenary session of the Conference that that country was taking the necessary steps to subscribe to the Convention and their definite desire to contribute in every way possible towards the development of the Institute's work. This statement was made by the head of the delegation of the Argentine Republic to the Conference, His Excellency Dr. Rodolfo García Arias, Ambassador of his country in Caracas. The Director General of Agriculture of the Argentine Republic, Dr. Rafael García Mata, was in constant consultation with both the Director and the Secretary of the Institute who were present at the Conference in connection with the investigations and educational work to be carried out by the Institute.

The resolution of the Third Inter-American Conference on Agriculture with respect to the Institute is as follows:

Resolution III

Inter-American Institute of Agricultural Sciences

WHEREAS:

1. Agriculture and livestock raising are the most important means of livelihood of the American peoples;
2. Many of the agricultural regions of those countries have not yet reached the stage of full development, and face numerous and serious problems of production and distribution;
3. Among the greatest contributions to the welfare of a great portion of the American populations is the perfecting of techniques, research and agricultural education; and
4. The Inter-American Institute of Agricultural Sciences, organized and put into operation in spite of the almost unsurmountable difficulties of the war, has shown in its two years of existence its true usefulness

not only by the work it has done but also in the orientation of projects having promise of excellent results,

The Third Inter-American Conference on Agriculture

RESOLVES:

To convey to the Governing Board and officers of the Inter-American Institute of Agricultural Sciences in Turrialba, Costa Rica, sincerest congratulations for the excellent work of organization, construction and research that it has done.

Interest in Students and Research

The delegation from Cuba, and personally the Director of Agriculture of that country, Dr. Rodolfo Arango, had long discussions with the officers of the Institute in Caracas relative to the future cooperation that the government of Cuba was interested in carrying out with the Institute in Turrialba. All the delegations that attended the Third Inter-American Conference on Agriculture in Caracas were extremely interested in the future of the Institute and indicated their strong desire to recommend to their governments that, if they had not already done so, they should join the member countries in supporting the Institute as promptly as possible.

At the time of the meeting of the Conference His Excellency, Dr. José Luis Bustamante, President of Peru, took office, and the Costa Rican representative, sent by his government to attend this ceremony, Dr. Carlos Manuel Escalante, discussed with the President the possibility of Peru's signing the Treaty and joining the Institute. He reports that the results of these conversations were extremely satisfactory.

The Colombian delegation was so interested in the work of the Institute that it extended an invitation to several members of the Institute's staff

who were present at the Conference to visit the Cauca Valley of Colombia and other regions of the country in a preliminary scientific survey, mainly of livestock. The Colombian government also invited His Excellency, Dr. José Joaquín Peralta, Secretary of Agriculture in Costa Rica, to come to Colombia to discuss matters pertaining to the Institute. As a result of these conversations the Institute has been informed that the Colombian government is interested in sending five students to the Institute to do research work and with scholarships granted by the Colombian government.

Another country that showed marked interest in the work of the Institute was Mexico. The Minister of Agriculture of Mexico, Ing. Marte R. Gómez, took time during his trip from Mexico City to Caracas to stop at Turrialba with other members of the delegation over which he presided to inspect the work of the Institute. His remarks at the Conference both publicly and in private indicated that he was well pleased with the progress made and that he thought the Institute's future had been established. He also informed the Institute that he would recommend that the Mexican government send two students with scholarships to carry out research work at the Institute in connection with cacao production and tropical grapes.

Many of the countries that have signed the Convention of the Institute are desirous of having it ratified. In many instances that has been impossible due to different reasons involving long recesses and also the fact that the congresses have met to discuss specifically certain internal questions, as is the case with Panama and Ecuador whose congresses are in session mainly to discuss modifications in their constitutions. The Institute's officials, with the cooperation of the Pan American Union, have kept in constant touch with those republics that have not as yet signed or ratified the Convention, and in most cases a promise of early subscription or ratification has been indicated.

FIFTY BUILDINGS ON THE CAMPUS

The first two annual reports discuss in detail the background and progress of the construction program. This program, which is practically completed, includes a group of fifty different structures ranging from the large dormitory, which is one of the finest buildings in Central America, down to small houses, "bodegas" and barns.

Early in the program it was found that housing provisions for students and faculty were essential. These have been provided. The present dormitory will provide space for fifty to eighty students, depending upon the number placed in each room. Other facilities in the dormitory, such as the dining room and lavatories, are of sufficient size to accommodate three hundred. In other words, under emergency conditions and for short periods of time a large number can be provided for. During the year the ten cottages for administrative assistants and the six large faculty houses were completed. All of the latter are occupied and provide comfortable living conditions for the main staff at Turrialba.

New Dormitory Wing

As the fiscal year ends much construction is still under way. The new administrative wing of the dormitory, which will be concluded under the Institute's contract with the Institute of Inter-American Affairs, is being built. This wing, when completed, will provide needed office and laboratory space. It is so designed that it may be easily converted into dormitory quarters.

Much favorable comment has been made upon the beauty and practicability of the dormitory. Its dining room will have many uses in addition to serving as an eating place. It is so constructed that it may be used for



Main Entrance Hall to Dormitory.



Dormitory under construction.



Kitchen and Dining Hall Unit of Dormitory.



Faculty Residence No. 1.

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

banquets, movies, lectures and other gatherings of large numbers of people.

The light and power plant building provides space for laundry and drying. This unit, close to the dormitory, is ready for use. Two Diesel engines have had many preliminary trials and the Diesel oil storage tanks, switch panels, and cooling systems are in readiness.

Local Stone Used

A large combination field house and "bodega" for the Department of Animal Industry has been completed. It is built of native stone and its cost ran below estimates. It has been found by experience that the type of construction used in this building offers great promise for low-cost construction of single story buildings, and this method of construction will be utilized in the future.

A general purpose dairy barn is being completed. This modern structure provides space for thirty-four animals and will serve present needs as two groups of animals may be handled at each milking time. Local stone was used in the construction of this barn at considerable saving.

At present a bull barn and a new seed house are being erected and should be ready for use in a short period of time.

The Institute has provided its own water system and a three-inch line has been laid from the Institute's boundaries to the city limits of Turrialba. Storage tanks for the water system have been installed. This system could provide an adequate water supply for many years.

There were eighteen laborers' cottages on the Institute's grounds which have been remodelled, improved and moved to strategic sites throughout the twenty-five hundred acres. There are thirty new structures and

two under construction. This makes a total of fifty structures that are available for the present needs of the Institute.

More Buildings Needed

Many buildings are needed in the near future to provide for the ever increasing demands of the Institute staff. Greatly needed are four smaller faculty houses for assistant professors, a large machine shop, a slaughter house, a conditioning barn for research with large animals and miscellaneous barns such as calf barn, bull barn, horse barn and swine houses.

For over two years the Institute has been building durable and adequate roadways that connect all important points on the grounds. There were few roads on the property when acquired and it has been found that the provision of an adequate road system has facilitated the work greatly. It is doubtful that much road construction will be needed in the immediate future.

Attractive Lake

One of the most attractive spots on the campus is a lagoon or lake of about twelve acres in size. This lake was constructed on a low spot on the campus that could not be drained at reasonable expense. The lake has been filled with water for over a year and both the animal and plant life in and around the lake have become established. The lake has been stocked with local fish and two islands that are in the lake are nesting grounds for many birds. The place is one of the beauty spots of the Institute's grounds and will continue to be made a center of landscaping activities. Its construction costs were very low, considering that the lake has proved to be so worthwhile.

After the buildings were erected they were landscaped to make them fully attractive. All of this work, with the exception of the final

landscaping of the dormitory and central campus, has practically been done. A bulldozer has been utilized in landscaping the campus and this central campus of about ten acres will be planted in grass. This work has proceeded slowly for the past year but most of the basic work is done, so that time and expense for this activity will not be great in the future.

It is visualized that in the future the construction program will be a slow but steady one. It is hoped that a small force of men that will serve both as a construction and maintenance crew can be emphasized at all times. In the future construction costs should be lower, particularly as smaller buildings of one story and rubble masonry, either stucco or plain, offer the greatest possibilities for the future.

RESEARCH PROGRAM RESULTS

During the construction period it was possible to carry on some research in connection with establishing a plant population and a herd of animals. These results have exceeded expectations and, in our opinion, indicate the rapid progress that will occur once that attention can be directed entirely toward the Institute's objectives. It must be remembered that these accomplishments were attained with limited facilities. In many cases it was necessary to borrow the equipment and to carry on the work without adequate laboratory facilities. The noteworthy research accomplishments to date are summarized briefly as follows:

New Tomato for the Tropics

Early in 1944, after careful trial and study of wild and cultivated tomatoes to select the parents, a hybrid was made between the two outstanding types that seemed to have all the characteristics necessary for a successful tomato in warm, moist areas. This hybrid was between an unusual wild tomato and Marglobe, a North American variety. The first generation grew well and twenty-five thousand generation plants were set out. These second generation plants produced so many first-class tomatoes that the army requested the Institute to let them have the crop not necessary for seed. This was done, and in one day about 7,000 pounds were picked and shipped for use in the Canal Zone and on ships. Later, about 3,000 pounds of riper tomatoes were picked for use in San José. The third generation of 125,000 plants is producing another crop and many selections are being made. This is one of the quickest and one of the most successful developments in the history of plant breeding. It indicates what can be done with many other plants.

Tick Control

Perhaps the greatest scourge of cattle in these warm areas is the cattle tick. An inefficient method, the cattle bath, has been used as the standard way of treatment. It had so many drawbacks that the Institute, less than one year ago, started a search for a new, efficient method of control. As a result there has been a spray developed, utilizing D.D.T. This method is simpler, cheaper and more effective than the old bath. The savings on the use of this method are so great as compared to the old method that they have been estimated as high as one hundred million dollars if the tick is controlled.

"Tórsalo" Control

Next to ticks perhaps the most destructive cattle insect is the "tórsalo". In certain tropical areas it causes large running sores on the animals. These become infected and cause serious injury and suffering. The use of locally produced rotenone for control is promising and combinations with D.D.T. for tick and "tórsalo" control have been developed. A tremendous amount of interest has been created in these developments.

Feeding Coffee Pulp

The coffee producers have a tremendous problem in the disposal of coffee pulp, a by-product of the first processing of this important crop in most of the Latin American countries. The Institute has shown the possibility of utilizing this waste product by feeding it to cattle in a balanced ration. Cattle baths, found on the Institute property and now abandoned because of the use of modern spray methods, were utilized as silos for coffee pulp at the very end of the coffee picking season. Many interesting techniques have been devised to ensile this product properly. In addition, its place in the ration has been worked out. This coffee

pulp silage, with a nutritional value nearly equal in value to alfalfa hay, provides not only a solution to the handling of a bothersome waste product but also a roughage needed in the diet. It is emphasized that the mere discovery of coffee pulp as a cattle feed is not enough. This feed must find its place in the most economical balanced diet for a region.

Tropical Grapes

The Institute has been extremely fortunate in having, as the basis of its grape breeding project, the excellent hybrid material of its horticulturist, Mr. Joseph L. Fennell. He has produced this material over a period of ten years and brought large supplies of seeds, cuttings and plants to the Institute two years ago. The new varieties--eighty in number--are now producing fruit at Turrialba. Some 1200 hybrids, involving numerous commercial and wild species of grapes, are being grown. A vineyard of six acres has been put out, utilizing some of the rougher, hilly ground of the Institute. Not one grape but several adapted varieties for various uses will be distributed.

Desmodium Forage Crop

A vigorous campaign of selection and testing of desmodium, the "alfalfa of the tropics", has revealed that there are numerous types of this genus of value for cultivation. Their high protein content, palatability and adaptation to warm climates and acid soils give them a prominence greater than nearly any other forage. This plant work, carried on by the Division of Animal Industry from the standpoint of use for livestock, has attracted wide attention and promises to be an outstanding contribution of the Institute.

Strategic Crops

Valuable basis work on such important crops as rubber (Hevea and Castilloa), cinchona, (ledgeriana and succiruba), teak, bamboo, African oil palms, rotenone plants, abacá or Manila hemp, coffee, cane, etc., is under way. The collection and establishment of this valuable material in Turrialba and Gatún Lake, Republic of Panama, is of great importance. Techniques of planting, varietal differences and other important agronomic data are being acquired.

Other Agronomic Trials

Contributions to the knowledge of agronomic procedures and breeding trials too numerous to mention continue at a rapid pace. Hybrids between outstanding blackberry species and numerous watermelon, squash, lima bean, grain sorghum and cowpea crosses have been made and offer promise. The determination of the best varieties to grow of nearly every food crop has been of much practical value. Preliminary fertilizer trials to demonstrate the economical use of phosphorus and potassium have contributed to the agriculture of these regions.

CALL FOR GRADUATE STUDENTS

In June requests were directed to the governments of the twenty-one American Republics for nominations of candidates for fellowships to be offered by the Institute. The Institute was prepared to offer at least one fellowship to each of the governments. Accompanying each request was a prospectus that gave the important information in regard to necessary qualifications for each candidate, the facilities at Turrialba, and an outline of the work to be done by each graduate student. This prospectus was included in the previous annual report and is available upon application.

The first fellowship was begun in January. This fellowship was created by the Pioneer Hi-Bred Corn Company of Des Moines, Iowa in an effort to estimate the possibility of gaining a generation of corn in-breeding during the winter months. It was awarded to Mr. Mario Gutiérrez of Costa Rica. The result of the work was discussed elsewhere in this report.

Requirements for Candidates

Fellowships in the Institute are awarded to those who have already shown outstanding ability in research and who expect to return to their own countries to continue their work in agriculture.

A candidate must meet the following requirements:

1. He must have recognized high professional and intellectual qualifications.
2. He must be in good physical condition.
3. He must devote his entire time to the pursuits for which the fellowship is awarded.

4. He must spend not less than one year nor more than three years in residence at the Institute.
5. The student should be well grounded in basic courses such as chemistry, physics, botany and zoology.
6. The student will present himself at the Institute at his or his country's expense, and it is expected that he or his country will pay his return transportation to his home.

Each student is expected to present a thesis summarizing the results of the thesis problem assigned to him. If publications result from this activity, the Institute must approve and the publication should carry an acknowledgment of the Institute's role in the activity.

There are no language requirements of candidates before entering the Institute, but during the course of his studies, each student is expected to become conversant with two of the four official languages of the Pan American Union—Spanish, English, Portuguese, and French. A service designed to assist students in these four languages will be set up.

Curriculum

No formal curriculum is offered now, inasmuch as the student's time, for the present, will be devoted largely to a research problem and participation in seminars in each of the divisions of work. Each student will be expected to devote considerable time to library work. An extensive collection of botanical books gathered by the late Dr. William A. Orton of the Tropical Plant Foundation has been obtained as a nucleus of a library on tropical agriculture. This library will be expanded as rapidly as possible to include all the important works on agriculture, particularly those dealing with research.

No student will be accepted for less than one year's work, and no course of instruction will run longer than three years. Students should be well grounded in such courses as chemistry, physics, botany and zoology.

As a center of research and training, the Institute will attract outstanding men in the agricultural field, and it is hoped to utilize these men in bringing to the students recent and important information in the field of agriculture.

Four Major Departments

The Institute is organized into four broad departments as follows: Animal Industry, Agricultural Engineering, Plant Industry and Soils, and Economics and Rural Life. Each is headed by a chief whose primary concern is to organize and conduct research and to teach a limited number of graduate students. Each department will be assigned ten graduate students so that specialized instruction may be had. Each department will offer seminar courses not only for the students assigned to the department but for the entire student body.

Fully fifty per cent of the student's time will be devoted to selecting, organizing, carrying out, and presenting the results of a comprehensive research problem. This problem will be selected after the student reaches Turrialba and after consultation with and approval of the department chief and the Dean of the Faculty.

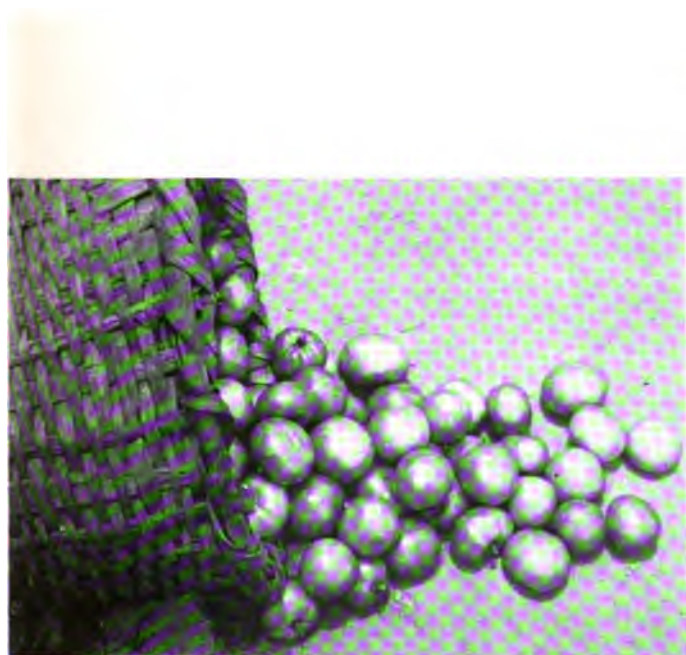
The head of each department is an outstanding scientist from one of the American Republics. He has been selected not only for his abilities in a particular field of agricultural research but for his ability to pass on to his students some of those characteristics that have made him an outstanding scientist in his field.



Eucalyptus, 1 year from seed.



Chirapo Indian Corn. No damage from corn root worm.



The Turrialba Tomato.



Taro (Root crop for food).

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

DEPARTMENT OF PLANT INDUSTRY

Three types of work have been carried on in the Department of Plant Industry as follows: (1) Strategic or Industrial Crops, (2) Food Crops, and (3) Landscaping of Buildings and Grounds.

Strategic or Industrial Crops

This section of the Division of Plant Industry is getting organized as a unit. However, much of the basic work such as introducing plants and seeds, starting nursery beds, clearing ground, and planting seed has been progressing for two years. Some of the more promising projects and progress during April are given as follows:

Teak production

The young teak trees (*Tectona grandis*) which were set out are beginning vigorous growth. A total of 4,500 seedlings of various sizes are in this area which comprises one of the hilly sections of the Institute. These seedling trees have been pruned and suckered so that they will develop straight clean trunks for future use as lumber. A nursery seed bed has been planted with about 40,000 teak seed. The seedlings from these nurseries will be used to enlarge the teak forest area.

Teak undoubtedly holds great promise as a fast growing producer of excellent lumber for many sections of the American tropics. The Institute is therefore establishing an experimental forest area where growth measurements can be taken and comparisons made with other lumber producing trees of local and foreign origin. Also, the Institute will be able to furnish large quantities of seed in case the demand arises.

Rubber rootstock studies (Hevea)

As a start towards the Institute's work at Turrialba with Hevea

rubber, a planting of 392 Hevea rubber trees (Hevea brasiliensis) has been set out in plots with the cooperation of the United States Department of Agriculture Rubber Experiment Station at Turrialba and the Costa Rican Ministry of Agriculture. At present these test plots consist of four high yielding clones budded on to three different types of rootstock, namely, Liberian, Cairo and Belem. These plantings are laid out in repetition and will be added to as soon as the rainfall increases. The purpose of this trial is to determine which of the various rootstocks will be most desirable for various soil types and what effect if any the different types of rootstocks have on the producing ability of the panel.

Castilloa rubber production

A planting of castilloa rubber trees (Castilloa elástica) has been set out on ground not adapted for plot work. This field planting includes several hundred trees of various sizes. It is planned to use this planting for testing yield variations, cultural methods and as an easily accessible field planting for any desired experimental work. It will be a source of material for seeds and student work, and will serve as a trial for comparison with Hevea rubber.

Cinchona production

We have transplanted to a permanent field planting several thousand each of Cinchona ledgeriana and Cinchona succirubra. These seedlings were turned over to the Institute by the American Cinchona Plantations Company. It is planned to use these seedlings for experimental work in propagation, cultivation and yield tests. It has been fairly well established at the Institute that these trees can be grown at a much lower elevation than was formerly thought possible. In fact the seedlings grown at Turrialba elevation (2000 ft.) have done better than those grown at varying higher elevations.

Derris

A considerable planting of Derris elliptica has been set out and will be increased as time goes on. These plantings have already been used to produce roots and extract for experimental work in insect control by the Animal Husbandry Department. These plantings were derived from high yielding eastern clones which were transplanted from the Institute's Rubber Substation in the Republic of Panama. This project will include work on production, cultural and propagating problems as well as rotenone content.

Coffee production

Coffee is one of the crops about which a great deal has been written but still very little is known. There is considerable discussion over various varieties, systems of cultivation, shade, pruning, etc. In order to gain information on these various features of coffee production it is planned to carry on a considerable research program in coffee production. A sizeable nursery of coffee seedlings (*Coffea arabica*) is nearly ready for setting out into field plots where the various fertilizer trials may be carried out. The Institute now has several hundred acres in coffee production where research problems may be carried out on a commercial scale.

Abacá (*Musa textilis*) production

Whereas no large scale abacá plantings will be made on the Institute grounds, plantings of sufficient size for experiments in cultural methods, pathological studies or fertilizer trials will be set out. A small stock of the leading Philippine varieties is now on hand and will be increased into field trial plots as the demand arises. The great holdings of the United Fruit Company, consisting of several thousand acres, are nearby

and may be utilized for research and student use. Also, they have two large processing plants.

Oil palm production

A considerable stock of seedlings of Elaeis guineensis and other oil palms is now on hand ready to be set out into field plants. These palms will be set out in convenient locations where they will be allowed to grow for future experimental work. As these palms take considerable time to develop and are spaced rather far apart (35 ft.), the areas devoted to field plantings will be intercropped and used for other work during the several year development period.

Sugar cane production

The Institute now has about 400 acres of land in sugar cane production. This gives an excellent opportunity for research on all phases of production, cultivation, fertilizers, pathological studies and insect pests. Much of this work has been arranged in plot trials in order to obtain accurate results. Plans are also being made for the collection of the most important commercial and non-commercial cane varieties so that these will be available for any phase of study in cane culture or breeding. Arrangements have already been made for the introduction of a large collection of non-commercial varieties which it is hoped will arrive shortly. Complete fertilizer trials have already been started.

Cacao (Theobroma cacao) production

The United Fruit Company has furnished 13 high-yielding clones of cacao as the basis for this work. These were in the form of rooted cuttings and so will reproduce their valuable characteristics. It is hoped to add to this planting with other varieties of cacao and numerous selections from the wild as fast as these can be obtained. There is an

especially rich field for research in problems connected with the pathology and propagation of cacao as well as with cultural methods.

Food Crops Research

More than two years of research with food crops have been completed at the Institute. During this interval considerable progress has been made and many problems which seemed, at first, of almost impossible proportions are now little more than a matter of record.

Throughout the entire time the training of men to do new, unfamiliar, and specialized jobs--and do it efficiently--has not been an easy task. To take farm laborers who previously have known little more than routine coffee cultivation--and the best of whom can no more than read and write--and school these persons into helpers capable of aiding in scientific research has necessitated a rare combination of patience, perseverance, encouragement and pressure. Results are proving the existence of good latent capabilities in some of these men.

Another of the early problems was that of soil fertility deficiencies. Many of the first plantings of some important food crops as beets, turnips, cabbage, and tomatoes almost completely refused to grow. As the result of preliminary fertilizer tests and general close observation, it was found that phosphorus was the number one soil need, with a secondary emphasis on calcium and potassium. As proof that we have in a large way solved this soil problem, some of these first most difficult food plants are now being grown in large acreage for the United States armed forces in the Canal Zone.

Soil drainage and erosion control, as likewise the best rotation and timing of crops in relation to seasons, have held an important place in our investigations. In very compact, wet soils it was found that by arranging

the surfaces of the plots in a convex fashion (highest in the middle), with small drainage ditches along the sides, much improvement was attained. The objective is to carry off as much surface rain water as possible with a minimum of erosion. Thus, leaching and "drowning" of the roots are held to a minimum. The frequent rotation with nitrogenous crops, as cowpeas, ricebeans, and velvet beans, has been found to greatly improve the soil and to provide for most nitrogen demands.

A few of the more important food crop projects, which are of special interest, are as follows:

Corn variety trials

Preliminary results (given in previous reports) have shown that the root worm constitutes one of the most serious problems of the crop in Central America. For this reason the department's first real project with corn was set up with a dual aim, first, to find varieties with some resistance to the root worm and, second, to utilize the resistant varieties in a breeding program. During the past two years some two hundred varieties and hybrids from many parts of the tropics and temperate climates have been tested. Two rare types (Chirripó Indian) recently discovered have indicated outstanding resistance to the pest. After the full degree and cause of this resistance is understood, the second phase of the project will follow, namely, the development of improved root worm resistance varieties and hybrids for the tropics and the semi-tropics. Such types might prove of incalculable value to sections of the southern United States where root worm problems are encountered.

Breeding tomatoes for the tropics

Tomatoes have always been one of the most difficult crops throughout the tropics, especially in warm rainy weather. Diseases and insect pests as well as poor adaptability to soils and climate seem to be the reasons

for failure with the varieties from the United States. People well familiar with the tropics may have noticed, however, certain small cherry, or even knotty types, in the markets during seasons when the better cultivated kinds are unavailable. One selection of this unimproved wild tomato, a very knotty, multiple ovary form of the cherry type (Lycopersicon esculentum var. cerasiforme) has been employed in breeding experiments by this Division. From a total population of some twenty-five thousand F₂ plants, a mass selection is being carried forward. From a population of 125,000 plants in the F₃ and later generations, selection will be made for more specific qualities and several distinct varieties will be isolated. Thus far, the cross has shown most unusual promise, as is evidenced by the fact that fruit, passed up in selection efforts, has been eagerly sought for commercial shipment to the army. This fact alone shows the need for such work, as well as the fact that it is equally of benefit to the United States as to other countries. Third generation seeds will be employed in large-scale commercial production for the United States Army at the Canal Zone. Much valuable information on tomato breeding and genetics has been acquired during the course of this project. A technical paper on this work has been published.

Tropical grape breeding

In the project for the development of tropical grapes, which Mr. Fennell had under way for the past ten years in Florida, Puerto Rico and Costa Rica, certain double crosses are showing considerable promise. Many vines are fruiting for the first time this year and fruit qualities of approximately eighty new sorts will be determined within two or three months.

Some very early kinds, as are now in the ripening stage, may become of value for early season commercial shipments to the United States and



New tropical grapes.



Watermelon X Citron Hybrid to overcome some of the many plant troubles of melons.



Cinchona ledgeriana.



"Local" corn.

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

Europe. It is becoming apparent also, that this new class of grape, which is especially designed for tropical climates, may make wine production for home markets feasible in almost every country of tropical America.

Two vineyards, totaling six acres, have recently been planted for the purpose of testing rootstocks and the propagation and large scale testing of superior new selections.

Tropical blackberry breeding

A project for the development of fine quality, improved tropical blackberries is now well under way. Hybrids are being made between the rugged and giant growing Rubus trichomallus of Central America and the renowned Youngberry of the United States. Both the regular and the thornless strains have been used. Other breeding experiments are being made between several additional tropical wild species and carefully chosen cultivated types from the temperate climate. Some valuable new varieties for the tropics are expected in the second generation progeny.

Various breeding projects

Breeding projects with watermelon, squash, lima beans, grain sorghum and cowpeas are already under way and in some cases, second, third and even fourth generation populations are now being grown for selection.

In the varietal tests, production figures and other pertinent data are being accumulated on many crops. Some forty-two varieties of soybeans, thirteen varieties of peanuts, twenty-three varieties of cowpeas, fifty-three varieties of beans, four varieties of sweet potatoes, along with many other crops, have been given extensive year-around field trial to determine their value to the grower.

Guava variety trials

The aim of this project is to obtain higher quality fruit and freedom

from fruit worms with the guava (guajava).

The guava has possibilities of becoming one of the foremost fruits of the tropics, provided that freedom from worms and improved quality can be obtained. Material now growing at the Institute includes the following species of Psidium: molle, friedrichsthalianum, polycarpon, cujavillus, cattleianum (type), cattleianum (var. Lucidum), coriaceum, guiniense; and guajava, (common type), varieties Stone, Sureme, Peruvianum, and Choice and a selection from Panama.

General Plant Introduction: Fruits, economic plants, ornamental plants. A list of species introduced during the past year is given below:

Food and Field Crops Tested

Beans	53 Varieties	Adlay	1 Varieties
Garden Peas	14 "	Pumpkin	8 "
Lima Beans	15 "	Peppers	11 "
Beets	7 "	Lettuce	19 "
Soybeans	42 "	Potato	1 "
Peanuts	13 "	Eggplant	6 "
Grain Sorghums	7 "	Cabbage	6 "
Cowpeas	23 "	Collards	3 "
Tomatoes	29 "	Kohlrabi	2 "
Rutabagas	7 "	Celery	2 "
Turnips	4 "	Cauliflower	3 "
Okra	3 "	Stock Beets	3 "
Corn	203 "	Sesame	1 "
Onion	27 "	Velvet Beans	2 "
Sweetpotatoes	4 "	Sesbania	1 "
Swiss Chard	6 "	Lespedeza	1 "
Muskmelon	11 "	Rice Bean	1 "
Watermelon	7 "	Strawberry	1 "
Squash	14 "	Sun Flower	1 "
Carrots	7 "	Raspberry	6 Kinds
Mustard	2 "	Blackberry	8 "
Chickpeas	1 "	Plum	2 "
Pigeon Pea	1 "	Blueberry	3 "
Dasheen	2 "	Mango	28 "
Pineapple	1 "	Misc. tropical	
		plants of possible	
		commercial value	200 "

Food Production

A general program of cooperation with the Food Production Division of the Office of Inter-American Affairs to furnish food for the army in

the Canal Zone has been put into effect at their urgent request. The Institute has cleared about 30 acres of land in coffee and shade trees and planted it to the new hybrid tomato, cabbage and sweet potatoes. The Institute is happy to assist in this program to aid the food supply of the armed forces. At the same time, we get much needed plot ground cleared and prepared, get a large generation of hybrid tomatoes for selection and gain some experience in the commercial handling and needs of these crops.

Landscaping and Grounds Improvement

The landscaping work has reached the stage of putting the finishing touches to various sections of the Institute grounds. Nearly all important areas of the Institute are now available by hard surface all-weather roads. There are some new minor jobs to do and some changes and additions to be made, but nearly all heavy work has been completed.

Landscaping work has been completed on all the faculty residences. Final filling of small low areas around the central lake is completed. One island in the lake has been eliminated and the other two are planted to bamboo and papyrus.

All ground preparation on the large experimental area has been completed, including grading and drainage of certain sections. New areas for the planting of corn, tomatoes, cabbage, sweet potatoes and Sudan grass have been developed. A permanent area for sugar cane and coffee research has been set aside. Numerous plots have been made and there is ample cleared land for experimental work.

DEPARTMENT OF ANIMAL INDUSTRY

It is believed that there are three major problems in the animal industry of tropical regions, as follows: (1) The Elimination and Control of Diseases, Parasites and Other Pests, (2) The Improvement of the Plane of Nutrition, and (3) The Establishment of New Strains or Breeds. Steps one and two have received the emphasis to date in our program because of the limited facilities and the important part they play in a successful animal program, which includes breeding, management and sanitation. The work that has been undertaken and accomplished has revolved about the first two great problems.

The Aragon area of the Institute was set aside for the activities of this department. This was formerly a private farm consisting of cane, coffee and pastures all in rather poor condition. One of the first tasks that had to be accomplished was the clearing of pastures, repairing of fences and the construction of drainage canals. This was important because excessive rains inundated pastures, often to a depth of two feet. During this time personal training was started, a necessity for the carrying out of experimental work.

Animal Purchases

Some 200 head of beef cattle and six horses were purchased by the department for use in experimental work and the utilization of pastures. These purchases started in August 1944 and were terminated on November 15, 1944. To date 150 of the beef cattle have been employed in experiments and some have been made ready for the market. These will be sold locally with a number reserved for student use. Plans have been made to supply



Young Sudan Grass, thirty days old.



Cattle eating coffee pulp. Notice grass roofs which have proven effective for sheltering feed troughs.



Using the Knapsack sprayer for tick control.



Luxuriant growth of a native Desmodium.

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

the dormitory of the Institute with our eggs, milk, butter, cheese, and meat.

Pasture Improvement Work

Pastures fenced and improved and those in the development stage are approximately as follows:

4 pastures consisting of 8 different grasses and an unlimited number of legumes	260	acres
2 pastures of molasses grass	32	"
1 pasture of para and gamalote grass	90	"
2 "Tórsalo" experimental pastures	154	"
3 pastures being cleared and planted	104	"
TOTAL	640	acres

This project allows sufficient feed for the beef and dairy cattle and makes available high and low ground and some swampy areas. All have an abundant variety of pasture grasses and legumes for experimental and student practice work.

In this pasture development work, water holes and streams were cleared and fenced so that a clean water supply would be available at all times in each of the pastures.

Forage Crops Section

The low plane of animal nutrition made it necessary to formulate a "feed production" program in the Animal Industry Department. A Forage Crops Section, therefore, was formed in the Department of Animal Industry. This section in most institutions is usually placed with the plant research. However, it was felt that here in the tropics it would be ideal to tie the two formerly distant lines of work closer together. The approach used to solve the problems in this section is that of the livestock man, the finding of new plants, chemical analysis, tests of palatability, digestibility, trials of the ability of the plants to compete, and economic methods of cultivation. Plant breeding is not attempted,

although selection is vigorously practiced. This section is responsible for producing feedstuffs to feed the cattle and horses and the growing of derris for the extraction of rotenone, a basic component of the insecticides used in combating ticks and "tórsalos". Excellent crops of adlay, peanuts and Sudan grass have already been harvested, and 25,000 derris plants have been set out. More than 18 legumes and 12 native grasses are growing in pure state, giving excellent opportunity for student practice and general research.

Experimental Work

With the clearing of land, pasture improvement work, plant introduction, cattle purchases, and the training of personnel, an experimental program has been in progress. The problems attacked were those which are basic--parasite control and the improvement of the nutritional intake of animals. At present sufficient work has been accomplished to allow the start of a well-planned animal program.

Parasite control studies (the Nuche Fly or "Tórsalo" - Dermatobia nominis)

These studies have been concerned with the use of rotenone and D.D.T. preparations as sprays and baths for the purpose of killing the larvae in the animal or preventing its penetration of the animal's hide. Control measures yielding 80 per cent results have been worked out and a new formula has been established. Experiments are still in progress with the use of this formula. Other work in progress has to do with demonstrating the value, if any, of clean, well-kept pastures over dirty, overgrown pastures as to "tórsalo" infestation rates. The main emphasis in the work at present is being placed on preventing the larvae from entering the animal. It might be well to add that this pest causes considerably more damage to cattle in the intermediate altitudes of those countries

bordering the Caribbean Sea than does the Ox Warble in the United States. Estimates place Ox Warble damage at 50 to 100 million dollars annually. A technical paper on this work has been published.

Control of the cattle tick (Boophilus annulatus)

The cattle fever tick is without a doubt the foremost cattle pest of Latin America, especially the tropical regions. The damage it does runs into high figures. To date modern control methods have not worked efficiently due to tropical conditions. It should be remembered that it was as late as the year 1944 that United States control methods became completely effective. This was because of swampy regions in Florida and ticks being brought across the border from Mexico into the State of Texas. Here in the tropics there is less chance of exercising rigid control measures, and there are considerably more swamps than there are in the State of Florida.

Tick control experiments were among those first considered at the Institute. D.D.T. was combined with the standard rotenone insecticide and a solution I.A.S. AI-110 was worked out and tested. 100 cc. of this solution sprayed lightly over a tick infested animal was found to destroy up to 15 ticks per square inch of body surface and keep the animals free of ticks from 12 to 80 days, depending upon seasonal and environmental factors. This solution averts the losses from overheating, poisoning and bruising connected with dipping animals. It allows for excellent tick control measures over transient cattle and cattle sold at fairs and auctions. It brings into line all those cattlemen that feared dipping because of the losses and operational costs of the dips, and those who could not afford dips for the reason of having too few animals.

This solution was thoroughly tested on no less than 1,000 animals living in wet, humid and hot, dry lowland conditions and also on those in the intermediate highlands. The results have been published.

The study of legumes

These studies are for the locating and testing of leguminous plants for the purpose of raising the protein content of animal feedstuffs. The work has consisted of finding high protein plants such as those of the genus *Desmodium* and testing them as to chemical analysis, palatability, digestibility, ability to compete, and economic methods of cultivation. The Forage Crop Section now has approximately eighteen leguminous plants fulfilling animal requirements and growing in a pure state. Additional plants and seeds are being imported. Methods for the successful cultivation of these plants have been worked out. These are seed scarification, the topping and cutting of roots eight to ten days prior to transplanting. This system has caused the transplanting mortality to drop from 70 per cent to approximately 1 per cent. Promising legumes for tropical climates are *Desmodium rensoni*, *D. leiocarpum* and at least six other *Desmodium* species. Methods for the collection, handling and separation of the hulls from the seeds of wild *Desmodium* seeds have been worked out. All seeds are scarified by "scratching" them on sand paper, a method which yields an excellent percentage of germination. The results have been published.

The study of grasses and pasture improvement

The largest proportion of this work has been concerned with Sudan grass. Three pounds of Sudan seed were introduced from El Salvador and studies involved selection, methods of cultivation, and effects of fertilizers were undertaken. Data collected over the past nine months

indicates that Sudan grass can be grown successfully under extremely wet conditions, if adequate drainage is provided. Sudan grass has been grown successfully in the rundown soils of old cane fields. The rate of growth is 8 to 16 inches the first month, 25 to 38 inches the second, and 36 to 48 inches the third. It requires 90 to 100 days for the plants to set seed. It is calculated that approximately six to nine cuttings can be affected yearly with this grass. At present, four varieties have been selected and are growing in a nearly "pure state". One of the four shows excellent promise for rapid growth, excellent forage characteristics and strong healthy roots.

Other grass work is concerned with establishing "pure" stands so that rates of growth, number of cuttings possible, and other characteristics of the plants may be studied. In connection with the work mixed plots are being developed to obtain plants which can be cultivated together and which may balance the deficiencies some may have. In the mixed grass plots emphasis is being placed upon the interplanting of leguminous plants for the purpose of raising the protein content of the pastures and creating a balanced diet.

Feed production, preparation and storage studies

This part of the work is for the purpose of producing, preparing and storing feedstuffs under excessively wet conditions. Hay making under natural conditions of Turrialba is practically impossible due to the rains. Soybeans and peanuts produced by the Plant Industry Department have been dried and made into excellent protein meals. Experiments on sweet potatoes, a heavy tropical producer, have indicated that chopping the potatoes in small pieces, drying them under 25 to 35 hours of tropical

sun and then grinding is sufficient to prepare a palatable well-keeping high carbohydrate stock feed.

Another problem that has been solved is concerned with Adlay. Adlay wheat (Coix) is a more nutritious stock feed than common wheat. However, the plant has one undesirable fault, the seeds do not mature at the same time. Plants may have flowers and all ranges of maturity of the grain. This plant is also known for dropping the grain and attracting thousands of birds that make off with the crop. In spite of these faults, the plant is an excellent grower under wet swampy conditions. It produces a nutritious crop, sorely needed. Experiments concluded to date indicate that excellent results can be obtained by topping the plants when the first grains begin to drop. These heads are composed of approximately 50 per cent stems and nutritious green leaves and 50 per cent grain, by weight. The heads are dried so that the leaf and stem color remains green, then all is passed through a hammer mill. The resulting product can be made fine for chicken mashes or coarse for cattle and horse feeds. Not only is there a satisfactory supply of proteins and carbohydrates but there is also the vitamin A content preserved in the green leaves.

The value of coffee pulp silage as a cattle feed

Coffee pulp has always been a problem of coffee producing countries. It is largely dumped in the rivers and doctors report that this practice raises the infant mortality rate. Its use as a fertilizer has never proved popular and to date it still looms as a problem. At present an attempt is being made to determine what value, if any, the pulp may have as an animal feed. If these experiments are successful then an economic method of handling the pulp will have been found and a major problem solved.

Field Office.



Workers' House No. 1.



First Structure for Livestock Work.



Guest House.

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

Experiments concluded to date have shown the chemical analysis of pulp silage to be approximately 12 to 14 per cent crude protein on a dry matter basis. Methods have been worked out for the preparation of a palatable silage. Cattle have consumed 35 pounds per head per day of coffee pulp silage over a 100 day period without any visible mal effects.

Results of the trials concluded indicate that the pulp silage, in spite of its excellent chemical make-up, is only slightly digestible. Therefore to study this factor of low digestibility three additional experiments are in progress. The first is a digestibility trial involving three animals. The feed is weighed before being given to the animals and the feces are weighed. Both are analyzed and the chemical content of the feces is to be subtracted from that of the feed. The difference is the digestible part. The second is a trial involving six animals wherein the pulp is being supplemented with proteins, minerals and carbohydrates in an attempt to balance the deficiencies of the pulp. The third is a trial of two groups of six animals feeding in the same pasture. One group is supplemented with all the pulp silage they can eat. The other group is used as the control.

Studies on the mortality of cattle brought from highlands or northern climates into the lowland tropical regions

This is one of the limiting factors in a rapid breed improvement program. Purebred sires or dams brought from highland or northern climates into the tropical lowland regions for the purpose of improving the breed often suffer up to 95 per cent mortality. This high mortality is due principally to tick fever. However, nutritive and digestive disturbances, due to a radical change of feed, have been found to play an important part. It is hoped now, with the development of the new tick

control solution that the deaths from tick fever can be averted. The department has six "treated" animals doing splendidly after six months. They came from altitudes of over 10,000 feet. Twelve out of twelve animals "untreated" were lost in these trials.

Studies on the supplementation of pastures

These studies are concerned with two important nutritional deficiencies of tropical areas, namely proteins and the minerals phosphorus and calcium. Carbohydrates are abundant and can be easily acquired. However, high protein feedstuffs are literally non-existent. This is because of the low production and excessive cost of protein supplements. Three groups of cattle share the same pasture. Group No. 2, supplemented with all the minerals they could eat, doubled the daily gains of the controls or No. 1 group. Group No. 3 received the minerals plus one pound per head per day of cotton seed meal. This group trebled the daily gains of the control or unsupplemented group. The No. 2 group consumed .231 pounds of the salt mix per head daily and so established the more or less requirement of minerals for animals under tropical conditions. These trials likewise demonstrated that animals supplemented during periods of excessive continuous rainfall not only do not suffer the mortalities of unsupplemented animals but also that they gain weight.

Other trials are concerned with the supplementing of cattle on molasses grass pastures with all the minerals they can eat. One-half the animals used in these trials had one-quarter Indian blood. No significant differences under Turrialba conditions were shown by the addition of the Indian blood. The supplemented animals gained 1.75 pounds per head per day. Unsupplemented groups gained .95 pounds per head per day.

AGRICULTURAL ENGINEERING DEPARTMENT

The Agricultural Engineering Department was organized late in the fiscal year with the appointment of Professor Norton C. Ives, formerly of Iowa State College, as Head of the Department. Mr. Ives is at Turrialba and has assembled a staff and organized the work along the following lines:

- I. TEACHING
 - A. Service courses
 - B. Professional courses

- II. RESEARCH
 - A. Cooperative - projects initiated by other departments that engineering assistance can benefit.
 - B. Applied - adaptation and use of modern machinery for Tropical Agriculture
 - C. Preliminary studies of drainage, irrigation, housing and other Agricultural Engineering problems requiring special adaptation to Latin America.

- III. INSTITUTE FARMS AND GROUND SERVICE
 - A. Provide and supervise farm operations service
 - B. Provide repair and maintenance facilities for IAIAS property
 - C. Design and supervise construction of IAIAS buildings and equipment.

Teaching

There will be two types of courses, (1) Service Courses, and (2) Professional Courses. The service courses will be designed and developed either as required or elective courses, according to the student's ability. These service courses will be as follows:

- I. Power and Machinery methods in Agriculture

- II. Physical land Development and Management, Land Clearing, Drainage, Soil Erosion Control, Irrigation.

- III. Farm and Home Utilities and Conveniences
 - Running Water Systems, complete
 - Heating and Cooling
 - Rural Electrification

Most of the professional courses will be special problems courses for those students working for advanced degrees in Agricultural Engineering.

In order to qualify for a Master's Degree the student must show that he has adequate course work in certain subject matter units, or he must take special course work at the Institute to such extent as to satisfy the above requirements.

Each student enrolling in the Institute should be familiar with three basic fields of work, as follows: (1) Farm Buildings, (2) Farm Power and Machinery, (3) Land Development. In the field of farm buildings there are many details that the student should be familiar with; for example, he should have had some work on farm building design which includes drawing and reading plans, properties of common building materials, and structural, functional, and architectural design. On farm building construction he should have had some experience with farm carpentry and machinery, water and sewage systems, interior and exterior finish, joint construction, and fabrication and electrical wiring.

The field of farm power and machinery is a new and large one in Latin American agriculture. It is planned that each student will be familiar with present use and past development of power and machinery in North American agriculture. He should know some of the uses of tractor, horse, electric, and water power on the farm. It is necessary to become acquainted with the latest farm machinery design, its operation, care and repair. Each student must be familiar with farm motors, particularly operation, care and maintenance. It is planned to set up model equipment for a farm shop so that students may have some experience in woodworking, metalworking, and welding. The new and expanding field of rural electrification with its unique home plants, rural high lines, and uses on the

farm for light, heat, cooling, and power will be stressed.

The third large field of basic work is land development. Five phases of this work will be stressed as follows: elements of surveying, land clearing, soil erosion control, drainage and irrigation.

Research

For the present the research work will be along two main lines, land development and cultural practices in farm operations. Special surveys and studies will be undertaken to determine agricultural problems in Latin America and ascertain the possibility and feasibility of the solution of these problems.

Special practices in land clearing, drainage, soil erosion control and irrigation will be tried out and demonstrations set up.

Special studies will be conducted on cultural practices in the production of such crops as coffee, sugar cane, bananas, corn, rice and beans. Particular attention will be given to studies of the use of labor, power and machinery. These studies will be conducted to determine present methods and to ascertain the possibility of adapting newer methods in the growing of these crops. The major objectives will be to increase production efficiency, reduce labor requirements, and adapt the use of power machinery to Latin American agriculture.

Service Work

The department will be in charge of the Institute farms and ground services. A labor, power and machinery service will be set up to do all mechanical farming operations at the Institute. The work will be done on a job, contract or custom basis for the various departments.

Some of the important functions of the building and ground service will be as follows:

1. Road construction and maintenance
2. Small building and equipment construction
3. Field clearing, construction and development
4. Power plant
5. Care and maintenance of the Institute's transportation facilities
6. Building care, repair and maintenance
7. Campus maintenance.

The department will also design and supervise the construction of certain Institute buildings yet to be built. These are as follows:

1. Seedhouse, drying and storage
2. Poultry production and experimental plant
3. Complete dairy production and experimental plant
4. Meat animal production and experimental plant
5. Agricultural engineering laboratory
6. Buildings and ground services repair shop, supply and machine storage.

DEPARTMENT OF ECONOMICS AND RURAL SOCIOLOGY

This department is in the formative stage of organization. It has been left to the last, not because of lack of importance, but because it is felt that less time is needed for staffing and equipping, than the other departments. It requires considerable time to obtain and establish both plants and livestock. The same is true in regard to getting together machinery and equipment for an engineering department.

It is believed that, with the assistance of the present Institute staff, a program of work in this field can be developed along sound lines. It is planned, even before a permanent head of this department is appointed, to begin some studies of existing rural conditions. A factual survey of rural life and cost of production studies of certain important crops will institute the program.

The following is a suggested list of research projects for graduate students in this department:

1. What should (a given country) produce as a basis for stronger national development and international trade?
2. The economics of single-crop versus diversified agriculture.
3. Economic consequences of various combinations of land, labor and capital equipment.
4. Problem of local education, health and sanitation, roads, etc.
5. The cost of producing specific farm products, particularly strategic crops.
6. The economics of various combinations of enterprises on individual farmers.
7. The marketing of specific farm products, particularly strategic crops.
8. The level and content of farm family living.
9. The group and institutional participation of farm people.
10. Factors effecting social and economic progress among farm people.



Faculty House No. 2.



Faculty Residence No. 4.



Light Plant and Laundry.



Interior of Dormitory Residence Hall.

All photographs were taken during the month of May, 1945, at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

11. Development of techniques of education and extension to achieve greater local acceptance of improved knowledge and agricultural practices.
12. Effects of tariffs and taxation on agricultural production.
13. The agriculture of various countries - its possibilities and future.
14. Balanced agricultural production in the hemisphere.

CORN PRODUCTION AND BREEDING FELLOWSHIP

In January 1945, a series of experiments were started to test the adaptability of certain pure lines and hybrids of corn. This was carried on in cooperation with the Pioneer Hi-Bred Corn Company of Des Moines, Iowa, in an effort to ascertain the possibility of gaining a generation of corn during the winter months.

These experiments were carried out on a ten acre area set aside for the purpose. The corn was planted in three replications of three rows each, 54 hills to the row. Seed was planted at two-week intervals, Local corn was used in the check plots.

Although the results are as yet incomplete, to date the check plots have proved superior to the United States produced seed in every case. With one exception, the pure lines have hardly reproduced the seed sown.

The chief limiting factor in corn production in many of the Latin American countries and here in Turrialba is the corn rootworm (Diabotrica spp.) In experimental control work we have used chloropicrin fumigation of the soil, D. D. T., rotenone and cultivation methods. The first of these treatments interfered with the proper growth of the corn. None of the other treatments has proved wholly satisfactory to date. However, a selection of Chirripó Indian corn has proved to be resistant to the rootworm in these trials.

Various fertilizer trials have been started. It is too early to have gained any results from these, although it is known that the soils are low in phosphorus. Control measures for various insect pests are also being tried. Ground has been prepared for the second plantings of corn in August and September. Four plots of ground, isolated from are another have been prepared. In one plot a top-cross of Chirripó X Institute 451 (mass selection) will be made. The reciprocal cross, Institute 451 X Chirripó, will be planted on a second plot. The mass selection, Institute 451, will be increased on a third plot. The fourth plot will be used for miscellaneous trials.

LIBRARY INSTALLED

The library has been set up in one of the ten administrative houses under the capable direction of Mr. Mario Gutiérrez, graduate student. He has the organization of this important phase of the work well under way. Fortunately, the books that were sent here early were kept in a dry place free from rodents and are in good condition. It was found that books keep here much better than expected. Now the library consists chiefly of the basic books and reports donated to the Institute by the Tropical Plant Research Foundation (Orton Library). This is an invaluable collection and not equalled by any other institution. In addition, the Institute has purchased many current text books which have been carefully recorded and are in daily use. The Institute is also subscribed to the most important technical and scientific publications pertaining to the biological sciences.

NUMEROUS PUBLICATIONS

The Institute has published 26 technical articles in addition to three annual reports, 36 monthly reports, an Announcement of Fellowships, and numerous press releases on personnel, progress, program and special reports. Mr. Joseph L. Fennell has published 11 technical articles. Mr. Robert L. Squibb has published 10 technical articles. Doctor Earl N. Brossman has published 5 articles on the more important strategic and food crops. This is an indication that at even this early date the Institute has made every attempt to serve the public with the information available.

COOPERATIVE ACTIVITIES

Cooperation with the numerous agencies in related fields of work is essential in an organization of this type. Satisfactory and complete cooperation has been affected with the following:

Ministry of Agriculture - Costa Rica
Department of Agriculture - United States
American Cinchona Plantations Company
Pioneer Hi-Bred Corn Company
Goodyear Rubber Plantations
Office of Inter-American Affairs
Institute of Inter-American Affairs
Escuela Agrícola Panamericana

In addition to the above the Institute has exchanged seed, plants, and information with numerous governmental agencies and experimental stations.

PANAMA RUBBER SUBSTATION

A cooperative rubber research program (with the United States Department of Agriculture) is being carried on at this substation acquired from the Goodyear Rubber Plantations Corporation in July 1943. This activity was made possible by a grant of funds to the Institute by the Rubber Development Corporation, an agency of the United States Government.

Cooperative Research Program

In the first Annual Report the agreement between the Government of Panama and the Institute and the Memorandum of Understanding between the United States Department of Agriculture and the Institute are published. These two documents provide the charter for the activities at this substation.

The property at this substation includes 1,155 hectares of land situated on the shores of Gatún Lake adjacent to the Canal Zone. About 700 acres of this property were planted to rubber; much of it had been badly damaged by the South American leaf disease, the most important single factor governing the profitable growth of rubber in this hemisphere.

In cooperation with the United States Department of Agriculture a comprehensive program of top-budding (budding resistant clones of Hevea rubber on high-yielding susceptible clones of various ages to overcome the disease and get data on the effect of these new tops on yields of the clones.) was inaugurated on about 150 acres of rubber. The results of this program are briefly discussed in this report.

During the first months of the fiscal year just ended it was seen that it was impossible to undertake (with present finances) all the work that had been planned. The budding results were poor in certain sections so top-budding was limited to the areas where results were fair. Budding results improved and good progress was made with the smaller area. Budwood became more plentiful so that the workers always had a fresh supply of material in the right stage of growth for good results. The weather was very unfavorable as there were over 100 inches of rain in the six months from July to December, but in spite of this fair results were obtained.

Loss Disease Now

About the end of the year spraying was discontinued as there were no laborers to spare, but this did not affect the results. This was probably due to the area being under control and consequently less innoculum in the air. There has been fair success in budding since January except for the last month of the dry season when success could not be expected.

It looks now as if some of the areas where results were poor last year could be opened and finished up before the end of 1945 provided there is sufficient labor. A part of the region known as Line 10 and 11 has been opened and some budding completed. There is a great deal of pruning to do, but the trees are in better condition and about thirty acres will be opened up with the hope of getting a good stand by making a round every month until finished. This Line 10 and 11 area is being top-budded with "All Weather" selections exclusively. If estimated results are as good as expected, Line 20 may be opened later.

In the area completed there are two blocks which have been top-budded with 10 of the best "Ford" clones. The trees were marked off in groups of ten and each one of the ten budded with a different clone. One block was top-budded and the other low-budded. The block low-budded will give information on the yield of these Ford clones and both will give a large supply of hybrid seeds.

Another area completed contains 20 acres of GA 49 and 5 acres of GV 17, all top-budded, some with "All Weather" selections, some with Belem and those done this year with "Ford" clones.

High-Yielding Clones Top-Budded

In the area being salvaged there are about 40 acres of GV 17, 20 acres of GA 49, 10 acres of GV 21 and 10 acres of GV 42. These are four of the popular high-yielding, eastern clones. There are two other clones of which there are only a few trees top-budded but more are expected this year. These are GV 31 and GV 37 clones.

In addition to these well known eastern clones there are top-budded trees of 30 different GX and GA crosses, in some cases only five of a cross and in others up to fifty. In a few years it will be possible to test all of these crosses and find out which is the most suitable for planting out and the best yielder. Some of these crosses grew to top-budding size without spraying and others were four years old and not tall enough for budding at the regular height.

In the original area planted in 1935 by Goodyear there are still a few crosses making fair growth and some of them now have fruit for the first time. The yield is quite good despite the ravages of disease. It is believed that these trees could be planted in an area where the

surrounding trees are top-budded with "All Weather" selections, such as AW 9 or AW 12, which have a resistance rating of 2 and no sporulation. A line of these trees could be interplanted in a resistant area and the high yield obtained, possibly without damaging other trees.

An old nursery at the end of the station, which was overgrown, has been thinned out and is to be top-budded with H. spruceana and "Ford" clones. The seeds from these trees are expected to make better root stock and by using these 5 year old trees a crop will be obtained quicker than from a new planting.

Tapping Results

Tapping began in May, but June was the first full month of tapping. The 60 trees that were test-tapped last year are now, in June, producing about twice as much as they did last year. Yield tests are being made on 128 of the GA 49 trees. The yield is being checked on trees of different height of top-budding, some were budded at 5 feet, some at 6 feet and on up to 10 feet. The yield is also being checked on trees of different girth, with trees from 16 inches to 25 inches in girth being tapped. A tree of 20 inch girth yields, on an average, twice as much as one with a 16 inch girth.

The workers are tapping, in all, 350 seedling trees and 350 top-budded high-yielding trees. From this latex sheet rubber is being made. With clean pans and a good strainer there is not much difficulty in making good, clean sheets. A smoke house has been built and the sheets are dried and smoked in the regular way. As the latex is thick and does not empty readily out of the cups, the tappers pour about half an ounce of water into each cup so that when the latex is brought in it contains an unknown

quantity of water. However, once the finished product has been dried and smoked we find that a gallon of latex, under present conditions, makes 12 ounces of dry rubber. The sheets weigh, on an average, about 15 ounces. The size is roughly 24 by 18 inches and from four to five sheets are obtained each day.

Large Seed Crop

The nurseries have made excellent growth without spraying. All of the seed crop coming on is to be sent to the Cooperative Rubber Station in Turrialba, Costa Rica. A crop of 100,000 seeds is estimated. It should be ready for harvesting in August and September.

The "Ford" clones are beginning to flower as well as some of the "Survey Parties" selections. Each year there will be more and more opportunity for making pollinations. The first "Ford" clones to flower were E 1705 and F 1706. A few of the pollinations made here in 1942 flowered this year. There was no success in back-crossing them, as the flowers did not come on until May, when the rains commenced.

REPORT OF THE TREASURER

The Pan American Union is the fiscal agent for the Inter-American Institute of Agricultural Sciences and in that capacity is responsible for the receipt and disbursement of funds on behalf of the Institute.

To facilitate the transaction of business outside of Washington, bank accounts are maintained at the Field Headquarters in Turrialba, Costa Rica and at the Substation in Panama. Under the general supervision of the Director, fiscal matters in Costa Rica were handled by the Business Manager, Mr. Rice B. Ober, during the past year and at the Panama Substation by the Manager, Mr. George M. Slater. These officers are bonded and render monthly accounts to the Washington office which are in detail and are supported by receipts. At the close of the fiscal year all accounts are examined by a firm of Certified Public Accountants, William Gordon Buchanan and Company.

The following statements are submitted for the fiscal year ended June 30, 1945:

- Balance Sheet as of July 1, 1944
- Statement of Revenue
- Statement of Expenses
- Balance Sheet as of June 30, 1945
- Statement Showing Status of Grants-in-Aid
- Analysis of Working Fund Account

Balance Sheet
as of July 1, 1944

ASSETS:

Cash on deposit in Riggs National Bank	\$41,604.69	
Cash on deposit in Banco Nacional de Costa Rica for Business Manager	60,745.92	
Cash advanced to Manager, Rubber Substation	1,462.87	
Cash on deposit with Collector of Panama Canal	162.49	
Petty Cash Fund	<u>100.00</u>	\$104,075.97
Accounts Receivable		<u>665.27</u>
	TOTAL ASSETS	\$104,741.24

LIABILITIES:

Grants:

Original Grant OEMera-15 for "Administrative Expenses, etc."	\$100,000.00	
Less: Expenditures	<u>85,501.70</u>	\$14,498.30
Grant-in-Aid IAAA-20 for "Administrative and Operating Expenses" to June 30th	\$ 85,000.00	
Less: Expenditures	<u>60,796.93</u>	\$24,203.07
Grant for "Construction Expenses, etc."	\$365,000.00	
Less: Expenditures	<u>314,232.51</u>	\$50,767.49
Total Unexpended from Grants		\$89,468.86
Accounts Payable		784.24

DEFERRED LIABILITIES: Deposit on Coffee Contract 7,130.13

RESERVES: General Reserve 7,358.01

TOTAL LIABILITIES AND RESERVES \$104,741.24

Revenue

Fiscal Year July 1, 1944 to June 30, 1945

Governmental Contributions:

Costa Rica	\$ 400.95	
Dominican Republic	1,700.00	
El Salvador	1,862.98	
Guatemala	1,989.61	
Nicaragua	591.47	
United States	<u>90,087.97*</u>	\$ 96,632.98

Other Income:

Sale of Coffee	\$21,923.00	
Sale of Cane	31,502.05	
Sale of Other Farm Products	1,200.23	
Sale of Firewood	1,151.06	
Pasture Rental	231.81	
Charges for Light and Water	84.00	
Push Car Rental	5.25	
Sale of Books	<u>243.90</u>	<u>56,341.30</u>

TOTAL CASH REVENUE FOR THE YEAR ENDED June 30, 1945 \$152,974.28

* In addition to this quota payment, the United States, through the Institute of Inter-American Affairs, supplemented Grant-in-Aid IAAA-20 for Administrative and Operating Expenses by \$75,000.00 and of which \$3,440.84 was refunded.

Schedule of Expenses

Fiscal Year July 1, 1944 - June 30, 1945

I. Operating Accounts of the Business Manager at Field Headquarters, Turrialba, Costa Rica:

Coffee Operations - Labor	\$10,770.51		
- Other	<u>9,423.89</u>	\$20,194.40	
Cane Operations - Labor	\$17,687.24		
- Other	<u>3,729.37</u>	21,416.61	
Land Improvement - Labor	\$ 5,872.23		
- Other	<u>4.81</u>	5,877.04	
Roads - Labor	\$15,426.60		
- Other	<u>613.81</u>	16,040.41	
Plant Industry - Labor	\$10,155.28		
- Other	<u>1,018.19</u>	11,173.47	
Miscellaneous Supervisory Expenses - Labor	\$ 9,687.02		
- Other	<u>4,473.40</u>	14,160.42	
Office Expense		775.31	
Maintenance of Buildings and Equipment - Labor	\$ 532.50		
- Other	<u>1,603.55</u>	2,136.05	
Oil and Gas		1,545.11	
Operating Equipment		26,242.77	
Medical Expense (Net)		1,950.06	
Animal Husbandry - Labor	\$ 3,757.36		
- Other	<u>7,842.32</u>	11,599.68	
Miscellaneous Expense - Labor	\$ 2,979.25		
- Other	<u>1,030.81</u>	<u>4,010.06</u>	\$137,121.39

(continued)

Schedule of Expenses (concluded)

II. Operating Accounts of the Manager at Panama Substation:

Compensation of Manager, including		
Retirement Contribution	\$ 4,389.00	
Labor Expense	8,422.20	
Travel	464.44	
Supplies and Equipment	1,041.52	
Miscellaneous Office and Plant		
Maintenance Expense	<u>410.78</u>	\$ 14,727.94

III. Operating Accounts of the Treasurer at Executive Headquarters in Washington, D.C.:

Administrative Salaries, including		
those of executives and faculty		
in Costa Rica	\$43,543.67	
Contributions to Retirement Fund	<u>1,650.00</u>	\$45,193.67
Expenses of Executive Offices		
in Washington and		
Miscellaneous Expenses	5,044.97	
Travel	5,864.45	
Quarters Allowance of Officers		
in Costa Rica	<u>1,450.00</u>	\$ 57,553.09
TOTAL OPERATING EXPENSES		\$209,402.42

IV. Expenditures for Construction of Buildings and Other Facilities 55,090.30

TOTAL EXPENSES FOR THE FISCAL YEAR \$264,492.72

Balance Sheet

as of June 30, 1945

ASSETS:

Cash on deposit in Riggs National Bank	\$45,810.32	
Cash on deposit in Banco Nacional de Costa Rica	16,770.60	
Cash on hand - Manager, Panama Substation	1,363.53	
Cash on deposit with Collector of Panama Canal	256.40	
Treasurer's Petty Cash	<u>100.00</u>	\$64,300.85
Accounts Receivable		<u>997.45</u>
TOTAL ASSETS		\$65,298.30

LIABILITIES:

Grant-in-aid OEMcra-15 for "Construction Expenses, etc."	\$365,000.00	
Less: Expenses to 6/30/44	\$314,232.51	
Expenses 7/1/44 to 6/30/45	<u>48,886.09</u>	<u>363,118.60</u>
Accounts Payable		1,957.69
Scholarship Prepayment		37.50
Reserve for Construction		55,000.00
Working Fund Balance		<u>6,421.71</u>
TOTAL LIABILITIES		<u>\$65,298.30</u>

NOTE: Quotas assessed and unpaid are not taken up as income nor assets until paid.

Statement Showing Status of Grants-in-Aid

U. S. Grant-in-Aid OEMcr-15 from the Office of the Coordinator of Inter-American Affairs for Administrative and Operating Expenses:

Amount of Original Grant:	\$100,000.00	
Refund of Unused Balance of Deposit for Equipment with U.S. Procurement Division	<u>213.32</u>	\$100,213.32

Expenditures:

To June 30, 1943	\$ 45,994.35	
July 1, 1943 to June 30, 1944	39,507.35	
July 1, 1944 to June 30, 1945	<u>14,711.62</u>	<u>100,213.32</u>

BALANCE June 30, 1945		<u>NONE</u>
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U. S. Grant-in-Aid IAAa-20 from the Institute of Inter-American Affairs for Administrative and Operating Expenses:

Amount of Original Grant:	\$ 85,000.00	
Supplmental Grant	75,000.00	
Refund of Expenditures	<u>17.99</u>	\$160,017.99

Expenditures:

To June 30, 1944	\$ 60,796.93	
July 1, 1944 to November 30, 1944	95,780.22	
Returned to the Institute of Inter-American Affairs	<u>3,440.84</u>	<u>160,017.99</u>

BALANCE June 30, 1945		<u>NONE</u>
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U. S. Grant-in-Aid from the Office of Inter-American Affairs for Construction of Buildings and Other Facilities:

Amount of Original Grant:	\$365,000.00	
Refund of Unused Amount Advanced for Plans and Specifications	362.73	
Refund of Excess Disbursement	210.21	
Insurance Payment on Damaged Marble	<u>5,631.27</u>	\$371,204.21

Expenditures:

To June 30, 1943	\$ 25,693.32	
July 1, 1943 to June 30, 1944	288,539.19	
July 1, 1944 to June 30, 1945	<u>55,090.30</u>	<u>369,322.81</u>

BALANCE June 30, 1945		<u>\$ 1,881.40</u>
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Analysis of working fund account

BALANCE July 1, 1944				\$ 7,358.01
REVENUE per Statement				<u>152,974.28</u>
	TOTAL			\$160,332.29
Operating Expenses per Statement	\$209,402.42			
Construction Expenses	55,090.30			
Credited to a Reserve for Future Construction	55,000.00*	\$319,492.72		
Less:				
Charges to Grant-in-Aid OIMcr-15	\$14,711.62			
" " " " " IAAA-20	95,780.22			
" " " for Construction	<u>55,090.30</u>	<u>165,582.14</u>	<u>153,910.58</u>	
BALANCE June 30, 1945				<u>\$ 6,421.71</u>

- * To comply with the terms of an agreement with the Institute of Inter-American Affairs \$55,000.00 was set aside from funds during the year ended June 30, 1945 and \$10,000.00 from the following year in order to supplement, if necessary, monies which that Institute had agreed to use in completing a building project undertaken for the benefit of the Inter-American Institute of Agricultural Sciences.

BUDGET FOR THE FISCAL YEAR

July 1, 1945 - June 30, 1946

Estimated Revenue

The principal sources of income for the Institute for the fiscal year 1946 will be from the receipt of contributions from the supporting governments and the sale of agricultural products.

The amount to be received from governmental quotas will depend upon those governments which desire to participate and the amount so received should be considerably more than for the portion of the previous year during which the Institute was on a basis of an international convention. Last year the gross receipts from the sale of agricultural products was \$56,008.15 and it is believed will be at least that much for the fiscal year 1946.

There will be a small revenue from miscellaneous sources such as the sale of publications which for the fiscal year 1945 amounted to \$333.15.

There are other possible sources of income which may develop during the year but which cannot be estimated closely at this time. These sources include such items as students' tuition and dormitory charges.

In addition conversations are in progress in connection with the possibility of the Institute carrying out certain cooperative projects for which the Institute will receive financial assistance.

There will also be available the working fund balance which was on hand July 1, 1945 in the amount of \$6,421.71.

Although it is not now possible to set forth an itemized list of estimated receipts with any degree of accuracy, it is understood that the administrative officers of the Institute will keep expenditures within the possibilities which will be afforded through available funds.

Estimated Expenses

The following schedule of estimated expenses is submitted with the intention that they be considered as estimates and that the officers of the Institute be permitted to make reasonable revisions in the light of experience as the fiscal year progresses. For instance, the cost of operating the dormitory will be largely dependent upon the number of students which the various governments may see fit to send.

Inter-American Institute of Agricultural Sciences

Estimated Expenses

For the Fiscal Year July 1, 1945 - June 30, 1946.

I - ESTIMATED REQUIREMENTS OF THE FIELD
BUSINESS MANAGER IN COSTA RICA:

Department of Animal Industry	\$15,000.00	
Department of Plant Industry	15,000.00	
Department of Agricultural Engineering	3,000.00	
Operation and Maintenance of Physical Plant and Equipment	18,000.00	
Farm Operations	36,000.00	
Dormitory Operations	4,500.00	
Office Expense	7,200.00	
Medical and Social Security Expense	5,100.00	
Purchase of Equipment	6,000.00	
Building Construction	13,500.00	
Miscellaneous Expenses	<u>1,200.00</u>	\$124,500.00

II - ESTIMATED REQUIREMENTS AT THE EXECUTIVE
HEADQUARTERS IN WASHINGTON:

Administrative Salaries Paid from Washington including those for Executives and Faculty in Costa Rica	\$60,000.00	
Contributions to a Retirement Fund for the Regular Members of the foregoing Staff	3,000.00	
Traveling Expenses, including Per Diem in lieu of Subsistence while away from Station	7,500.00	
Cost of Printing and Translations	2,100.00	
Office and Miscellaneous Expenses at Executive Headquarters, including Office supplies, auditing, local transportation, official entertainment and meetings, and all other expenses not otherwise provided	<u>3,000.00</u>	75,600.00

III - ESTIMATED REQUIREMENTS AT THE PANAMA SUBSTATION:

Compensation of the Manager, Labor, Supplies and equipment, and all other expenses at the Station		<u>15,000.00</u>
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TOTAL ESTIMATED EXPENSES

\$215,100.00

QUOTAS OF THE AMERICAN REPUBLICS FOR THE
SUPPORT OF THE INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
FOR THE FISCAL YEAR ENDING JUNE 30, 1946*

	<u>Population</u>	<u>Quotas at \$1.00 per Thousand</u>
Argentina	13,906,694	\$13,906.69
Bolivia	3,533,900	3,533.90
Brazil	41,565,083	41,565.08
Chile	5,178,260	5,178.26
Colombia	8,701,816	8,701.81
Costa Rica	705,000	705.00
Cuba	4,227,597	4,227.60
Dominican Republic	1,768,163	1,768.16
Ecuador	3,105,541	3,105.54
El Salvador	1,862,980	1,862.98
Guatemala	3,410,762	3,410.76
Haiti	2,719,474	2,719.47
Honduras	1,154,388	1,154.39
Mexico	21,153,321	21,153.32
Nicaragua	1,013,946	1,013.95
Panama	631,637	631.64
Paraguay	1,014,773	1,014.77
Peru	7,395,687	7,395.69
United States	156,233,264	156,233.26
Uruguay	2,185,626	2,185.63
Venezuela	<u>3,996,095</u>	<u>3,996.10</u>
	<u>285,464,007</u>	<u>\$285,464.00</u>

* Populations used are those effective for the quotas of the Pan American Union and computations are shown for all the American Republics regardless of expressions of intentions with respect to support of the Institute.

QUOTAS OF THE AMERICAN REPUBLICS FOR THE
SUPPORT OF THE INTER-AMERICAN INSTITUTE OF AGRICULTURE SCIENCES
FOR THE FISCAL YEAR ENDING JUNE 30, 1947*

	<u>Population</u>	<u>Quotas at \$1.00 per Thousand</u>
Argentina	13,909.950	\$13,909.95
Bolivia	3,533.900	3,533.90
Brazil	41,565,083	41,565.08
Chile	5,289,120	5,289.12
Colombia	8,701,816	8,701.81
Costa Rica	725,149	725.15
Cuba	4,778,583	4,778.58
Dominican Republic	1,940,546	1,940.55
Ecuador	3,171,367	3,171.37
El Salvador	1,896,168	1,896.17
Guatemala	3,410,762	3,410.76
Haiti	2,719,474	2,719.47
Honduras	1,154,388	1,154.39
Mexico	21,153,321	21,153.32
Nicaragua	1,059,805	1,059.81
Panama	631,637	631.64
Paraguay	1,014,773	1,014.77
Peru	7,395,687	7,395.69
United States	158,960,887	158,960.89
Uruguay	2,185,626	2,185.63
Venezuela	<u>3,996,095</u>	<u>3,996.10</u>
	<u>289,194.137</u>	<u>\$289,194.15</u>

* Populations used are those effective for the quotas of the Pan American Union and computations are shown for all the American Republics regardless of expressions of intentions with respect to support of the Institute.

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Inter-American Institute
of Agricultural Science.

Annual report.

1944-45

DATE	ISSUED TO
3 MAR 1945	Rosa de la Cruz
29 III 1945	F. Sotres
	C. Molestina