

FISCAL YEAR 1946-47

H ANNUAL REPORT
OF
THE INTER-AMERICAN INSTITUTE
OF AGRICULTURAL SCIENCES



Executive Headquarters

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

Field Headquarters

Turrialba, Costa Rica

Rubber Substation

Gatún, Canal Zone

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

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REPORT OF THE DIRECTOR
FOR THE FISCAL YEAR ENDING JUNE 30, 1947

Gentlemen of 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 1946-47 and containing a budget and statements of the general conditions and financial status of the Institute.

The continued sympathy and interest of the Board of Directors are appreciated by the staff of the Institute. As international civil servants forming a part of the Inter-American system, we desire to remain at all times open to suggestions as to the directions in which our efforts should be applied so as to result in the greatest possible benefit to the welfare of the basic industry of the Americas.

Respectfully submitted,

Ralph H. Allee
Director

INTRODUCTION

The process of building an international institution susceptible to the needs of the American Republics has progressed in several directions during the past year. As might be expected, the program is still heavily concerned with providing facilities and the organization of an adequate staff.

The greatest concentration has been on the Plant Industry Department for which we were extremely fortunate in obtaining the services of Dr. Manuel Elgueta as Head. Dr. Elgueta, completely conversant with plant improvement and the organization of agricultural research in several parts of the hemisphere, has had notable success as Director of the Department of Plant Genetics of the Ministry of Agriculture in the Republic of Chile. His program at the Institute will emphasize coffee, sugar cane, cacao, and the other basic industrial and food crops of the hemisphere. In addition to projects under way, during the coming year he will develop an Inter-American cacao research and training program. He will also initiate a series of special investigations in the application of new chemical compounds, such as herbicides, growth regulators and fungicides. Special grants of funds, outside the Institute quotas, have been obtained to assist in the above projects.

By the close of the fiscal year plans will have been completed for the establishment of a vocational education and extension program. The chief emphasis of this program will be

toward evolving effective methods of reaching the farmers and the farm home and to train leaders in this field. This vital part of the Institute's activities will use facilities to be made available in part by a grant from the American International Association of New York City. Dr. D. Spencer Hatch, prominent rural educator, will join the Institute staff as Head of the Extension and Vocational Education Unit.

It is expected that the coming year will be devoted to strengthening the present program of the Institute. However, plans will be further perfected for the addition of research and educational programs in forestry, nutrition, and the control of pests and diseases affecting crops and animals.

Personnel and Associated Organizations

At the close of the fiscal year ending June 30, 1947, the resident and cooperating staff comprised:

| | |
|----------------|-----------|
| Ralph H. Allee | Director |
| José L. Colom | Secretary |
| Lowell Curtiss | Treasurer |

Plant Industry Department

| | |
|-------------------------|----------------|
| Manuel Elgueta | Chief |
| Joseph H. Fennell | Horticulturist |
| Ernest Casseres | Olericulturist |
| Ora Smith ^{/1} | Physiologist |
| Guillermo Bonilla | Assistant |
| Napoleón Murillo | Assistant |

Animal Industry Department

| | |
|-----------------|-----------|
| Albert O. Rhoad | Chief |
| Oscar Echandi | Assistant |

Department of Economics and Rural Life

| | |
|------------------|-------|
| Julio O. Morales | Chief |
|------------------|-------|

Agricultural Engineering Department

| | |
|----------------|-----------|
| Norton C. Ives | Chief |
| Tomas Zeledón | Assistant |

| | |
|-------------------|--------------------------|
| Angelina Martinez | Librarian |
| George Slater | Business Manager |
| Arthur W. Allen | Records and Publications |
| Anna Marie Dye | Purchasing Assistant |

^{/1} Under agreement with Cornell University, on the faculty of which Dr. Smith is Professor of Vegetable Crops.

During the fiscal year the Institute maintained or effected cooperative relations with the following educational, technical and scientific entities:

American International Association for Economic and Social Development

Cooperative Rubber Experimental Station of the Government of Costa Rica and the United States Department of Agriculture

Cornell University

Escuela Agrícola Panamericana

Food and Agriculture Organization of the United Nations (FAO)

Institute of Inter-American Affairs

Instituto de Defensa del Café de Costa Rica

Junta de la Cafía de Costa Rica

Ministerio de Trabajo de Costa Rica

Montana State College

Rockefeller Foundation

United Fruit Company

United Nations Educational, Scientific and Cultural Organization (UNESCO)

United States Department of Agriculture

Administrative Committee

The Administrative Committee, under the chairmanship of H. Harold Hume, Provost of the College of Agriculture, University of Florida, United States of America, reviewed Institute activities at meetings held at Turrialba on August 11, 12 and 17 and September 16 to 20, 1946 and from March 31 to April 3, 1947. Other members of the committee present were Robert E. Buchanan, Director of the Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts; Manuel Elgueta, Director of the Department of Plant Genetics, Ministry of Agriculture of Chile, who took over his duties as Chief of the Plant Industry Department at Turrialba early in June; and Luis Cruz, of San José, Costa Rica. Also attending the meetings in an ex-officio capacity were Director Ralph H. Allee and José L. Colom, Secretary.

This committee, appointed by the Board of Directors, consults with the Institute staff in determining the scope of its activities and the nature of its organization.

STATUS OF THE CONVENTION

At the time of the publication of this Report, ten countries had ratified the Convention of the Institute and are contributing to the support of the Institute. These nations are the following: Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, the United States, and Venezuela.

Although the Senate of the Argentine Republic has ratified the treaty, action is necessary on the part of the House of Deputies to complete the requirements necessary to consider Argentina as a member country. It is hoped that after the meeting of the Ninth International Conference of American States to be held in Bogotá March 30 to April 30, action will be taken by other countries to ratify the treaty, particularly those that have already initiated steps to do so. So far the treaty has been signed by the following nations: Bolivia, Chile, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, the United States, Uruguay, and Venezuela.

REPORT OF THE MANAGER

The shift in Institute activities from construction and development of the physical plant to a more normal operation during the fiscal year 1946-47, with research and teaching as its principal objectives, forced a consolidation of management into one unit. This department, headed by George M. Slater, who was transferred from the Panama substation in October 1946, is in charge of keeping the physical plant in good condition, operating the farm enterprises efficiently, and supplying the Institute with necessary facilities such as light, water and lodging.

A more active program was initiated in the field of farm operations. Approximately twenty-five hectares were cleared from brush, prepared and planted to various temporary crops. All the sugar fields of cultivating age were fertilized at the rate of 700 pounds per hectare of the formula 10-10-10. Fertilizing and proper cultivating are showing results far surpassing the cost. An estimated seventy-five hectares of sugar cane were harvested during the year furnishing a yield of 2,933 long tons. This year's coffee crop was the highest yet, amounting to 2,190 fanegas (240,900 pounds).

Equipment acquired during the year has supplied mechanical shops with most of the essential elements to cover the Institute's needs. A bull-dozer and dumpster truck have greatly helped in

reducing maintenance and operating costs. A rock crusher now being installed will reduce construction and road maintenance expenses.

The control of expenditures and use of materials in the warehouse, as well as claims on the labor force, have been brought more closely under the Business Manager through a system of requisitions, purchase and work orders. This process makes possible better departmental and cost accounting.

The contract on the laboratory and administration wing of the Central Building was terminated during the year, and completion of the interior is under way with the installation of partitions & equipment. Surfacing and other improvements of grounds around the building are being carried out. A three truck garage and one laborer's cottage were rebuilt in more convenient places on Institute property, and three of the ten small houses have been enlarged. All of the light and power needs are being supplied by the Institute light plant

The total number of men employed by the Institute has decreased during the year, but the amount paid out in salaries and wages has increased, due to the employment of more skilled personnel including agronomists, mechanics, and office workers.

A considerable saving is resulting from the use of our own oxen and carts for work and ploughing. A saving in the amount

being spent on watchmen has resulted from reducing the number of watchmen at the buildings and gates to two regular men. During the months when corn and other seeds are ripening however, special watchmen have to be employed to protect crops from animals.

SUMMARY OF LAND USE AS OF JUNE 30, 1947

Areas Estimated

| | <u>Hectares</u> |
|--|-----------------|
| Rented Out for Sugar Cane | 120 |
| Rented Out for Coffee | 100 |
| Experimental Coffee | 75 |
| Rehabilitated Cane Fields | 85 |
| Land Cleared for Sugar Cane | 85 |
| Plant Breeding and Arboretum | 45 |
| Teak | 5 |
| Experimental Grass Plots | 10 |
| Pastures | 270 |
| Land Available for Pastures | 75 |
| Waste Land, Waterways, Roads and Tramlines | 110 |
| Buildings and Grounds | 20 |
| | <hr/> |
| | 1,000 |

Note: Exact measurements are still not available for many of the fields, however, these estimates are probably accurate to within ten percent.

ORTON MEMORIAL LIBRARY

Library Collection

The bulk of the Library's holdings consist of several collections donated to the Institute or purchased at nominal cost. The following are included: (1) The William A. Orton collection, consisting of about 600 books and 10,000 pamphlets and journals. This collection was presented to the Institute by the Board of Trustees of the Tropical Plant Research Foundation when the Foundation was dissolved in 1943; (2) the F. A. Pearson collection, composed of about 60 books and 300 journals on economics; (3) the Francisco Sancho collection consisting of 103 books on chemistry and related fields. This collection was donated to the Institute by relatives of the late Lic. Francisco Sancho Jiménez of Cartago, Costa Rica; and (4) the W. I. Myers collection consisting of 139 bound volumes on economics and farm management.

New acquisitions to the Library during the fiscal year include 113 books which were purchased, 182 which were received through the Embassy of the United States of America in San José as part of a donation made by the United States Department of State through the American Library Association, and 200 books donated by the Library of the United States Department of Agriculture. The total number of book holdings amounted to almost 2,000 in June 1946, and including journals and pamphlets

the approximate number of volumes in the Library reached 12,000 at the end of the fiscal year.

Ordering of Materials and Equipment

The selection of the materials to be ordered was done largely by the members of the staff. The materials ordered during 1946-47 included 171 books, 1,442 experiment station bulletins, and various library supplies. Equipping and furnishing of the library has continued, including the building of cabinets, magazine racks, book shelves, charging trays and other necessary items in the Institute's shops.

Cataloging and Classification

The Librarian spent a good deal of her time cataloging and classifying the books. Some 1,371 sets of cards were ordered from the Library of Congress in the United States; 1,045 books were classified; 712 books were fully cataloged and processed; and 4,568 cards were prepared for the card catalog, shelf list and accession record. About 10,000 pamphlets and journals were stamped and 4,000 were classified.

Reference Materials

The library reference room will seat about ninety individuals comfortably, and the rooms available for stacks have an estimated capacity of 40,000 volumes. The encyclopedias, dictionaries, and

other books of reference value are kept outside in the reading room. The Librarian spent a considerable part of her time looking up materials for students and staff members.

A microfilm reader was purchased and about 100 pieces of microfilm materials were received. The library subscribed to 42 scientific journals and abstracts, and 17 other complimentary or exchange subscriptions were received. It was decided to bind all important journals and abstracts, and the binding of the Biological Abstracts has almost been completed.

Library materials circulate among staff members, students, and visiting scientists. Some 974 volumes were charged out of the library during the year, and it is expected that this number will greatly increase in the coming year.

General Comments

The organization of the Institute's Library was started in August 1946. The work was done by the Librarian with the help of a part-time clerk who also did some office work. Starting with the first of July 1947 however, the services of an Assistant Librarian and a full-time clerk will be available and should signify an expansion of the services of the Library.

An increase in the Library budget is essential in order to build up a well-rounded collection and to carry out needed improvements in its services. The following items are of major

importance and will, it is hoped, be carried out in the coming year: (1) Purchasing of back numbers of important journals to complete the files in the library, (2) filling in gaps in the collection, (3) obtaining more Spanish titles, (4) binding complete volumes of important journals, and (5) increasing the number of magazine subscriptions.

PLANT INDUSTRY DEPARTMENT

Manuel Elgueta, Head

In addition to the regular staff members of the Plant Industry Department Dr. Ora Smith spent his sabbatical leave at the Institute in charge of chemical and weed control work, and on May 23, 1947, Dr. Frederick L. Wellman, from the Office of Foreign Agricultural Relations of the United States Department of Agriculture, joined the staff, in charge of coffee diseases.

The work done during the year is outlined in the following reports:

General Horticulture

Joseph L. Fennell

During the year ending July 1, 1947, considerable progress has been made on several projects. Those showing best results have been with grain sorghums, grapes, tomatoes, cowpeas and fruits. The highpoints of progress in each project will be discussed separately.

Grain Sorghums

At the present time more than three hundred lines, mostly in the seventh generation, are being grown. A few of these lines show large heavy-grained open heads and large sized grain. Lines vary in height from about 3-1/2 feet to 7 feet. Heavy production

(9075 lbs.) per hectare and moderately good uniformity in growth characters have been obtained. Relative freedom from disease and insect damage, and satisfactory adaptability to humid climates have been reached, and selection of grain characters for special uses is now beginning. Two new varieties have been named Enana and Belleza, and are being distributed in experimental quantities throughout the hemisphere and to other parts of the world.

Grapes

Progress in the grape project continues. One or two promising new selections have borne fruit for the first time. Limited tests are being conducted to determine the suitability of the fruit of various selections for making wine, jelly, etc. In all, approximately six or eight new varieties would seem worthy of cultivation for fruit; another six or so indicate value for wine. Eight or ten additional selections show value for further breeding.

Satisfactory experiments have been made in the practical control of wasp damage to ripening fruit. Several new varieties of promise as root stocks have been selected and are now under observation and in experiment. A new test vineyard of some seven hundred seedling selections has been set out and is now in growth. Two fruiting varieties have been named Seminok and Myakka and limited distributions have been made to government experiment stations in the Americas.

Tomatoes

Extensive selection and testing have continued with our recently named Turrialba variety. Selections of this variety have continued to show promise for production under wet growing conditions. Imported varieties have failed to prosper. During the rainy month of June (13 inches of rainfall) a total of more than four hundred dollars was received from the local sale of excess, ripe fruit after all selections and experimental tests had been completed. This was from a planting of less than two acres in area. Seeds of the Turrialba tomato in sample experimental lots have been widely distributed.

A seemingly high degree of resistance to Phytophthora infestans has been discovered in a wild cherry tomato selection from South America. In F₁ crosses, with susceptible cultivated varieties this resistance has seemed to be transmitted almost as a full dominant. High susceptibility to an unidentified leaf-spot has been associated with this resistance. These Phytophthora resistant and leaf-spot susceptible F₁ plants have been back-crossed to best lines of Turrialba, and it is believed that disease-resistant segregations with large fruit may be selected in the next generation.

A sizable collection of disease resistant breeding material has been assembled from South America, the United States, Australia, Hawaii, and elsewhere.

Cowpeas

Steady progress has been made with cowpeas. Two superior new varieties have been selected from a cross between Sugar Crowder and New Era. These will be given a name in the near future, and wide distribution for experimental purposes has been started.

Selections from two crosses between Cowpea varieties and the yardlong bean (Vigna sesquipedalis) have given, in the F₃ generation, lines with high resistance to powdery mildew (Erysipha polygoni). Resistance to this very destructive disease seems to be inherited as a recessive. Crosses back to the Cowpea (Sugar Crowder x New Era) have given heavy production and relatively good disease resistance. From these "yardlong" crosses as a basis, a new race of cowpeas with mildew resistance, larger seeds, and heavier production is expected to be developed. A selection for greater resistance to mosaic diseases indicates progress.

Citrus

During June approximately four acres were planted to fifteen selected varieties of citrus.

Other fruits

During the year a promising new fruit has been discovered. This species (Solanum hirsutissimum), which is a native to remote parts of Costa Rica and Panama, has indicated unusual horticultural possibilities. The juice of select forms is nearly at par with that of the orange; it is acid and richly flavored. A moderately good "dry" wine has been made experimentally from the pure juice, and tests are planned to determine its value for making pies. The well-ripened fruit is moderately good to eat, though it is a little too seedy.

An effort at breeding and improvement has been started using several other selected species. One of these, native to the upper Amazon and acquired through the cooperation of the Tingo María Experiment Station in Peru, produces large edible fruit which often reach 3-1/2 to 4 inches in diameter. When peeled like apples, they have been used to make delicious jelly, marmalade and pies, having something of the flavor between the apple and the pineapple.

Selection of superior fruited plants are being made from named varieties in a population of guava seedlings.

During the year two students completed their studies in grape culture at the Institute after spending approximately five months in the Republic of Chile in complementary training.

Mr. Fennell spent the month of November in Venezuela as a

guest of the Ministry of Agriculture. During the year the following articles written by him were published:

"Grain for Tropical America" Agriculture in the Americas
December 1946

"Un Acelerador para Mejorar los Cultivos de las Zonas Templadas". La Hacienda, February 1947

"Improvement Studies with the Cowpea and Peanut"
Southern Seedsman (In press)

Vegetable Crops

Ernest H. Casseres

Studies with Irish Potatoes

1. A comprehensive fertilizer experiment worked out by Dr. Ora Smith has been used to obtain valuable information on the requirements of the potato crop as grown in the deep, black volcanic soils of the potato production areas of the country. The experiment was laid out in Pacayas with Dr. Smith on January 21, 1947 and the yield data was obtained on May 27 of that year. Fertilizers were applied to the surface of the plots and then it was worked into the soil in the hilling operation commonly practiced. N, P, and K were applied at the rates of 0, 25 and 50 pounds per acre for N and K and at 0, 50 and 100 pounds per acre for P. This resulted in 54 plots from three levels of each of three fertilizers replicated twice (3 x 3 x 3 x 2). The source of N was ammonium sulphate (21.5%); superphosphate was used (32%)

for phosphoric acid; and mutiate of potash (60%) was the source for potash. The data were taken by weighing the potatoes from 18 plants in each treatment, eliminating guard rows and border plants. The analysis of variance was worked out for the commercial crop which consisted of all tubers above one ounce in weight.

The results of this experiment are shown in Table 1 with the two-way data for two fertilizers at a time, and in Table 2 with the analysis of variance figures.

Table 1.

Two-way Summary Tables of Potato Production According to Fertilizer Interactions

| N X P | | | | |
|-------|-------|-------|-------|--------------|
| | N o | N 1 | N 2 | |
| P o | 29.5 | 36.1 | 32.1 | : 97.7) |
| P 1 | 46.0 | 52.6 | 54.6 | : 153.2) * |
| P 2 | 49.3 | 53.3 | 56.3 | : 158.9 |
| | 124.8 | 142.0 | 143.0 | : 409.8 |
| | | x | | |
| N X K | | | | |
| | N o | N 1 | N 2 | |
| K o | 40.5 | 43.8 | 47.1 | : 131.4) |
| K 1 | 41.8 | 52.8 | 45.0 | : 139.6) NS |
| K 2 | 42.5 | 45.4 | 50.9 | : 138.8) |
| | 124.8 | 142.0 | 143.0 | : 409.8 |
| P X K | | | | |
| | P o | P 1 | P 2 | |
| K o | 31.5 | 49.3 | 50.6 | : 131.4 |
| K 1 | 34.5 | 50.8 | 54.3 | : 139.6 |
| K 2 | 31.7 | 53.1 | 54.0 | : 138.8 |
| | 97.7 | 153.2 | 158.9 | : 409.8 |

Table 2.
Analyses of Variance

| Variance | D.F. | Sum Squares | Mean Square | F | | |
|----------|------|-------------|-------------|-------|----------|---------|
| | | | | Found | Required | |
| | | | | 99:1 | 19:1 | |
| Total | 53 | 217.57 | | | | |
| Blocks | 1 | 12.71 | 12.71 | 7.57 | 7.72 | 4.22 x |
| N | 2 | 11.63 | 5.81 | 3.46 | 5.53 | 3.37 x |
| P | 2 | 127.00 | 63.50 | 37.80 | 5.53 | 3.37 xx |
| K | 2 | 2.27 | 1.13 | -- | -- | -- NS |
| NxP | 4 | 2.92 | .73 | -- | -- | -- NS |
| NxK | 4 | 8.74 | 2.18 | 1.30 | 4.14 | 2.74 NS |
| PxK | 4 | 1.30 | .32 | -- | -- | -- NS |
| NxPxK | 8 | 9.01 | 1.13 | -- | -- | -- NS |
| Error | 26 | 41.99 | 1.68 | -- | -- | -- NS |

Conclusions:

1. Differences between the blocks were significant.
2. Nitrogen increased yields significantly.
3. The addition of superphosphate was highly significant in increasing yields.
4. No beneficial effect was evident from the addition of potash.
5. The possible interactions did not give any significance.

A second factorial fertilizer experiment was laid out on June 24 near Cartago in a commercial field with the help of two students.

2. Fifteen late-blight-resistance potato varieties from Cornell University were received in November 1946. These were planted out in four different potato growing regions of Costa Rica for preliminary testing. Harvests were possible from only two

localities during the following March and April. Notations were made periodically on performance. They were again planted out in one field in June 1947 for further testing.

3. Seven commercial potato varieties from the United States were planted in June 1947. These were ten pound lots which had been harvested the previous fall in New York State. The varieties received were: Chippewa, Houma, Katahdin, Ontario, Sebago, Pontiac and Smooth Rural.

4. Notes were taken and small samples obtained of local potato varieties including some of old sorts which had practically disappeared.

Standardization of Vegetables Commonly Grown in the Tropics

This project was submitted on July 1, 1946 after some preliminary observations had been made on the variability of certain important food crops which could be improved by selection and standardization. Work was started with the chayote (Sechium edule). A comparison of four types indicated there are differences in yield and cooking quality as shown by the data in Table 3 for the production during the first crop and the rank accorded by persons sampling mature fruits.

Yields are up to December 30, 1946. Variety No. 4 matured about 12 fruits one week ahead of the other varieties and was the best. Other crops being studied in this project are the native ayote, sweet and hot peppers, and yuca (cassava) varieties.

Table 3.

Yields of Four Types of Chayote and Rank by Quality

| Variety Number | Number seeds planted July 15, 1946 | Number mature fruit harvested on first crop | Rank by quality and number persons re- porting | | |
|-------------------|--|---|--|------|------|
| | | | 1st. | 2nd. | 3rd. |
| 1 | 2 | 112 | -- | 16 | 5 |
| 2 | 1 | 184 | 3 | 8 | 15 |
| 3 | 1 | 4 | 4 | -- | -- |
| 4 | 1 | 117 | 25 | 3 | -- |

Trials of Imported Vegetable Varieties

A preliminary planting of vegetable varieties made in October 1946 was carried on for five months. Satisfactory production performance was not obtained due to fungus and insect pests. However, a useful experience was obtained by observation of some of the main limiting factors of vegetable production and a basis was afforded for Project No. 63, submitted on March 27, 1947. This provides for tests of several new fungicides and insecticides in combination with performance trials of vegetable varieties produced elsewhere whose superior germplasm might prove of some usefulness in the tropics.

Results were obtained during May and June on a fungicide test on four standard United States tomato varieties. Four copper sprays applied after the plants were fairly well developed but apparently healthy failed to prevent the appearance of late blight Phytophthora infestana. For this reason yields were relatively very

low but they confirm the fact that although the fungus may not be apparent microscopically, the crop should be sprayed for protection when the plants are very young, preferably from the seedling stage on.

Seed of the Marglobe, Stokesdale, Valiant and Rutgers varieties were sown on February 1, 1947 and the field set on March 11. Fungicides were applied six times between May 2 and May 28. Late blight appeared May 17. The treatments given below are on the basis of material for three gallons of water:

- A - check
- B - 54 grams Tribasic copper
- C - 108 grams Tribasic copper
- D - 54 grams Basi-Cop plus 108 grs. Hydrated Lime
- E - 108 grams Basi-Cop plus 216 grs. Hydrated Lime

No replicates were made due to limited number of plants and the data does not lend itself to statistical interpretation. The yields, although low, are given below for the record. Yields are made from 14 plants spaced 36 x 30 inches apart, counting only normal healthy fruit above 2 ounces each.

Table 4.

Yields of Four Tomato Varieties Under Five Fungicide Treatments

| Variety | Yields per Treatment | | | | | Total yield per variety lbs. |
|------------------|----------------------|-------|-------|-------|-------|------------------------------|
| | A | B | C | D | E | |
| Bonny Best | 17.00 | 26.75 | 19.00 | 14.00 | 21.00 | 97.75 |
| Marglobe | 20.00 | 19.00 | 23.00 | 17.50 | 22.50 | 102.00 |
| Stokesdale | 16.00 | 17.50 | 11.50 | 22.25 | 23.50 | 90.75 |
| Valiant | 31.25 | 23.50 | 26.50 | 19.75 | 24.00 | 125.00 |
| Treatment Yields | 84.25 | 86.75 | 80.00 | 73.50 | 91.00 | |

Marglobe produced the best fruits and plants. The data shows highest yield for Valiant, but the quality of the fruit was the least good of the four varieties. It did produce almost ten percent of its early crop fully one week before the other varieties. It is suggested that Valiant and other "early" varieties might have some value in tropical areas of short days where high prices might make production of out-of-season fruit profitable. Bonny Best performed well enough to merit another trial, but Stokesdale was generally poor.

The fungicide treatments indicated that spraying should start when the plants are six weeks old or sooner. Observers suggest that when testing commercial varieties susceptible to late blight during rainy seasons and high price periods, sufficient control might be attained by starting sprays early and training plants above ground by staking. Further experimentation is needed.

Trials with Selective Weed Killer

Ora Smith

1. Bananas - mature plantings

(United Fruit Company)

Eight hormones and other type weed killers were sprayed on tall, rank growing grass and broadleaved weeds on a commercial banana plantation. This was done during the dry season, hence the weeds were growing very slowly and were in a hardened condition. Most herbicides are more effective when the weeds are growing rapidly.

None of the chemicals killed all the weeds and grass, although Sinox General and Esso Aromatics HB appear very promising. Bananas were uninjured.

(Institute)

Ten chemicals were sprayed on weeds and grass surrounding mature banana plants. The best kill of weeds and grass was obtained with Sinox General, Sinox and Esso Aromatics HB. Bananas remained uninjured.

2. Bananas - mature plantings

(United Fruit Company)

When banana plantations are abandoned because of disease and it is desired to plant some succeeding crops, volunteer bananas persist as a bad weed. 2-4D was sprayed on mature bananas and surrounding weeds. All broadleaved weeds were killed, but grasses were uninjured. Within 4 days the bananas broke off at about the soil level. Those sprayed on trunks only showed no ill effects. 2-4D applied to mature plants infected with Panama disease resulted in death of the main stem and all of the suckers.

(Institute)

Mature banana plants were sprayed with a solution of 2-4D. Within 7 days all stems had fallen over, breaking off just above the seed. No new sprouts have appeared from these plants within a period of 3 months. Spraying of trunks only resulted in no apparent change.

In another experiment 10 herbicides were applied directly to the foliage of banana plants. The best materials for killing the banana plants were three hormones, 2-4D, Esso X79M.E. and Esso X79K.

3. Cacao - young plants.

(United Fruit Company, Quepos Div.)

Plants were circled with sprays of Sinox and of 2-4D during the dry season. Weeds and grasses were damaged but not killed. Cacao was uninjured. Excess shade trees such as papaya were sprayed and killed with the above chemicals.

Grassy circular areas were sprayed to kill weeds before transplanting cacao plants to these areas. Only partial killing of weeds and grass resulted. Cacao plants subsequently transplanted to these areas appear uninjured.

4. Cacao, mature

(United Fruit Company, Almirante, Panama Div.)

Four herbicides were applied to weeds in mature cacao planting, 2-4D and Esso X79K killed all broadleaved weeds under the cacao trees.

Mature trees were sprayed in an effort to control bird vine and other aeroid plants on the cacao. 2-4D did not kill the aeroid plants but resulted in twisted and distorted growth of cacao chupons.

5. Sugar Cane

(Institute)

Four experiments were conducted during November and December with 2-4D sprayed on cane from 3 to 6 weeks after it had been harvested. In all experiments very good control of broadleaved weeds was obtained, but grasses remained.

In one experiment the area was cultivated with machetes one week after application of 2-4D. In this area regrowth of weeds was much slower and fewer weeds appeared than in the unsprayed macheted area.

In another experiment 10 herbicides were applied to the area. Best control of grasses was obtained from Sinox General, Sinox and Solvesso 150 Bottoms; best control of broadleaved weeds from 2-4D, Esso X79K, Esso Varsol No. 2, Solvesso 100 and Esso HAN132. In another experiment 13 herbicides were applied to a narrow strip in the rows of recently harvested cane, before new growth appeared. Sufficient weed growth has not occurred during the five weeks since application of these materials to justify conclusions as yet. In none of the experiments has cane been injured by the herbicide.

6. Coffee: neglected cafetal; rank weed growth.

Two experiments were conducted using 2-4D, circling each plant in some cases, and in others spraying the entire area. A very good killing of all broadleaved plants resulted, but the

grasses remained alive.

In another experiment nine herbicides were applied. The best control of weeds and grasses was obtained from Sinox General, Sinox and several of the Esso hydrocarbons.

In another experiment 10 herbicides were sprayed in the cafetal just after the tall weeds and grass had been cut with machetes. The best treatments in this experiment were Sinox General, Esso Aromatics HB, Varsol No. 2, and Solvesso 100.

7. Corn

Spray applications of 2-4D were made to areas planted to corn, resulting in very good control of broadleaved weeds with no apparent injury to the corn plants.

8. Potatoes

Control of weeds with chemicals in potatoes has been discussed in the progress report of "Studies with Irish Potatoes".

9. Rice

Seven weeks after planting, 2-4D spray applications were made to six varieties of rice. Application was made to other areas 11 weeks after planting. In all areas where 2-4D was applied broadleaved weeds were controlled effectively without injury to the rice. Better weed control was obtained from the late application.

Weed control at harvest time was much better in areas sprayed with 2-4D than in areas which had been handweeded at the same time that the applications were made. This method of weed control in rice appears very promising.

10. Vegetables

(a) Eleven herbicides were sprayed on the weeds and soil surface two weeks before the land was prepared for planting. Eight kinds of vegetables were planted on the area four weeks after application of the chemicals.

Excellent control of weeds was obtained from applications of Esso Aromatics HB, Esso HAN132, Sinox, Solvesso 100, and Sinox General.

(b) After the soil was prepared for planting the 11 chemicals mentioned in (a) were applied to the soil. Three days later 8 kinds of vegetables were planted in this area. Good control of weeds resulted from applications of Esso Aromatics HB, 2-4D, Sinox, Esso HAN132, Sinox General and Solvesso 100.

(c) Six days after planting eight kinds of vegetables, spray applications of 11 herbicides were made to the area. Weeds were controlled best following the applications of Sinox General, Sinox and Esso X79K.

(d) Seven chemicals were sprayed on the weeds and soil preceding preparation for planting. All weeds were hoed two days later. The following day snap beans and sweet corn were planted in the area. Final data have not been obtained from this experiment.

(e) This experiment is the same as that described in (d) except that the chemicals were applied five days after planting. Complete data are not yet available from this experiment.

(f) Seven chemicals were applied to very rank growth of weeds without disturbing the soil. Good kill of weeds resulted from applications of 2-4D and Esso X79K. Very little grass grew in these areas.

(g) All weeds were removed from a large area with hand hoes and the area was planted to snap beans and sweet corn. The following day spray or dust applications were made of 10 chemicals which kill by contact and five chemicals of the hormone type. Each of the hormones were also superimposed on each of the contact type chemicals resulting in 69 treatments. Sufficient weed growth has not yet occurred for final observation and obtaining data.

(h) Three chemicals, singly and in combination, were applied to soil two days before planting the snap beans and sweet corn. These chemicals had not been used previously. Final data have not yet been obtained.

11. Lawns

Several lawn areas near the Institute have been sprayed with 2-4D with very good control of all broadleaved weeds and no apparent injury to any of the grasses.

12. Railroad Tracks, Pastures, Ditchbanks

(United Fruit Company, Quepos, Costa Rica and Almirante, Panama).

The best of eight chemicals applied along the railroad were Esso Aromatics HB and Solvesso 100. In slow growing pastures during the dry season the best chemicals, but not satisfactory,

were Sinox General and Sinox. Along ditchbanks broadleaved weeds were killed by 2-4D and Esso X79K and burning of weeds and grass resulted from Sinox applications.

13. African Oil Palm

(United Fruit Company, Quepos Div.)

(a) 2-4D killed most of the broadleaved weeds in a sprayed portion of a commercial planting. Sinox General killed some weeds, burned the grasses, but recovery occurred later.

(b) Both of the above solutions were sprayed thoroughly over entire palm plants of 1 year and 2-1/2 years of age. 2-4D had no visible effects; Sinox General resulted in severe burning.

(c) Six chemicals were sprayed on the weeds and soil in an oil palm nursery where the weeds consisted solely of Bermuda grass. In no case was the Bermuda grass killed, although it was severely burned. Sinox General killed some of the oil palm seedlings.

Sugar Cane Trials

Napolc3n Murillo

Fertilizer Trials

100 N, 50 lb. P₂O₅ and 150 K₂O in all combinations were applied on commercial plantations 4-1/2 and 7-1/2 months old on January 14 and 15, 1947. Harvest will take place on the old plantation about January 1948 and on the younger plantation about April or May 1948. No visibility influence has been noted.

Sugar Cane Collection

There are now 68 varieties of Saccharum officinarum, s. spontaneum, s. sinense, and s. barberi, and some hybrids. From these collections 62 were already in the country and 4 have been introduced recently by the Institute. Observations have been made on date and percentage of germination, growth vigor, diseases, etc. The best varieties are being propagated to have material for future trials. Variety Trial in Nicoya, Guanacaste (in cooperation with the Institute of Inter-American Affairs).

Seven varieties were planted among different farmers on April 14, 1947. There are observations on germination and tillering.

Fertilizer Trial in Cervantes

The objective was to determine if a certain discoloration symptom of the plantation was due to potassium deficiency. Application of sulphate of potash was made on special plots. After 3 months there was no change in the symptom.

Variety Trial of Sugar Cane with and without Fertilization

Ten of the best varieties were planted on 12 plots, of which 5 were for harvest at a 12 months period, 5 at 15 months period, and 2 to study a curve of sugar accumulation. They were sown on August 29, 1947, and germination was counted 45 days later. Statistical analyses showed great significant difference in varieties. There was interaction between variety and fertilizer, three of them

showing significant and positive influence of fertilization on germination. The two tests left for sugar content determination will be sample harvested weekly after the twelfth month.

Coffee Trials

Frederick L. Wellman

Dr. Frederick L. Wellman has been working on coffee diseases since his arrival at the Institute on May 28, 1947. His work at the Institute is in cooperation with the United States Department of Agriculture and the government of Costa Rica. His first month was spent in orientation, and investigation of the cinchona diseases in the United States Cinchona Plantation Projects. Plans were made, however, for the setting up of the pathological laboratory and the outlining of specific projects. The main objective in plant pathology is in the direction of coffee diseases, and most specifically on the severe leaf spot, ojo de gallo, caused by Omphalia flavida, and the serious root rot, Maya, caused by Rosellinia. Other coffee diseases will not be neglected, however, and general consultations will be conducted on miscellaneous diseases of all kind of other crops. Projects are planned to deal with coffee seed and bean fungicide treatments, coffee seedling tests, coffee seedling transplanting to study the effects of three different treatments in nursery, coffee root-rot control, and coffee fungi studies.

Before the arrival of Dr. Wellman at the Institute, coffee trials included the following planned by Dr. Walter N. Bingham and carried out by Manuel Elgueta and Guillermo Bonilla:

Old Coffee Plantation Renovation through Fertilizer and Cultural Practices

This project was initiated in November 1946. Four different progress reports have been made. In 1946 the harvesting of the plots was done previous to any treatment. Data were analyzed. As expected, no significant differences were obtained in any of the treatments. Calculation was done as a uniformity study.

ANIMAL INDUSTRY DEPARTMENT

Albert O. Rhoad, Head

During the fiscal year 1946-47 the Animal Industry Department made considerable progress in its experimental programs, increased its herds, and was called upon to give assistance in livestock improvement programs in four South American countries. It also prepared plans for a construction program to start July 1, 1947.

Summary of Experimental Projects

Ground Corn vs. Ground Milo Heads in Fattening Steers on Pasture.

Results

Table 1

| | | G R O U P S | | |
|---|------|--------------------------------|----------------------|--------------------------------|
| | | I | II | III |
| | | Pasture ground corn salt | Pasture - salt | Pasture ground milo salt |
| No. animals | Kgs. | 10 | 10 | 10 |
| Initial av. weight | " | 367.1 | 363.8 | 363.8 |
| Final av. weight | " | 418.8 | 399.5 | 418.3 |
| Average gain | " | 51.7 | 35.7 | 54.5 |
| Concentrates - consumption per animal | " | 298.5 | -- | 286.9 |
| Days on feed | " | 99 | 99 | 99 |
| Daily consumption concentrates per animal | " | 3.01 | -- | 2.94 |
| Daily gain liveweight | " | .52 | .36 | .54 |
| Consumption per kg. gain | " | 5.78 | -- | 5.44 |
| Net gain from feeding concentrates <u>1</u> | " | 16.0 | -- | 18.8 |
| Consumption concentrates per kg. net gain | " | 18.6 | -- | 15.2 |
| Cost per kg. net gain at 44¢ per kg. concentrates | ¢ | 8.18 | -- | 6.69 |

1 Net gain equal to average gain less gain from pasture alone.

Conclusions

Both ground corn and ground milo heads increased liveweight gains of steers on pasture.

Ground corn and ground milo heads had about equal feeding value.

Control of Dermatobia hominus (Tórsalo) in Cattle.

Continuing previous studies at the Institute on the control of *Dermatobia hominus*, known in various countries under the common names of tórsalo, nuche or berne, a new project was started on August 20, 1946. Three groups of 10 steers each were treated as follows: Group I - check or no treatment; Group II - sprayed daily with five percent solution of wettable DDT; Group III - sprayed daily with rotenone obtained as a water extract from green root of derris (*D. elliptica*) in proportion of one pound mashed root in one gallon water prepared the day previous to application. Both solutions were applied by hand sprayers. Starting on January 17, two additional groups were added to the experiment but sprayed once a week using a power sprayer.

Although the experiments have not terminated, it is evident that the water extract of the green root of derris (rotenone treatment) applied daily is very effective in controlling this skin parasite. DDT is also effective but not as efficient as the rotenone spray.

There was a pronounced decrease in infestation during the course of the eleven-month period. This was due in part to seasonal trend, less infestation during the relatively dry period, and in part to decrease in parasite and vector population due to control measures. The three groups in the daily applications are together in the same pastures. The two groups in weekly applications are kept together but in different pastures from the steers treated daily. Spraying once a week with rotenone in the form applied in this experiment is not as effective as daily applications.

Rotenone was also more effective than DDT in control of ticks on the same steers. With daily application, ticks were eliminated after four weeks with rotenone and after five weeks with DDT.

The effect of Control of Tórsalos on Liveweight Gains of Steers

The steers used in this experiment were the same as those in the previous projects. The control of tórsalos through spraying was started while the steers were still on feed. Three steers of each group, i.e. from groups fed ground corn, ground milo head and from check group, were treated, i.e., sprayed with five percent solution of wettable DDT, rotenone aqueous solution, and no-treatment group, without spraying.

The results were as follows:

Table 2

| | Gain per steer Kgs. |
|-----------------------------|------------------------|
| Pasture plus corn | 51.7 <u>1</u> |
| Pasture plus milo | 54.5 <u>1</u> |
| Pasture only | 35.7 <u>1</u> |
| Control treatment: | |
| No treatment - fed corn | 47 |
| No treatment - fed milo | 43 |
| No treatment - pasture only | 22 |
| Rotenone spray fed corn | 67 |
| Rotenone spray fed milo | 63 |
| Rotenone spray pasture only | 40 |
| DDT spray fed corn | 43 |
| DDT spray fed milo | 62 |
| DDT spray pasture only | 49 |

With the exception of the group sprayed with DDT and fed corn and milo, the results are consistent in showing more live-weight gains for steers when ectoparasites are controlled, for both the tick and tórsalo were affected by these treatments. The smallest gains were made by the steers on pasture only with no treatment. With the exception cited above, the liveweight gains were about equal for groups treated with rotenone or DDT.

Throughout the tórsalo control experiment, weights of steers were obtained every 28-day period. On the eleventh weight period, 308 days, the no-treatment or check group had gained 104 kgs.; the DDT group, 118 kgs.; and the rotenone group, 134 kgs., from the start of the experiment.

1 Taken from Table 1.

Although the check group were very lightly infested with ticks, the DDT and rotenone groups were free of ticks from the second weight period on. The above liveweight gains would indicate, therefore, that greatly reducing or eliminating the tórsalo entirely increases significantly the production efficiency of cattle.

Coffee Pulp Silage vs. Soilage Crop as a Roughage for Cattle II.

This feeding trial was a continuation of the 1945-46 studies under the same title.

Two groups of 5 steers each were fed the following rations:

Table 3

| | G R O U P S | |
|--------------------------|---------------|--------------------|
| | I | II |
| | Check | Coffee pulp silage |
| | <u>Pounds</u> | |
| Roughage | | |
| Para grass | 55 | 20 |
| Coffee pulp silage | -- | 40 |
| Concentrates | | |
| Cotton seed meal | 3 | 3 |
| Molasses | 4 | 4 |
| Milo head (ground) | 4 | 4 |
| Mineral mixture | | |
| 1/2 salt |) | |
| 1/4 bonemeal |) | ad lib |
| 1/4 ground oyster shell) | | ad lib |

Results

Table 4

| | | G R O U P S | |
|---|--------|-------------|--------------------|
| | | I | II |
| | | Check | Coffee pulp silage |
| Number animals | | 5 | 5 |
| Av. initial weight | pounds | 953 | 968 |
| Av. final weight | pounds | 1,023 | 1,063 |
| Av. gain per steer | pounds | 70 | 95 |
| Days on feed | | 63 | 63 |
| Daily gain per steer | pounds | 1.1 | 1.5 |
| TDN in daily ration | pounds | 15.3 | 14.2 |
| TDN consumption per 100 lbs. gain | pounds | 1,386.5 | 929.8 |
| Total coffee pulp silage consumed | pounds | -- | 20,413.0 |
| Coffee pulp silage consumed per head per day | pounds | -- | 65.0 |
| Coffee pulp silage consumed per head per day per 100 per /v.wt. | pounds | -- | 6.4 |

Because of limited quantity of silage the number of steers per group and the length of the feeding period were both smaller than desired. However, certain useful information was obtained as follows:

1. Coffee pulp silage is of low palatability.
2. Reasonable consumption can be obtained in dry-lot feeding by adding highly palatable feeds.
3. Daily consumption of coffee pulp silage originally calculated at 40 pounds was gradually increased to 65 pounds per steer or 6.4 pounds per 100 pounds liveweight.

4. The total digestible nutrients (TDN) consumed per steer per day -- 15.3 and 14.2 -- were somewhat below the Morrison standard for steers of this size.
5. Of special significance was the greater liveweight gains, 95 pounds per steer in the coffee pulp silage group, on 14.2 TDN per day, than in the check group 70 pounds, on 15.3 TDN per day.
6. This difference would indicate that the calculated TDN (6.1) in coffee pulp silage is low. The experiment indicates that the feeding value in TDN is higher than usually given.

Pasture Improvement Studies.

Many promising forage plants grow under clean cultivation in garden plots, often behave differently when grown under pasture conditions in competition with other forage plants and weeds, and when grazed by livestock.

The following table gives a summary of observation on behavior under pasture conditions in tropical rain forest region (Turrialba) of certain forage plants successfully grown in the Institute forage gardens.

Table 5

| <u>Name</u> | <u>Competition Resistance</u> | <u>Agressiveness</u> | <u>Cattle Preference</u> |
|-------------------------|-----------------------------------|----------------------|------------------------------|
| Hyparrhinia rufa | fair | slow | 4 |
| Axonopus compressus | excellent | highly | 3 |
| Paspalum notatum | fair | fair | 3 |
| Milinis minutiflora | good | good | 1 |
| Panicum maximum | fair | fair | 1 |
| Paspalum pilosum | fair | slow | 2 |
| Chloris gayana | poor | poor | 5 |
| Eriochloa polystachya | fair | fair | 1 |
| Pennisetum purpurem | fair | poor | 2 |
| Desmodium intortum | fair | poor | 5 |
| Pennisetum clandestinum | very poor | poor | - |
| Panicum antidolate | poor | poor | 1 |

Beef Cattle Improvement Program

In March of 1947 the beef cattle breeding program was inaugurated, with the purchase of 50 head of native-type cows. They were selected from a herd of 98 head brought into Costa Rica from Nicaragua and are typical cattle of that country.

On June 7 the herd was divided into two groups of 25 each and placed with the Brahman Angus bull number 1 and the Santa Gertrudis bull number 2, respectively. Additional cows are to be purchased to complete the beef cattle herd.

Publications 1946-47

1. "The Development of A Superior Family in the Modern Quarter Horse." A. O. Rhoad and R. J. Kleberg, Jr. Journal of Heredity 37 (8). August 1946.
2. "New Blood and the American Brahmans." A. O. Rhoad. Brahman Breeder Feeder. September 1946.
3. "How to Find Animals of High Genetic Worth in your Beef Breeding Herds." A. O. Rhoad. The Cattleman. October 1946.
4. "Agricultural Development Prospects in Costa Rica." Report to the Inter-American Development Commission by L. E. Peterson. "The Livestock Industry Contribution by A. O. Rhoad." A Publication of the Inter-American Development Commission. Washington D. C. 1947.
5. "Impresiones del Ganado Cubano" A. O. Rhoad. Cuba Ganadera; in press.
6. "Colombia Improves its Native Cattle The Komo Sinuano." A. O. Rhoad, La Hacienda; in press.
7. "Heat Tolerance Formulae for Cattle. Comments on the Gaalaas Modification of the Rhoad Formula." A. O. Rhoad. In press.

Besides the above, three manuscripts from technicians working in Brazil and Peru were sent to the Department for review and comments by A. O. Rhoad before publication. Also, Mr. Rhoad was asked to assist in compiling a summary of recent experimental work in the field of animal climatology for a monograph on the subject being prepared under the auspices of the Food and Agriculture Organization of the United Nations. Mr. Rhoad also wrote abstracts of original articles from various South American scientific journals for publication in Biological Abstracts.

Extension Activities

At the official invitation of the Governments of Colombia, Peru and Chile, Mr. Rhoad visited these countries in the fall of 1946 for consultation with livestock technicians on matters concerning the livestock improvement programs in these countries. One month was spent in each country in visiting and studying the livestock programs. During these visits Mr. Rhoad gave several invitation lectures at the Facultad de Agronomía in Medellín, in Bogotá and in Lima. He also gave four talks before cattle breeders' associations.

In March 1947 Mr. Rhoad was official judge of beef and dual-purpose cattle at the Exposición Nacional de Ganadería in Havana, Cuba.

Livestock Inventory - June 30, 1947

The following table shows the class and number of livestock on hand as of June 30, 1947.

| <u>Class</u> | <u>Number</u> |
|-----------------|---------------|
| <u>Cattle</u> | |
| Bulls | 4 |
| Cows | 50 |
| Calves | 16 |
| Steers | 95 |
| Oxen | 9 |
| <u>Horses</u> | |
| Geldings | 7 |
| <u>Chickens</u> | 89 |

The Animals Program for 1947-48

An extensive construction program and the acquisition of livestock and other facilities will be the major effort of the Animal Industry Department during 1947-48. Various experiments, especially the control of Dermatobia hominus (tórvalo) will be extended.

AGRICULTURAL ENGINEERING DEPARTMENT

Norton C. Ives, Head

Staff

In October 1946 a staff assistant was added to the Department primarily to make a topographic survey of the Institute land and to assist in this type of work in some of the Agricultural Engineering research projects. An assistant in farm machinery was added in June, 1947.

Erosion

Two research projects "Erosion control plots" and "Tile Drainage Studies", were designed and the construction work has advanced toward completion.

The erosion project consists of three major groups of check plots.

Group 1 - 2 plots 5 M. x 20 M.

2 plots 2 M. x 20 M., both on exactly 45% slope.

Group 2 - Same as group one except that slope is 16%.

Group 3 - 5 plots 3 M. x 20 M. on an average of 45% slope, the ground surface varying slightly from the 45%. Five cultural practices triplicated will be compared as to their effect on soil and water runoff and crop yields.

Open-topped concrete catchment tanks were designed to be built at the base of each plot with provision being made for the installation of multi-slot divisors at a latter date, if necessary.

Drainage

An ideally situated area, about 22 acres in size, has been designed for experimental use to study the feasibility of sub-surface drainage using the common type clay drain tile. A system of drain tile was designed and is being installed on 11 acres of this area. The tile laterals are spaced at 50, 100, 150 feet and vary in depth from 2.5 to 4.5 feet.

Detailed records will be kept on the effect of tile lateral depth and spacing on the ground water fluctuation and the amount of runoff and the effect of drainage on crop growth. On June 30, 1946 the installation of the tile system was about 90% completed.

Other Projects

Projects have been planned and prepared in "Farm Machinery" on the production of rice, corn, potatoes, peanuts, cane, grain, sorghum, soy beans and yuca using local experience in determining the type of machinery to be tried. The purpose of planning the machinery layout in detail for this rather large group of crops was

to help determine a basic list of farm machines that would treat adequately the important crops to be grown here.

Machinery and Mechanic Situation

Before work can begin on farm machinery, certain preliminary developments are necessary, such as land development in drainage, rock removal, tree and stump removal, establishment of grassed waterways in place of the sharp ditches, field rearrangement, shop maintenance and repair facilities, and the securing of trained experienced operators who have acquired some conception of the maintenance of tractors and machinery. This preliminary work has been under way for some time now with good progress. A repair and maintenance shop has been built, and experienced and promising mechanics and operators have been hired and trained. At the close of the year another assistant in Agricultural Engineering was employed to take charge of the operation, maintenance and repair of all mechanical and motorized equipment. The wood-working and machine shops have been improved considerably during the year.

Service Projects

There are many kinds of developmental work at the Institute that lend themselves to experimentation, although they would not be described ordinarily as research projects. The term Service

Project has been applied to this group which consists at the present of "Field stone removal", "Roads", "Drainage of Lagoon", "Grassed waterways".

Some work has been done and further developments are under way on all of these projects. Detailed plans have been developed for the drainage of the lagoon. Two grassed waterways have been installed where formerly deep drainage ditches and gullies existed. With the installation of the rock crusher a quite efficient system is now being followed in field stone removal and disposal and fields are gradually being cleared of stones, and roads are being greatly improved.

Teaching & Building Plans

Two students were enrolled in Agricultural Engineering during the year.

Preliminary plans have been drawn and an architect's perspective made up for the proposed Agricultural Engineering Laboratory.

Mr. Ives will attend the annual meeting of the American Society of Agricultural Engineers to be held at Philadelphia, during the third week of June 1947.

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL WELFARE

Julio O. Morales, Head

Work in the Department was started during the current year. A research program comprising six major projects has been drafted. One of these projects has been completed and a report summarizing the results is ready for publication in mimeographed form. Other projects were initiated and considerable work has been performed on one of them. The teaching program has received careful consideration leading to a detailed plan on each subject covered by the Department.

Welfare Study

This study covers the health, nutrition, economics and social problems of a sample of families living in the Central District of the "county" of Turrialba, an area including approximately 20,000 people. The problems of these families will be approached by the physician, nutritionist, rural sociologist, economist, and home economist in a concerted, well-synchronized program to find out the nature of these problems and the ways to solve them.

The initial phase of selecting the sample, organizing the team of researchers, drafting questionnaires, surveying the literature is nearly complete. Collection of data in the field will be started in the coming two or three months.

Rubber Intercropping Study

An analysis of the effect of intercropping rubber with corn, yuca, and other commercial crops was completed and is ready for publication in mimeographed form. This study showed that, under the conditions existing at Cairo, Costa Rica, intercropping yuca on rubber plantations was a profitable enterprise during the years 1943-46. Corn would have been profitable if somewhat better yields had been obtained and a reduction in the high labor requirements had been achieved. Intercropped rubber lots showed a better rubber tree development than those not intercropped. In addition, a reduction of about \$25 in weeding costs per hectare of rubber was secured by intercropping. Detailed cost figures on corn and yuca as well as on rubber plantation development were obtained in the course of the study.

Coffee Study

The coffee industry of this hemisphere is among its most important agricultural enterprises. The Department is devoting a considerable share of its time to the statistical study of this industry, the collection of financial and other economic data on individual coffee farms and the study of coffee processing plants. A survey of the literature available at the Institute Library has been completed. Basic data on coffee for producing and consuming countries are being compiled. A detailed economic and engineering study of Costa Rican coffee processing plants will be started in the coming months.

Sugar Cane Study

Sugar cane ranks, together with coffee, among the leading crops of the Americas. Considerable research has been performed on most scientific aspects of its cultivation and processing, but the economic aspects have been studied less intensively. Processing of the local type of sugar (panela), although of great economic significance, has received negligible scientific attention.

Panela helps to provide minerals which are not present in refined sugar. As smaller mills are required for its manufacture, this type of sugar cane processing is better adapted to areas where transportation and other factors limit the size of sugar cane plantings. The economic and engineering problems of panela manufacture will be studied in a work-simplification project to be started soon by the Department.

Several minor projects on prices of farm products, labor productivity, and other economic and rural welfare problems are also under way.

Teaching

Selected information is being gathered for use in the process of teaching the principles of economics and rural sociology to our students. It ranges from detailed maps and financial records of selected farms to statistical information on production, trade

and other economic and social aspects of specific countries. These data, together with the research projects of the Department, will furnish the basic teaching tools to convey essential principles to the students. The discussions of this material are being organized into a well-rounded instruction program.

Other Activities

A census of the Turrialba area is being carried out to serve as a basis for study of practical census-taking problems. A detailed map of the area is almost finished and cooperation has been established with various Costa Rican governmental agencies interested in the program for the national Census in 1950.

Relations have been established with various institutions as part of the program to promote more effective use of our resources by other educational and research institutions of the Americas. We also hope to use their facilities in the course of our programs.

REPORT ON TEACHING PROGRAM

1946 - 1947

Courses

Five courses were offered during the year at different times according to the availability of instructors and to the time at the disposal of students. Courses were given on an informal basis stressing individual needs and roundtable discussions. Laboratory experience in the field, or otherwise, was provided when necessary. A brief summary follows:

Rubber Improvement by M. Langford. Technical aspects of Hevea improvement with special reference to disease resistance. (9 hours class and lab.)

Plant Physiology by Ora Smith. Selected topics of particular interest, especially Photoperiodism. (6 lectures).

Plant Identification by J. L. Fennell. Intensive laboratory practice in identification of cultivated and wild plants with use of botanical keys. (28 lab. periods.)

Genetics by A. O. Rhoad. A lecture and practice course on the principles of genetics.

Plant Breeding Methods by E. H. Casseres. A lecture and laboratory course stressing procedures to follow and technical information concerning plant improvement. Corn used as an example for basic methodology. (32 class room lectures and lab periods).

Survey of Tropical Fruits by E. H. Casseres. A lecture and laboratory course stressing procedures to follow and technical information on better known major fruits. (14 lectures). Mr. Fennell led two field identification trips through the Institute orchards and plant collections.

Agricultural Engineering by N. C. Ives. A lecture and practice course in land surveying (20 class hours), land development (20 class hours), drainage (30 class hours), and soil erosion control (40 class hours).

Guidance

A Student Committee composed of the Advisor, the Director and the Acting Registrar guided each student in his study and final phases of preparation of reports.

Seminars

During the 1946-47 academic year there were 29 seminars with students and staff participating. The subject matter presented at the seminars treated many phases of plant and animal improvement. On various occasions visiting scientists conducted the seminars. The following is a list of the subjects given in the seminars and the leader on the occasion.

- July 1946 - Improvement of Cattle. A. O. Rhoad.
- July 1946 - The Tractor - Its Care and Maintenance. N. C. Ives.
- July 1946 - Rubber in Peru. R. Sibert, United States Department
of Agriculture.
- July 1946 - Corn Experiments at the Institute. M. Gutiérrez G.,
Student.
- August 1946 - Protein seed plants. J. Fennell.
- August 1946 - Plant Improvement in Chile. M. Elgueta, visiting
scientist from the Ministry of Agriculture, Chile.
- August 1946 - Viticulture and Climate. R. Lambour, student.
- August 1946 - Photography in research. J. Mitchell, United States
Department of Agriculture.
- September 1946 - Economic Geography in National Agricultural Pro-
grams. J. Tamayo, Geographical Institute of
Mexico.
- September 1946 - Soil Research in California. H. Jenny, University
of California.
- October 1946 - Sugar cane research. J. Matz. United States De-
partment of Agriculture.
- October 1946 - Plant exploration. R. Schultes, United States
Department of Agriculture.
- November 1946 - A Plan for Improving the Tropical Grape. P.
Trujillo, student.
- December 1946 - Observations on Animal Husbandry in Peru and Chile.
A. O. Rhoad.

- December 1946 - Observation on horticulture in Venezuela.
J. Fennell.
- January 1947 - Some Economic Aspects of Soil Conservation.
F. S. de Castro, student.
- January 1947 - The "tórsalo" and other parasite control problems. L. E. Swanson - University of Florida.
- January 1947 - The Climate of Costa Rica. J. León.
- May 1947 - The Development of the Institute. Director Allee.
- May 1947 - The Program of the Department of Agricultural Economics and Rural Welfare. J. O. Morales.
- May 1947 - Crop Improvement and Cooperation in Agriculture.
J. Harrar and V. Stakman - Rockefeller Foundation, U.S.A.
- May 1947 - Crosses of Wild and Domestic Peppers. P. Trujillo, student.
- June 1947 - Some cultural Aspects of the Commercial Grape.
R. Lambour, student.
- June 1947 - The Puerto Rico Agricultural Development Program.
T. Fennell, United States of America.
- June 1947 - Jungle selection of superior Hevea clones.
A. Uribe, student.
- June 1947 - Conservation of Soils. Medina Reyes, student.

- June 1947 - Ensiling Coffee Pulp, O. Echandi.
- June 1947 - Coffee research in Brazil. C. Krug, Brazil.
- June 1947 - Tropical Climate and its influence on the grape.
R. Lambour, student.
- June 1947 - Three Grape Diseases. P. Trujillo, student.

INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS
July 1, 1946 TO June 30, 1947

CASH BALANCE, JULY 1, 1946 \$ 10,401.16

RECEIPTS:

Miscellaneous:

| | | |
|--|----|-----------------|
| Loans | \$ | 44,544.43 |
| Quota Assessments Paid in Advance | | 760.50 |
| Collections of Accounts Receivable | | 10,056.32 |
| Refund of Coffee Picking Expenses and Labor | | 19,220.24 |
| Refund of Cane Expenses | | 2,250.36 |
| Refund of Travel, Payment for Automobiles and Other Expenditures | | <u>3,916.37</u> |
| | \$ | 80,748.22 |

Income:

Governmental Contributions:

| | | |
|--------------------|----|-----------------|
| Dominican Republic | \$ | 1,940.55 |
| El Salvador | | 1,862.98 |
| Honduras | | 1,154.36 |
| Nicaragua | | 1,059.81 |
| United States | | 158,960.89 |
| Venezuela | | <u>3,996.10</u> |
| | \$ | 168,974.69 |

Less: Quotas Paid in Advance

| | | |
|----------------------|----|---------------|
| Previous Fiscal Year | | |
| Dominican Republic | | 1,940.55 |
| Nicaragua | | <u>806.31</u> |
| | \$ | 2,746.86 |

| | | |
|---|------------|-------------------|
| | | \$166,227.83 |
| Sale of Cane | | 24,442.04 |
| Sale of Coffee | | 11,577.61 |
| Sale of Firewood | | 90.91 |
| Sale of Miscellaneous Land Products | | 2,291.51 |
| Pasturage Rental | | 667.89 |
| Car Rental | | 150.99 |
| Sale of Books | | 181.15 |
| Sale of Stone | | 48.13 |
| Sale of Light and Water - Panama | | 37.05 |
| Sale of Animals | | 1,999.96 |
| Sale of Meals and Laundry | | 1,838.92 |
| Sale of Gasoline and Oil | | 1,002.92 |
| Sale of Food | | 508.96 |
| Sale of Trucks | | 2,718.31 |
| Sale of Construction Supplies and Equipment | | 2,079.52 |
| Sale of Houses - Panama | | 875.00 |
| Sale of Sundry Materials and Equipment | | 967.34 |
| Gain on Exchange | | 2,290.20 |
| Miscellaneous | | <u>22.98</u> |
| | 220,019.22 | <u>300,767.44</u> |

\$311,168.60

Continued -

| | |
|---|--------------------|
| <u>DISBURSEMENTS</u> (See Schedule A-1) | <u>306,949.66</u> |
| CASH BALANCE, JUNE 30, 1947 | <u>\$ 4,218.94</u> |

REPRESENTED BY:

| | | |
|---|---------------|--------------------|
| Riggs National Bank, Washington, D. C. | \$ 346.83 | |
| Banco Nacional de Costa Rica, San Jose, Costa Rica (21,569.60 Colones) | 3,844.85 | |
| Petty Cash Fund - Costa Rica | 49.79 | |
| Estate Manager, Panama Rubber Sub-Station | <u>671.13</u> | <u>\$ 4,218.94</u> |

SCHEDULE OF CASH DISBURSEMENTS
JULY 1, 1946 TO JUNE 30, 1947

| | Riggs National Bank Washington, DC | Business Manager Costa Rica | Estate Manager Panama Rubber Sub-Station | The Collector of the Panama Canal | Total |
|---|--|-----------------------------------|---|---|--------------|
| Department of Animal Industry: | | | | | |
| Labor | \$ | \$ 8,550.96 | \$ | \$ | \$ 8,550.96 |
| Supplies and Services | | 866.20 | | | 866.20 |
| Purchases of Animals | 2,000.00 | 3,752.46 | | | 5,752.46 |
| Department of Plant Industry: | | | | | |
| Labor | | 11,609.65 | | | 11,609.65 |
| Supplies and Services | 270.60 | 538.65 | | | 809.25 |
| Department of Agricultural Engineering: | | | | | |
| Labor | | 2,001.23 | | | 2,001.23 |
| Supplies and Services | 68.79 | 630.48 | | | 699.27 |
| Department of Economics and Rural Welfare: | | | | | |
| Supplies and Services | | 7.21 | | | 7.21 |
| Operation and Maintenance of Physical Plant: | | | | | |
| Roads and Landscaping | | 4,555.17 | | | 4,555.17 |
| Light Plant Maintenance and Fuel | | 4,778.49 | | | 4,778.49 |
| Machine Shop | 789.84 | 3,262.29 | | | 4,052.13 |
| Repair of Buildings and Fences | 178.07 | 3,952.39 | | | 4,130.46 |
| Repair of Equipment | 1,419.34 | 2,919.69 | | 139.66 | 4,478.69 |
| Gas and Oil | | 5,537.61 | | | 5,537.61 |
| Storeroom | | 1,033.72 | | | 1,033.72 |
| Labor | | 1,552.05 | | | 1,552.05 |
| Farm Operations: | | | | | |
| Coffee - Labor | | 810.84 | | | 810.84 |
| Coffee - Supplies and Service | 12.75 | 19,698.82 | | | 19,711.57 |
| Cane - Labor | | 6,402.64 | | | 6,402.64 |
| Cane - Supplies and Service | | 4,171.22 | | | 4,171.22 |
| Other Food Products - Labor | | 863.26 | | | 863.26 |
| Other Food Products - Supplies and Services | 20.66 | 33.60 | | | 54.26 |
| Labor | | 3,248.61 | | | 3,248.61 |
| Dormitory Operations: | | | | | |
| Feeding students - Labor | | 1,270.84 | | | 1,270.84 |
| Cost of Food | | 8,348.52 | | | 8,348.52 |
| Other Expenses | 635.75 | 570.84 | | | 1,206.59 |
| Total Forward | \$5,395.80 | \$100,967.44 | | \$139.66 | \$106,502.90 |

INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
SCHEDULE OF CASH DISBURSEMENTS
JULY 1, 1946 TO JUNE 30, 1947

| | Riggs National Bank Washington, D.C. | Business Manager Costa Rica | Estate Manager Panama Rubber Sub-Station | The Collector of the Panama Canal | Total |
|---|---|-----------------------------------|---|---|--------------|
| Total Forwarded | \$5,395.80 | \$100,967.44 | | \$139.66 | \$106,502.90 |
| Laundry - Labor | | 350.01 | | | 350.01 |
| Laundry - Supplies and Services | | 28.77 | | | 28.77 |
| Housekeeping Expense - Labor | | 947.85 | | | 947.85 |
| Housekeeping Expense - | | 335.99 | | | 335.99 |
| Library: | | | | | |
| Staff | 2,331.27 | 38.50 | | | 2,369.77 |
| Supplies and Services | 249.62 | 218.35 | | | 467.97 |
| Books, Periodicals, Etc. | 1,541.67 | 136.74 | | | 1,678.41 |
| Office Expenses: | | | | | |
| Salaries | | 5,466.44 | | | 5,466.44 |
| Supplies and Services | 191.94 | 1,587.27 | | | 1,779.21 |
| Books and Publications | -- | -- | | | -- |
| Legal Services | | 1,950.00 | | | 1,950.00 |
| Insurance | 585.00 | 342.51 | | | 927.51 |
| Communications | | 917.12 | | | 917.12 |
| Medical and Social Security Expenses | | 1,828.02 | | | 1,828.02 |
| Miscellaneous Expense: | | | | | |
| Labor Separation | | 3,829.42 | | | 3,829.42 |
| Travel | 8,065.32 | 5,784.20 | | | 13,849.52 |
| Other | 1,756.60 | 1,305.70 | | | 3,062.30 |
| Equipment Purchased | 16,390.89 | 3,623.93 | 1,205.26 | 407.83 | 21,627.91 |
| Panama Rubber Sub-Station Expenses: | | | | | |
| Compensation of Manager, Includ- ing Retirement Contribution | 288.00 | | 1,710.00 | | 1,998.00 |
| Labor Expense | | | 4,525.45 | | 4,525.45 |
| Travel | | | 375.91 | | 375.91 |
| Supplies and Equipment | | | 913.38 | | 913.38 |
| Miscellaneous Office and Plant Maintenance Expense | | | 740.40 | | 740.40 |
| Total Forward | \$36,796.11 | \$129,658.26 | \$9,470.40 | \$547.49 | \$176,472.26 |

INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
SCHEDULE OF CASH DISBURSEMENTS
JULY 1, 1946 TO JUNE 30, 1947

| | Riggs National Bank Washington, D.C. | Business Manager Costa Rica | Estate Manager Panama Rubber Sub-Station | The Collector of the Panama Canal | Total |
|--|---|-----------------------------------|---|---|---------------------|
| Total Forwarded | \$36,796.11 | \$129,658.26 | \$9,470.40 | \$547.49 | \$176,472.26 |
| Executive Headquarters Expense: | | | | | |
| Administrative Salaries, including Faculty in Costa Rica | 59,587.44 | 555.91 | | | 60,143.35 |
| Travel | 2,126.10 | | | | 2,126.10 |
| Printing and Trans- lation | 520.24 | | | | 520.24 |
| Miscellaneous Office Expense | 2,891.86 | | | | 2,891.86 |
| Construction Costs | 1,214.64 | 11,755.31 | | 1,513.75 | 14,483.70 |
| Scholarship Payments | 37.50 | 37.50 | | | 75.00 |
| Payments on Accounts Payable | 9,222.53 | 1.96 | | | 9,224.49 |
| Miscellaneous Charges to Accounts Receiv- able | 11,238.82 | 773.84 | | | 12,012.66 |
| Payments on Loans | 29,000.00 | | | | 29,000.00 |
| TOTAL | \$152,635.24 | \$142,782.78 | \$9,470.40 | \$2,061.24 | \$306,949.66 |

STATEMENT OF INCOME AND EXPENSE
JULY 1, 1946 TO JUNE 30, 1947

INCOME:

| | |
|--|--------------|
| Quota assessments | \$168,974.69 |
| Sale of Coffee | 11,577.61 |
| Sale of Cane | 24,442.04 |
| Sale of Firewood | 90.91 |
| Sale of Miscellaneous Land Products | 2,298.20 |
| Pasturage Rental | 667.89 |
| Car Rental | 150.99 |
| Sale of Books | 181.45 |
| Sale of Stone | 48.13 |
| Sale of Light and Water - Panama | 37.05 |
| Sale of Animals | 1,999.96 |
| Sale of Meals and Laundry | 1,961.18 |
| Sale of Gasoline and Oil | 1,002.92 |
| Sale of Food | 508.96 |
| Sale of Trucks | 2,718.31 |
| Sale of Construction Supplies | 2,079.52 |
| Sale of Houses - Panama | 875.00 |
| Sale of Sundry Materials and Equipment | 967.34 |
| Gain on Exchange | 2,590.20 |
| Hi-Bred Corn Scholarship | 412.50 |
| Miscellaneous | 22.98 |

Total Income

\$223,607.83

EXPENSES:

| | |
|--|--------------|
| Costa Rica (Schedule B-1) | \$168,370.39 |
| Panama Rubber Sub-Station (Schedule B-2) | 8,445.14 |
| Washington (Schedule B-3) | 65,472.49 |

Total Expenses

242,288.02

EXCESS OF EXPENSES OVER INCOME

\$ 18,680.19

SCHEDULE OF COSTA RICA EXPENSES
JULY 1, 1946 TO JUNE 30, 1947

| | | |
|--|-----------------|-------------|
| Department of Animal Industry: | | |
| Labor | \$ 8,550.96 | |
| Supplies and Services | 917.68 | |
| Purchase of Animals | <u>5,846.62</u> | \$15,315.26 |
| Department of Plant Industry: | | |
| Labor | \$11,609.65 | |
| Supplies and Services | <u>781.50</u> | 12,391.15 |
| Department of Agricultural Engineering: | | |
| Labor | \$ 2,001.23 | |
| Supplies and Services | <u>1,314.49</u> | 3,315.72 |
| Operation and Maintenance of Physical Plant: | | |
| Roads and Landscaping | \$ 4,339.35 | |
| Light Plant Maintenance and Fuel | 4,790.66 | |
| Machine Shop | 4,360.17 | |
| Repair of Buildings and Fences | 4,075.47 | |
| Repair of Equipment | 4,357.96 | |
| Gas and Oil | 5,872.57 | |
| Storeroom | 1,033.72 | |
| Labor | <u>1,552.05</u> | 30,381.95 |
| Department of Economics and Rural Welfare: | | |
| Supplies and Services | | 7.21 |
| Farm Operations: | | |
| Coffee - Labor | \$ 989.19 | |
| Coffee - Supplies and Services | 536.26 | |
| Cane - Labor | 6,406.21 | |
| Cane - Supplies and Services | 2,342.42 | |
| Other Food Products - Labor | 863.26 | |
| Other Food Products - Supplies and Services | 54.26 | |
| Labor | <u>3,248.61</u> | 14,440.21 |
| Dormitory Operations: | | |
| Feeding Students - Labor | \$ 1,270.84 | |
| Cost of Food | 7,999.90 | |
| Other Expenses | 1,263.24 | |
| Laundry - Labor | 350.01 | |
| Laundry - Supplies and Services | 23.10 | |
| Housekeeping Expenses - Labor | 947.35 | |
| Housekeeping - Supplies and Services | <u>334.22</u> | 12,194.16 |
| Library: | | |
| Staff | \$ 2,370.09 | |
| Supplies and Services | 428.80 | |
| Books and Periodicals | <u>1,777.53</u> | 4,576.42 |
| Total Forward | | \$92,622.08 |

SCHEDULE OF COSTA RICA EXPENSES
JULY 1, 1946 TO JUNE 30, 1947

| | | |
|--------------------------------------|-----------------|---------------------|
| Total Forwarded | | \$ 92,622.08 |
| Office Expense: | | |
| Salaries | \$ 5,466.44 | |
| Supplies and Services | 1,750.13 | |
| Legal Services | 1,800.00 | |
| Insurance | 719.14 | |
| Communications | <u>871.30</u> | 10,607.01 |
| Medical and Social Security Expenses | | 1,327.12 |
| Miscellaneous: | | |
| Labor Separation | \$ 3,829.42 | |
| Travel | 12,784.99 | |
| Other | <u>2,373.64</u> | 18,988.05 |
| Equipment Purchased | | 27,758.85 |
| Construction | | <u>17,067.28</u> |
| TOTAL COSTA RICA EXPENSES | | <u>\$168,370.39</u> |

SCHEDULE OF PANAMA RUBBER SUB-STATION EXPENSES
JULY 1, 1946 TO JUNE 30, 1947

Panama Rubber Sub-Station Expenses:

| | |
|--|---------------|
| Compensation of Manager, Including Retirement Contribution | \$ 1,890.00 |
| Labor | 4,525.45 |
| Travel | 375.91 |
| Supplies and Equipment | 913.38 |
| Miscellaneous Office and Plant Maintenance Expense | <u>740.40</u> |

TOTAL PANAMA RUBBER SUB-STATION EXPENSES

\$ 8,445.14

SCHEDULE OF WASHINGTON EXPENSES
JULY 1, 1946 TO JUNE 30, 1947

Washington Expenses:

Administrative Salaries Including
Faculty in Costa Rica

\$ 60,251.35

Travel

1,809.40

Printing and Translations

520.24

Miscellaneous Office Expense

2,891.50

TOTAL WASHINGTON EXPENSES

\$ 65,472.49

STATEMENT OF GENERAL RESERVE (WORKING FUND)
JULY 1, 1946 TO JUNE 30, 1947

| | |
|---|------------------|
| BALANCE, JULY 1, 1946 | \$ 18,575.96 |
| Add: | |
| Excess of Expenses Over Income (Exhibit B) | <u>18,680.19</u> |
| DEFICIT, GENERAL RESERVE (WORKING FUND) JUNE 30, 1947 | \$ 37,256.15 |

QUOTAS OF THE AMERICAN REPUBLICS FOR THE SUPPORT OF
THE INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
FOR THE FISCAL YEAR ENDING
JUNE 30, 1948 /1

| | <u>Population</u> | <u>Quotas at</u> <u>\$1.00</u> <u>per Thousand</u> |
|---------------------|--------------------|--|
| Argentina | 14,130,871 | \$ 14,130.87 |
| Bolivia | 3,533,900 | 3,533.90 |
| Brazil | 41,565,083 | 41,565.08 |
| Chile | 5,389,554 | 5,389.55 |
| 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 | 3,241,311 | 3,241.31 |
| #El Salvador | 1,934,925 | 1,934.93 |
| #Guatemala | 3,546,624 | 3,546.62 |
| Haiti | 2,719,474 | 2,719.47 |
| #Honduras | 1,201,310 | 1,201.31 |
| #Mexico | 22,178,423 | 22,178.42 |
| #Nicaragua | 1,070,475 | 1,070.48 |
| #Panama | 631,637 | 631.64 |
| Paraguay | 1,071,689 | 1,071.69 |
| Peru | 7,395,687 | 7,395.69 |
| #United States | 159,772,539 | 159,772.54 |
| Uruguay | 2,202,936 | 2,202.94 |
| #Venezuela | 3,996,095 | 3,996.10 |
| | <u>291,728,627</u> | <u>\$ 291,728.63</u> |

/1 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.

- These countries have deposited ratifications, and their quotas for the fiscal year, 1947-1948, amount to \$196,997.74, and in addition it is estimated that contributions will be received from countries that have not ratified the convention at the beginning of the fiscal year.

REPORT OF THE SPECIAL COMMITTEE OF THE BOARD OF DIRECTORS
OF THE INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES
ENTRUSTED TO STUDY AND TRANSMIT TO THE BOARD THE BUDGET
OF THE INSTITUTE FOR THE FISCAL YEAR 1947-48

The Convention of the Inter-American Institute of Agricultural Sciences provides that the Board of Directors of the Institute approve annually the budget for the expenses of the institution. The Chairman of the Board at the meeting of November 21, 1945 appointed a Special Committee to study the annual budget of the Institute prepared by the Director with the understanding that once this budget was examined, it would be transmitted to the Board with the Committee's recommendations. The undersigned members of the Committee met at the Pan American Union on the eleventh of June, 1947 and have the honor to submit the following report to the Board.

At the present time, the following countries have deposited instruments of ratification at the Pan American Union and their annual quotas for the support of the Institute are as follows:

| | | |
|--------------------|----|-------------------|
| Costa Rica | \$ | 725.15 |
| Dominican Republic | | 1,940.55 |
| El Salvador | | 1,934.93 |
| Guatemala | | 3,546.62 |
| Honduras | | 1,201.31 |
| Nicaragua | | 1,070.48 |
| Mexico | | 22,178.42 |
| Panama | | 631.64 |
| Venezuela | | 3,996.10 |
| United States | | <u>159,772.54</u> |
| Total | \$ | 196,997.74 |

In addition to the above amount that the Institute should receive from quotas of the ten countries listed above, it is estimated that there will be other revenue from countries that have indicated their intention to contribute to the support of the Institute during the next fiscal year and from quotas that are past due. These additional contributions are estimated at \$22,382.54. The total revenue to the Institute from the sale of agricultural and livestock products during the year 1947-48 is estimated at \$73,205.00

The Institute will also receive the sum of \$133,000.00 for the development of a special project in cooperation with the American International Association for Economic and Social Development. A detailed schedule of the way in which these funds will be spent is given in the attached budget.

The total estimated expenditures of \$404,553.00 and the total estimated revenue of \$425,585.28 as indicated in the budget will result in an excess of revenue of \$21,032.28 which will be utilized as an operating fund and to retire previous indebtedness.

The budget containing the items of estimated revenue and proposed expenditures is attached to this report. Appended to the budget are explanatory schedules indicating the classes of expense for each of the departments of the Institute for the ensuing fiscal year.

The members of the Special Committee have examined in detail the items of the budget in relation to the plan of operation for the year and recommend that the budget be approved.

(Signed) Francisco de P. Gutiérrez
Ambassador of Costa Rica

(Signed) J. R. Rodríguez
For the Ambassador of the
Dominican Republic

(Signed) Louis J. Halle, Jr.
Representative of the
United States

June 11, 1947

BUDGET FOR THE FISCAL YEAR

July 1, 1947 - June 30, 1948

Estimated Revenue

Revenue will be obtained from contributions by the supporting governments. Included in the estimate are the quotas of the governments that have ratified the Convention governing the Institute and a modest amount for contributions of others who may provide it with funds during the fiscal year.

Income from farm operations, by its very nature, must be based on many uncertain factors. For that reason the estimated revenue exceeds the appropriation requested by \$21,032.28. Such part of this excess as may be realized will be used to cancel indebtedness incurred in previous years and to provide a small working fund.

ESTIMATED INCOME FOR THE FISCAL YEAR ENDING JUNE 30, 1948

| | Demonstration | | Total |
|---|---------------------|---------------------|---------------------|
| | Farm | General Institute | |
| Estimated receipts from Governmental Quotas | | \$219,380.28 | \$219,380.28 |
| <u>AIA Grant</u> | \$133,300.00 | | 133,000.00 |
| <u>Farm Income and Other</u> | | | |
| Coffee | 750.00 | 4,000.00 | 4,750.00 |
| Sugar Cane | 1,500.00 | 30,400.00 | 32,000.00 |
| Orchard and Garden | 500.00 | | 600.00 |
| Sale of Cattle | 75.00 | 10,000.00 | 10,075.00 |
| Sale of Milk | 10,500.00 | | 10,500.00 |
| Sale of Eggs | 270.00 | | 270.00 |
| Sale of Poultry | 400.00 | | 400.00 |
| Other Products | 1,210.00 | | 1,210.00 |
| Pasture Rental | 400.00 | | 400.00 |
| Meals | | 11,250.00 | 11,250.00 |
| Laundry | | 750.00 | 750.00 |
| Firewood | | 1,000.00 | 1,000.00 |
| Total | <u>\$148,305.00</u> | <u>\$276,780.28</u> | <u>\$425,585.28</u> |

Estimated Expenses

The 1947-48 budget is presented in three sections entitled Demonstration Farm, Vocational Unit, and General Institute. The purpose of this presentation is to clarify the relationships between investments and operations in the Demonstration Farm and Vocational Education Program, which are to be made from funds received from the American International Association of New York City, and expenditures made from general quota funds of the Institute. It should be recognized that this division is purely for clarification and accounting purposes, since the funds supplied by the American International Association are granted to the Institute and disbursed according to its general rules and regulations.

The detailed schedules supporting this budget are intended as information to support the estimates contained in the budget of expenses. It may be necessary in the development of the program during the year to transfer funds available from one category to another without changing the total appropriation made by the Board of Directors.

Attention may be drawn to the probability that the Institute will conduct several projects in cooperation with other entities. These operations may entail the administration of funds supplied from outside sources for the purpose of carrying out the projects. They will be handled in accordance with agreements in each of the cases involved.

INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES

ESTIMATED EXPENSES

FOR THE FISCAL YEAR JULY 1, 1947 - JUNE 30, 1948

| | |
|--|---------------------|
| Office of the Director | \$ 13,650.00 |
| Department of Animal Industry | 52,641.00 |
| Department of Plant Industry | 42,103.00 |
| Department of Agricultural Engineering | 23,000.00 |
| Department of Economics and Rural Welfare | 17,020.00 |
| Department of Vocational Education & Extension | 16,200.00 |
| Institute Services | 30,035.00 |
| Farm Operations | 16,763.00 |
| Dormitory Operations | 15,140.00 |
| Library | 7,950.00 |
| Office Expenses | 13,950.00 |
| Medical and Social Security Expenses | 2,400.00 |
| Miscellaneous Expenses | 3,100.00 |
| Travel | 12,000.00 |
| Purchase of Equipment | 49,403.00 |
| Construction of Buildings & Appurtenances | 69,158.00 |
| Executive Headquarters, Washington, D. C. | 17,040.00 |
| Panama Substation | 3,000.00 |
| Total Estimated Expenses | <u>\$404,553.00</u> |

060.58

I.59

TICA DE LA OEA

AUTHOR

INFORME ANUAL 1946-47

TITLE