

AIRGRAM

PD-AAY-698

Tour

INTERNATIONAL COOPERATION

*Liberal
sort*

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FROM MONROVIA

PAGE 1 OF 12
DATE SENT Oct. 16, 1961
DATE REC'D. 10-20-61

SUBJECT End of Tour Report Control No. U-513 -
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END OF TOUR REPORT

Arnold L. Erickson
Horticulture Advisor

October 2, 1961

General Objectives

The overall objectives of the Department of Agriculture and Commerce described in March 1960 are as follows:

1. "To obviate the necessity for imports of agricultural commodities by increasing agricultural production to a point of satisfying our local requirements for food and other agricultural products.

2. To increase exports of agricultural products by extending production to the point of creating surpluses of agricultural products beyond our local requirements and of such quality as to demand a premium on the world market."

The Horticulture Division had been working towards the goals described above since the time when the first projects were planted in the fields in 1953.

When the Department of Agriculture and Commerce was reorganized in March 1960, the Horticulture Division was asked to comply with the following specific objectives:

- a. "Engage in rubber research to include such studies as interplanting with short-term tree crops and vegetables.
- b. Establish high yielding clonal nurseries for budwood production....
- c. Conduct studies on production of Brazil nuts, oil palms, castor beans, and others of exportable value.

- 3
- d. Conduct studies on improving marketable quality of export crops especially coffee and cacao.
 - e. Introduce and test high yielding commercial varieties of sugar cane and pineapples.
 - f. Conduct herbicidal studies for weed control in tree crop plantings.

These six objectives have been incorporated into the program since March 1960. Actually they are fairly well in accord with the more general objectives set forth earlier. The Division has been limited in its operation by a small budget. But in its overall program, it has been working towards the above goals.

So many of the projects of the Division are of a long term nature, that it was decided to supplement this with some short term experiments in the nursery to obtain results of more immediate utility and broaden the training experience of the Liberian personnel. Accordingly, several short term investigations were initiated and the results are included in the report to GOL.

Activities

The Horticulture Division's activities can be divided into four major categories -

1. Consolidation and revision of old projects
2. Initiation of new projects
3. Building program and nursery development
4. Assumption of full responsibility for the work of the Division by the Liberian project leader.

1. From the time of arrival of the Horticulture Advisor in April 1957 to the end of 1957 the Division was occupied with the revision and consolidation of old projects initiated by the Advisor's predecessors. This involved setting up McBee punch card files for the recording of all the individual tree records of coffee and cacao in the various projects. Plant replacements were made and the permanent shade in some projects revised.

2. The Division entered the second stage, the initiation of new projects, in 1958. Two small cacao plantings, two small coffee plantings and a coffee-rubber interplanting were established.

3. A building program was initiated in 1960 and carried through into 1961. The following items were built in the nursery area, using the unskilled laborers of the Division supervised by Mr. Snyder, ICA Agriculture Engineering Advisor:

1. A second propagating unit 14.5 x 20 feet
2. A drying patio of cement 26 x 25 feet
3. A processing building 30.5 x 20 feet
4. A hardening house 16 x 21 feet

The two propagating units are made of cement blocks and are covered with polyethylene sheeting. Sand is used as the rooting medium. The units are under a roof of aluminum sheets. All light is indirect and no direct sun light is allowed to penetrate the bins.

The processing building contains a workbench, a tool room and houses a German-made coffee huller and two American-made coffee pulpers. All the

machines are hand operated. Some wooden trays were made for fermenting cacao according to the Rohan method recently developed in Ghana.

The climatic house contains a plastic roof which permits about 60% of available light to pass through it for storing plants in baskets. It was built as a hardening house for cuttings rooted in the propagating bins.

4. The final phase of operation involved the complete assumption of responsibility and leadership of the operation of the Horticulture Division by the Liberian project leader, Mr. Clarence Harmon. The project leader is capable as division head and holds a B.S. degree from Tuskegee. Lack of housing on the Station and lack of transportation keeps him from performing his job efficiently. It is hoped that in the future these problems will be resolved. A final report has been prepared for the Department of Agriculture and Commerce (GOL). It states the purpose, development, results, and recommendations for each project and experiment initiated by the Division.

The Division was also actively engaged at all times in general project maintenance consisting of pruning, ringweeding, grass and weed control, fertilizing, pest control, etc. During November through April or May of each year the laborers are used primarily to harvest coffee. Some women are employed also to pick coffee and to work in the nursery area.

From time to time during the project's development, the Horticulture Division has had occasion to distribute planting material. Small quantities of cacao pods, banana suckers, and seedlings of Liberica coffee, cinnamon

(Cinnamomum zeylanicum), Pitanga Cherries (Eugenia uniflora), Mangosteen (Garcinia mangostana), and Guava (Psidium guajava) have been distributed by the Horticulture Division to farmers. Fifteen hundred pounds of canephora (robusta) coffee cherries, and four thousand rubber seedlings of the hybrid cross Tjirlx 16 were delivered to the Extension Service.

The Horticulture Advisor prepared in simple English, bulletins on cacao culture and processing. A "Simple guide to coffee cultivation and processing in Liberia" has also been prepared for the Extension Agents.

Favorable and Unfavorable Factors

It is a fact that more unfavorable factors than favorable factors have influenced the project's development.

Poor Soils. The lateritic soils of the Suakoko area are porous, have no water holding capacity, and are of low fertility. It has been necessary to use about a pound of complete fertilizer per tree per year to sustain the trees in the various projects.

Drought. The long dry seasons cause the field plantings to wilt severely. An irrigation system has been used to carry the projects through the long dry period.

Field laborers. Due to the lack of a dependable labor supply it is believed that mechanization should be utilized for project maintenance. The labor supply fluctuates between a low peak during the rice-farm season, February through May, and a high peak during the rainy months of August and September. Competition with construction companies for

laborers is also keen throughout the year, the former usually paying high wages with regularity in payment. The employment of women has helped to relieve the labor shortage.

Favorable Factors

The Department of Agriculture and Commerce has shown some interest in the work of the Horticulture Division, especially on the part of the Technical Coordinator, Mr. J.T. Phillips, Jr. They have given as much support to the Division as they can with their limited facilities.

The attitude of the farmers and country people is very favorable. They know that the program is underway for their benefit and they look forward to being helped.

Evaluation of Results

With the development of the nursery area and the construction of the greenhouse, processing building and propagating units, the Division has become more efficiently organized. It has a central location from which it can operate and muster its field laborers. It gives a feeling of permanency to the aides and laborers. This did not exist prior to 1960.

Coffee

Most of the field work of the Division has centered on coffee. The Division's coffee production compares favorably with that of the more progressive and larger plantations. The Liberia Company at Flumpa, a large American owned coffee, rubber and cacao plantation, operated by experienced German planters from the Cameroons, considers two pounds of dry coffee or ten pounds of wet cherries per tree to be good production (canephora coffee).

An acre planting of Coffea canephora sel INEAC of the Horticulture Division averaged 10.6 pounds of fresh cherries per tree per year for a two year period. Fourteen trees in this same planting produced more than 49.2 pounds of fresh cherries (the statistical mean plus two standard errors) for the same two-year period. //These trees will serve a useful purpose if propagated vegetatively as the nucleus of a clonal garden.

Average production of fresh cherries per tree per year for sixty varieties of coffee in the Variety Collection was determined. A local Selection of Liberica called "Remie long bean" from the Kakata area gave the highest average of 6.8 pounds per tree per year of fresh cherries. On the whole the local Liberica selections produced more coffee per tree than the introduced Liberica and canephora varieties. This shows the greater adaptability of indigenous varieties to the long dry season and poorer soils than the imported varieties in the collections.

In two experiments, coffee grown without shade produced twice the yield of trees grown under partial shade. This is in agreement with statistics from other countries where sun grown coffee is producing more crop than shade grown coffee. Shade is being eliminated from all coffee projects.

Results with propagation of high producing coffee trees by a sexual means have been encouraging. The Division has only the crudest of propagators and can obtain about 50% rooting in five months. The propagators are watered by hand and are subjected to desiccating winds in the dry season which penetrate under the periphery of the plastic covers.

The Turrialba planting plan for interplanting rubber with coffee was replicated on an acre planting at the Suakoko station. The study has been underway three years and is doing well. It has stimulated quite a bit of interest among Liberian farmers. The ideas of crop diversification on one piece of land and efficient land use are new to them.

Cacao

Results with cacao have been disappointing. The soil and climate conditions of the Suakoko area are not suitable for cacao culture. One three year old planting of seedlings from Ghana strains and Costa Rican strains is doing well so far. However, planting died out in the last dry season. The plantings cannot survive the dry season without irrigation. A small planting of cacao in high forest on a lateritic soil has not been successful.

Citrus

A small budded orchard containing twenty varieties of lemon, lime, orange, grapefruit and tangerine was established at Suakoko. This project will serve a great need both as a demonstration area and as a source of budwood in an area where budded citrus is almost nonexistent. GOL has since requested and acquired a citrus advisor from FAO, Mr. Jean Philippe. The citrus area has been turned over to him.

Plant Introduction

About twenty species of various crops of potential economic value have been introduced to the station. Among these are five varieties of sugar cane which are doing well in the nursery area. Sugar cane is exploited in Liberia only as a source of cheap liquor. However, in the future a sugar industry may be developed. Cashew (Anacardium occidentale) and

Cinnamon (Cinnamomum Zeylanicum) both grow well under the conditions of the Suakoko area. Their success as cash crops depends on developing an easy method of processing.

The assistants have been trained in vegetative propagation of coffee, the use of McBee punch cards in the recording and summarizing of data, various methods of pruning coffee and cacao, the use of herbicides, and the processing of coffee and cacao on a limited scale. They have a good general knowledge of coffee and cacao, having grown up in areas where these crops are widely cultivated. Some work was done with the students enrolled in the Tree Crop classes of nearby Cuttington College by giving them some practical experience in the field. Two Cuttington seniors spent their last summer vacation working with the Division in "on-the-job" training. One of them has gone to the U.S. for advanced training in soils work.

Recommendations for the Future

1. The nursery area of the Horticulture Division should be expanded and the present facilities improved.
 - a. The entire nursery area must be fenced to protect it from trespass by stocks and humans. Two main gates should be provided.
 - b. Electricity should be supplied to the processing building to run the Haack coffee huller and other equipment the Division hopes to acquire.
 - c. A source of clean water is necessary for a permanent irrigation system in the nursery and for an internal spray system with Tee-jet nozzles for the propagating bins.

- d. Storage facilities for woven baskets and prepared soil should be provided.
- e. A watchman's house is needed.
- f. Construct a large patio area for plant storage with artificial overhead shade.
- g. Extend the present greenhouse, propagating units and drying patio.
2. A large mobile tank with sprayer is required to control pests in the fruit tree area, coffee plantings and cacao plantings.
3. A botanic garden should be established in line with growing national interest.
4. The processing of coffee and cacao should be stressed.
5. The selection and asexual propagation of coffee, high in production, and resistant to Leaf Rust (Hemileid) should continue. This should be closely coordinated with the plant pathology advisor.
6. The use of herbicides should be increased as a means of saving labor.
7. A rubber budwood garden should be established as quickly as possible, since rubber is a major crop in Liberia. Establishment of a clonal garden at the Station would give independence to a station rubber program and less dependence on the Firestone Plantations Company for planting material.
8. More detailed studies should be conducted on other tree crops, especially oil palms. More introductions should be made from the Carribbean area and other African countries of fruit trees and nut trees.
9. There should be less emphasis on coffee and more emphasis on citrus, oil palms, and other crops. This should be closely coordinated with the work initiated by Mr. Jean Philippe, FAO Citrus Expert.

10. ~~Good logistic support~~ is essential. The various projects should be fertilized at regular intervals for uninterrupted vigorous plant growth. The timing of fertilizer applications is affected by weather conditions. In times past fertilizers and chemicals for pest control have been very irregular in supply. As a result, a good, carefully planned cultural program is difficult to organize and carry out.

11. If all the above conditions can be fulfilled, the project should be ready for phasing out in 1965.

12. The Division at present has nobody that can be recommended for advanced training. The Project Leader has a B.S. degree from Tuskegee. There is no justification yet for recommending him for advance study. The two aides are not of college caliber.