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END OF TOUR REPORT

Woodrow W. Franklin
Entomology Advisor

September 8, 1962

General Objectives

The primary objective is to train Liberian Nationals assigned to the Entomology Division in the methods and procedures of Entomological Research to the fullest extent that their education, training and experiences will allow.

This training includes the recognizing of a problem, the review of possible methods of solution, the setting up of the best possible experiment under the local conditions, the analysis of the experiment at its conclusion, and the final write-up of the experiment.

Additional objectives include working with the other Divisions of the Experiment Station to develop a properly and efficiently operating Experiment Station.

Activities

The primary activities have been in the control of cacao and coffee insects. The first problem encountered was an outbreak of the rat-tailed caterpillar, Epicampoptera strandi (Bytk) family Drepanidae, order Lepidoptera, (determined by the United States National Museum) on coffee. The specimens sent were the first in the museum collection. A randomized block experiment was set up using six insecticides at eight rates. Endrin and DDT gave the best results with DDT at the 50% of normal (32 ounces active ingredient per acre) giving the most economical control. Where expanded to large acreage the DDT gave complete control while surrounding untreated coffee was defoliated twice. Only one application was necessary as this gave control until the

start of the dry season when the insects become inactive.

The second activity engaged in was the Entomological Phase of the General Project A in Production of Cacao and Coffee. The entire was treated with insecticides each month. Selected fertilizers were added to each plant four times a year. Fly in of the beetle, Xyleborus morstatti Hagsd, from the large acreage adjacent occurred regardless of the prophalytic treatment.

An experiment in control of soil insects was carried on from July 960 through June 1961. Results were valueless due to trampling by cattle on several occasions.

Another experiment was on the eradication of mound building termites in coffee. Six chemical-chlordane, DDT, dieldrin, endrin, methoxychlor, and toxaphene were used at 1, 2, 3, or 4 cupfuls (8 ounces) of 0, 2.5, and 10 per cent concentrations in water. All rates gave good control with the chlordane at the cheapest cost 0.6 cents per hill.

The main activity consisted with the continuation of the long term experiment on control of Insects and Diseases of Liberian Coffee. Coffee is grown with and without shade, at 8, 12, and 16 foot spacings, with chemical treatments of insecticides, fungicides, or insecticides and fungicides, and with no treatment. Three species of scale insects, two species of leaf miners, a stinging caterpillar, and three diseases, Cercospora, Hemilies, and brown spot were present in numbers during the year.

A course in General Entomology was taught in the Agriculture Department at Cuttington College. Three seniors and one junior made up the class. The three Entomology Aides also attended the class. One of the aides was the third ranking student in the class.

Some 20 to 30 hours a week in addition to a full resear h schedule during the first six months were spent in contacting the DAC Extension Aides in the Western Province. Spraying schools were held at Bolahun, Voinjama, and Kolahun. Several trips were made to set up these meetings, transport sprayers, insecticides, coffee, oil palm seed, and to give instruction in cultural practices in relation to growing, harvesting, and processing cacao and coffee. This work was mandatory as the resident memberships of both the Extension staff and Research staff were at their lowest due to transfers and home leaves. Furthermore, the up-country people had been promised assistance with agricultural problems the day the road to the north opened. These people were anxiously awaiting help and they could not be let down. Happily this situation is now corrected through the activities of the Extension Service.

Miscellaneous activities included: motion picture projectionest, radio operator and consultant, first aide orderly, acting director of research, electrician and plumber in the installation of the water system, and regulation of gas stoves.

Favorable and unfavorable factors:

As this is written it is felt that there are no longer any unsurmountable obstacles in the way of building a first class Experiment Station. However, many problems remain to be solved before [illegible] can be reached. For the first time in the 12-year history of the Station, a set of objectives is being adopted as a guide to the progressive improvement of both the physical facilities and research program. This should greatly accelerate the development of the Experiment Station and enhance its contribution to the overall Agricultural Program. To my knowledge this is the first time this has been done during my three tours of duty.

A second favorable accomplishment during the present tour is the working up of yearly budgets for the Division. While all the funds requested have not been allowed the budget was known and plans could be made accordingly. The personnel provisions of the budget were followed rather closely. The other items prescribed in the budget, i.e. equipment, materials, etc. were not supplied as effectively.

There has been a reorganization of the Department of Agriculture and Commerce (DAC) since the start of this term that has resulted in a decided improvement. The writer's return to Post in September 1959 found the DAC in an extremely low point of morale and everything was at a standstill. It was not known whether the Experiment Stations would remain at Suakoko or be moved to Booker Washington Institute (BWI) the secondary level trade school that had a high school Vocational Agriculture course. With the new set up under the new Secretary of Agriculture and Commerce and the Coordinator of Technical Programs, a new position, it has been decided that the Experiment Station should remain at Suakoko for the time being.

A decided change the first year of this tour was the decision to remove all "production" work and nurseries away from the Experiment Station. This is necessary if serious research is to be considered. Before, top priority went to the Production Division and next priority went to the Nursery Division. Research got what was left. Now all requests for field work by machinery have been handled rather quickly if the piece of equipment was functioning. However, there is talk of going back to vegetable production again.

Labor pay continues to be a problem. All attemps at a solution have failed. The writer formerly advanced the Entomology payroll for the preceeding month then was reimbursed when the paymaster came. This practice was discontinued at the request of the DAC.

The change in the approach to Entomological work was made with the change of Administration. Formerly it was decided to have the Entomologist go to the place of insect outbreak and set up his experimental work there rather than plant 20 acres in each crop the Entomologist was studying. This eliminated the cost of maintaining the area on the station. This arrangement was not satisfactory at best. It meant spending much time away from the station. It also limited what could be done to keep the injury from doing experimental work to a minimum. In addition the station was not being developed. Now the areas of coffee and other crops must be developed to provide at least 20 acres of each for experiments. Since most insects fly for greater or lesser distances 1/4 acre is just about minimum plot size. Therefore 20 acres will provide only 80 plots. Rather small for experimental work.

Another problem is the lack of a staff developed program of research. Most of the work has been dictated from Monrovia including how to do the work rather than the Monrovia office selecting the problems to be worked on and allowing the staff to develop the research program.

The biggest problem is obtaining well educated counterparts. Solution for this will be years in coming.

Unsolved problems still remaining are the lack of adequate water and power or sometimes any of either. This is especially true on the hill where the Horticultural Advisor, Agricultural Engineering Advisor, and Entomology Advisor live. Part of the difficulty was remedied by building cisterns and by the writer buying a 3½ KW power plant that all three used when needed.

Housing for the three mentioned in the preceeding paragraph is not satisfactory. Duplex houses with high windows, built originally for the Aides, are now in use. The

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floor space is 900 square feet including all storage space. From this a badly designed entrance room, scarcely usable, takes 100 square feet.

Roads on the station are in a bad state of repair. Several culverts are needed. Mostly, however, just plain road grading would help 100%. The writer and his crew maintained the road from his house to the main highway for the first half of this term.

The lack of a good and efficient garage and maintenance set-up costs much time and effort on the part of the technician and his crew. So often it takes longer to get them to do it than doing it oneself.

A major problem is obtaining of equipment, supplies and materials for use in the experimental work. The requisitioning once a year for both ICA and DAC causes a storage problem at best and at worst a feeling of envy among the Division having no ICA technician. They ask to have the materials "loaned" to them even when they know it cannot be returned. In such a case trying to husband the material for the entire year for use in the project for which it was ordered brings a charge of non-cooperation. The recent program office change in what supplies can be purchased and with the lack of notifying the scientist of its turn-down has been disasterous.

Evaluation of Results

There has been a complete change of Agricultural Aides this term. The writer was pleased that the Senior Aide was selected to start the Plant Quarantine Inspection work. After seven years at the Experiment Station working with insect problems primarily and a few plant disease problems as in the above section on activities the Aide received a month's training at the Firestone Plantation on recognition of plant diseases before starting work as the inspector at Robertsfield International Airport.

The writer recommended him for the USDA Plant Quarantine short course and he is now in the United States for approximately three months training.

The second Aide proved to be so afraid of snakes that he could not get out into the coffee, citrus, or cacao plantings. He resigned in March 1960. Another Aide took his place but resigned almost immediately. Three resignations plus the transfer of the Senior Aide left the Division without a single Aide. On recommendations of the writer a former school teacher was hired to help out until another set of Aides could be appointed. Although he had finished only 9th grade, he outranked all Aides except one on scholastic achievement tests, so he was hired as a third class Aide. This proved to be the wisest choice made in the Station during the writer's three terms. He has done so well as to advance from third class Aide to second class Aide.

Another Aide hired at the second class level stayed from May 1960 to April 1961 when he told the writer he had received a $6,000.00 bank loan to develop his farm. He made the highest grade on the scholastic achievement tests. He said he had completed his secondary education in London and had attended college 2 years. He expressed many times his desire to gain some idea of scientific Agriculture by working 2 or 3 years at the station and then return to his farm. He left sooner than anticipated with the granting of the loan.

Another Aide was hired, a 1960 graduate of BWI. He plans to work the remainder of this year then enter Cuttington College in the Agriculture Division.

Another Aide was transferred from the Soil Chemistry Division recently. This brings the Aide total to the level of three for the first time in nearly 4 years. He also is a 1960 graduate of BWI and expects to enter the next class at Cuttington College in the Agriculture Department. Both of the last two are looking for UCA scholarships.

All Aides have learned to carry on routine experiments and take data. They are also getting training in analyzing experiments. They are able now to follow direction for statistical calculations but must have constant supervision. This is probably the extent of their capabilities. They have been trained to follow instructions in mixing chemicals and to make applications to the plots. This, perhaps, is all that should be expected of them.

Laborers have become increasingly scarce during the past two years. The quality of the work had increased as they remained in the Entomology Division. There has been increasing dissatisfaction with the length of time used in preparing payrolls. This usually takes a minimum of 15 days and sometimes as long as 6 to 12 weeks. As a result two strikes have occurred. One lasted a day; the second one, two. Unfortunately the delay usually does not lie within the province of the DAC to correct. Of the laborers working, three are top notch and can do almost any type of work assigned and without much supervision. They have received training in repairing their three-gallon sprayers and back-pack mist blower power sprayers. Altog her some 150 station employees over the years have been taught the mechanics of small sprayer machines. A like number have been trained at off-station locations. Both research and extension Aides were trained first and they taught the Chiefdom and Clan Agriculturalists.

Progress in training the Aides and laborers has been quite satisfactory. The greatest loss has been at the counterpart level. At no time during the three terms has there been a trained National in the Entomologist position even at the B.S. degree level. However there is present in the budget starting September 1, 1961, $200.00 a month for an Entomologist. Also it seems there is a Liberian chap

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with a M.S. degree in Entomology working with the World Health Organization who might be interested in filling the position.

Recommendation for the future

To best overcome the remaining problems and utilize available assets the following suggestions are made:

Proceed to provide housing for GOL staff adequate for the position held. The largest housing to be provided for the Senior staff with lesser size for Junior staff, Aides, shop men, headmen, and laborers.

Develop an adequate road system with cement culverts, a crown in the middle of the road, and roadside drainage. The purchase of a simple pull type four wheel grader using a pair of large hand wheels for raising each side of the blade should be made.

Develop proper water and electrical systems. Use filtration, aeration, chlorination, and storage as needed. The electrical system should be redone using wire size in keeping with present and future needs. It is suggested that Shamag do the job while working on the power line in this vicinity.

Plant 20 acres of Inean coffee for Entomological experimentation. Using spacings of 10 x 15 feet for ease of manipulation and study.

Plant 20 acres of budded citrus perhaps of Marsh seedless grapefruit.

Finish the insectry for use in the stored grain insect project. Properly prepare for use.

Find a way to pay the laborers within two weeks after the time book closes each month.

Develop a foolproof warehouse system of storage of supplies so that materials ordered can be obtained at the time needed and without having to spend time in warehouse keeping. This may require an ICA Warehouse Advisor.

Provide adequate garage and maintenance service with machinery in good repair so that all work can be done within 3 days of time requested.

Have Farm Management Division set up and do all of the routine housekeeping jobs in the crop areas so that the research crews can spend their time doing research.

Build an Apiary building and a separate honeyhouse and set up a 20 colony honeybee project. This is a project that with a couple of years study can be taken to the village people with little cost. The village people love to eat the honey; comb, larvae and all.

Develop a separate branch station in Eastern Province or vicinity for study of cacao. Horticulture and Entomology both should have personnel there. Another branch station should be started in the Bolahun Kolahun region of the Western Province after the first one in the Eastern Province is fully functioning.

Develop a staff prepared program of research. Allow the individual scientist to develop his program of research within the policy outline set up and the funds, etc. provided.

Suggestions for improving participant training are as follows:

Concentrate undergraduate study for prospective entomologists in the Entomology Division of the College of Agriculture in the University of Liberia when established. Employ the graduates in Agriculture (or even in Biological Sciences for Fisheries, Plant Pathology, and Entomology) for a couple of years to weed out those that are looking for a paycheck only. Select the few that are serious minded toward

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research and send them to the United States for professional training until they get the M.S. degree. After a period of further good service in Liberia send them to the United States again for the Ph.D. in their chosen field. Educate to the top level to the extent of the needs of the country. This is a long term approach but probably is the only way. It should result in producing one Ph.D., one M.S., one B.S. degree Entomologist at Suakoko, one Ph.D. and one B.S. Entomologist in the Eastern Province; one M.S. degree Entomologist in the Western Province. In addition there should be one Ph.D., one M.S. and one B.S. degree Entomologist in the National Extension Service and one B.S. degree Entomologist in each of the 5 counties and 11 districts of the Provinces.