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About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

C. S. ...

Local Common Name	Fors' Common Name	Scientific Name
Abey	Abey Macho	Jacaranda Sagreana DC.
Ácana		Labourdonnaisia albescens Benth.
Algarrobo	Algarrobo	Samanea Saman (Jacq.) Merr.
Almendro		Dipholis salicifolia ?
Arabo	Arabo	Erythroxyton obovatum Macf.
Baria	Baria o Varia	Cordia gerascanthoides HBK.
Caoba	Caoba	Swietenia Mahagoni (L.) Jacq.
Cedro	Cedro	Cedrela mexicana M. Roem.
Cerillo		Exostema caribaeum (Jacq.) R. & S.
Cuaba	Cuaba	Amyris balsamifera L.
Gvajani <i>Curbaina ?</i>	Gvajani	Prunus occidentalis Sw.
Dágame	Dágame	Calycophyllum candidissimum DC.
Gallina	Ramon de Costa	Celtis trinervis Lam.
Guayacan Goyacan misspelled	Guayacan	Guaiacum officinale L.
Granadillo	Granadillo XXXXXXXXXX	Brya ebenus DC.
Guamá Real	Guamá	Lonchocarpus domingensis (Pers.) DC.

Guayacancillo	Guayacancillo	<i>Behaimia cubensis</i> Griseb.
Hayajabito misapilixxi or Jayabico Jayajabico		<i>Colubrina reclinata</i> (L'Her.) Brongn.
Hueso	Hueso	<i>Drypetes alba</i> Poit. or xDrypta <i>Drypetes</i> lateriflora (Sw.) (Sw.) K. & U.
Jiqui	Jiqui	<i>Pera bumelifolia</i> Griseb.
Jocuma	Jocuma	<i>Sideroxylon foetidissimum</i> Jacq.
Júcaro	Júcaro negro	<i>Bucida Buceras</i> L.
Macagua	Macagua	<i>Pseudolmedia spuria</i> L.
Majagua	Majagua	<i>Hibiscus tiliaceus</i> L. <i>Pithecolobium arboreum</i>
Moruro Moruro	Moruro Abey	<i>Peltophorum adnatum</i> Gris.
Nogal	Nogal	<i>Juglans insularis</i> Gris.
Ocuje	Ocuje	<i>Calophyllum calaba</i> Jacq.
Palo Rosa		<i>Cordia Gerascanthus</i> L.
Pito		
Quiebrahacha	Quiebra-hacha	<i>Copaifera hymenaeifolia</i> Moric.
Roble	Roble	<i>Tecoma pentaphylla</i> Juss. ?
Roble Guayo	Roble Guayo	<i>Petitia domingensis</i> Jacq. ?
Sabicu	Sabicu	<i>Lysiloma sabicu</i> Benth.

Sabina ?

Sangre de doncella

Yaba

Yaiti

Yana

Yaba

Yaiti

Yana

Byrsonima crassifolia HBK.

Andira inermis HBK.

Gymnanthes lucida Sw.

Conocappus erecta L.

ESTUDIO SOBRE EL CREDITO AGRICOLA EN CUBA

Dr. Laguardia, Dr. Minnemann, Dr. Shaddick, Senador Compte, Dr. Oscar Garcia Montes, y Ing. Amadeo Lopez Castro. Presidida por el señor Ministro de Agricultura.

DIVERSIFICACION DE LA AGRICULTURA CUBANA MEDIANTE EL DESARROLLO DE NUEVOS CULTIVOS INCLUYENDO EL ACRECIMIENTO DEL CULTIVO DEL PLATANO DE LA PAPA Y DE OTROS CULTIVOS YA ESTABLECIDOS EN ESCALA REDUCIDA.

Dr. Popenoe, Dr. Santos, y Dr. Acuña.

ARROZ

En cuanto a suelos y cultivo:

Ing. Blaney, Dr. Popenoe, y los Dres. Santos, Garcia Montes, y Agete.

En cuanto a la parte economica:

Senador Compte, Dr. Minnemann, Dr. Laguardia, Dr. Santos y Ing. Amadeo Lopez Castro. Presidida esta comision por el señor Ministro de Agricultura.

En cuanto a regadío:

Ing. Blaney, Dr. Popenoe, Dr. José Garcia Montes (quien ha hecho los estudios), Senador Compte, y en los demas elementos, Técnicos que han trabajado en la confección de los proyectos de regadío.

REFORESTACION Y PROPAGACION DE NUEVOS ARBOLES FORESTALES

Dr. Popenoe, Ing. Alberto Fors, y Dr. Isaac Corral.

INSTITUTO DE INVESTIGACIONES INDUSTRIALES

Dr. Aisenstein, Dr. Garcia Montes, Dr. Santos, Dr. Compte, Dr. Popenoe, Dr. Laguardia, y un miembro de la Sociedad de Tecnólogos Azucareros Cubanos.

Estudio sobre la utilizacion industrial de subproductos de la industria azucarera y de productos agricolas.

COLONIZACION RURAL

Dr. Shaddick, Dr. Laguardia, Senador Compte, Ing. Amadeo Lopez Castro. Presidida esta comision por el señor Ministro de Agricultura.

Estudio de un plan de ensayo con la mayor amplitud que pueda dársele de este tipo de mejora social.

GANADERIA

Senador Compte, Dr. Crespo, Dr. Justo Lamar Roura, Dr. Laguardia,
Dr. Shaddick, Dr. Minnemann, Ing. Agete, Dr. Rodríguez Cáceres.

Estudio de esta fuente de producción con el propósito de erradicar
la garrapata y mejorar la producción mediante el desarrollo
de plantas forrajeras y alimentos derivados de productos agrícolas.

ALMACENES DE REFRIGERACION

Dr. Aisenstein, Dr. Garcia Montes, Senador Compte y
Dr. Shaddick.

RICE PRODUCTION IN CUBA

Rice is the most important item in the Cuban diet, ~~and the~~^{the} quantity consumed is greater than that of flour and corn meal combined. Per capita consumption ~~of rice~~ amounts to between 110 and 120 pounds per year, as compared with only 6 to 7 pounds per capita in the United States. Yet only 8 to 10 per cent of Cuba's rice requirements are grown in Cuba; more than nine-tenths of the requirements, or about 410 to 440 million pounds, are imported, representing an annual expenditure of foreign exchange amounting to 9 to 10 million dollars.

Rice imports were formerly obtained almost entirely from the Far East, especially Siam and India, which in turn import practically nothing from Cuba. More recently, a preferential duty was granted to rice from the United States, and imports from that source increased to nearly 60% of the total in 1940, but this was due partly to the difficult transportation from the Far East under war conditions.

It is proposed that Cuba's rice production be increased
(a) ^{in order to} ~~as a means of~~ diversifying agricultural production and providing profitable employment, especially during the so-called "dead season", and (b) in order to decrease the dependence upon imported supplies and to reduce the expenditure of foreign exchange to countries which do not constitute markets for Cuban export products. It is not proposed that Cuba will be able to grow her entire requirements; the objective is to produce about one half and to continue to import the remaining half from the United States under a preferential duty arrangement.

Present Situation

Rice has long been grown in Cuba, but production failed to increase greatly because yields have been relatively low and the cost of production, relatively high. Censuses in 1929 and 1930 indicate a production of about 21 million pounds of rough rice. Subsequently, the Ministry of Agriculture endeavored to stimulate increased production through making available free seed of improved varieties and through assistance in providing rice mills. The recorded production rose to nearly 60 million pounds of rough rice in 1935, but subsequently declined to about 15 million in 1936 and 1937. In 1939, the latest crop for which data are available, the recorded production amounted to about 33 million pounds (rough rice), and the total production is estimated at about 50 to 60 million pounds, equivalent to about 36 to 43 million pounds of clean rice. The 1940 crop is reported to show an increase, and prospects for 1941 indicate that plantings may be sharply increased by possibly 50 per cent. Over 5,000 farmers were recorded as growing rice in 1939, but the ^{actual} ~~total~~ number is considerably larger.

Yields per acre for the country as a whole are low. During the 10 years 1930-39, ^{the annual average} yields varied from 766 to 1224 pounds annually (rough rice) per acre and averaged about 1060. This compares with an average yield of 1820 pounds per acre in the state of Louisiana from 1928 to 1939. Some of the larger producers in Cuba obtain higher yields and profitable production through the use of improved

methods and the selection of the most suitable soils even without irrigation. One large grower in Southern Matanzas Province who has grown rice for 10 years, reports an average production of 1660 pounds per acre and the lowest single year, 52-1206 pounds. The Ministry of Agriculture estimates that a normal average yield without irrigation would be 1,125 pounds per acre.

The principal reason for low yields has been insufficient moisture. Rice is grown under irrigation from a river in only one large area at Glines, although at several other places small areas are irrigated, primarily by pumping. Results show that through irrigation, yields may be nearly doubled. On one large farm near Glines, where rice has been grown under irrigation since 1938, the average yields reported are as follows:

	<u>Approximate Area in Rice Acres</u>	<u>Average Yield Per Acre Pounds</u>
1938	200	2,030
1939	365	2,240
1940	400	2,354
	Average	2,208

Experiments conducted by the Ministry in 1938 with about 100 acres of rice under irrigation, also near Glines, report an average yield of 2,720 pounds per acre. Under normal conditions, when irrigation water is available, the Ministry expects an average yield of 2,170 pounds.

Another reason for low yields has been the poor varieties and

poor seed, but the Ministry of Agriculture has done much to introduce improved varieties and to standardize production around Fortuna, Rexora and Mira. In 1939, about 90 per cent of all the reported production consisted of these 3 varieties, and their average yield amounted to 1,235 pounds per acre, as compared with 372 pounds for all other varieties.

Costs of production have been relatively high, primarily because of lack of equipment. With the exception of a few large farms, fields are normally plowed with oxen, frequently with the primitive pointed plow (without mould board), which merely loosens the soil and does not turn it over. With this equipment, it is necessary to cross-plow several times. Planting in rows is also usually done by hand, and is consequently slow and expensive if labor is hired at the minimum wage of 30 cents per day. Harvesting is ^{customarily} by hand with a sickle, and threshing is ^{also} by hand. The typical milling method ^{on the farms} has also been by hand by percussion.

Not only has this great amount of hand work limited the quantity of rice a farmer can grow, but it has also made production unprofitable if expanded to the point where it is necessary to hire labor, ^{Furthermore} and it has resulted in ^{an} inferior ^{grade of} production with a high percentage of broken kernels.

Prices of rough rice during the past 3 years have varied from 1.56 to 2.20 cents per pound at the nearest mill. This is

only slightly higher than the average prices received by farmers in the United States, which were 1.43 in 1938 and 1.72 cents in 1939. The Ministry considers that a price of 1.8 to 2.0 cents per pound may be reasonably expected for rough rice in Cuba, and that this price may eventually advance rather than decline as the volume and quality of production improve. The price of 2 cents at the mill, plus the 15-cent milling charge, ^{and 10 cents for bag} and assuming a 32% loss in milling, would be equivalent to an average price for clean rice at the mill of 3.26.

The average value of imported rice (clean) c.i.f. Habana during the past 4 years has averaged 2.0 to 2.3 cents per pound in addition to the import duty. Prices of imported rice had advanced to about cents per pound by February, 1941.

Proposals to Increase Rice Production

The Cuban Government proposes to increase rice production in two ways: (1) to increase yields through irrigation by constructing dams across several rivers in areas where the water supply is adequate and the soil is suitable, and (2) to reduce the cost of production through making available equipment for more economical preparation of the land, planting, harvesting, threshing and milling. It is also proposed to continue to supply free seed to new growers.

The immediate goal of the Cuban Government is to increase production to about 125 million pounds of rough rice annually and eventually to 200 million pounds. It is anticipated that possibly one-third of the increased production may be obtained from improved production in ~~areas~~ especially suitable areas without irrigation, and possibly two-thirds from irrigation projects to be constructed.

EQUIPMENT AND SEED FOR RICE PRODUCTION

The great amount of hand labor involved in the production of rice by the old method already described and still employed for most of the crop in Cuba, makes production very expensive when the acreage is expanded to the point where it becomes necessary to hire labor. Furthermore, the lack of equipment, especially for threshing and milling, in most areas has discouraged growers from planting any considerable acreage. Through the use of modern equipment, it is possible to decrease the number of hours of labor to a fraction and to reduce the cost of production. However, small farmers have no funds with which to purchase such equipment, nor would it be economically feasible for individual small farmers to do so.

In order to make the needed equipment available, the Government proposes to purchase it from manufacturers in the United States and to sell it to Cuban farmers or groups of farmers, who would contract to repay to the Government the cost of equipment in annual installments over a period of years. If sold to large farmers, it is proposed that the purchaser assume the obligation of making the equipment available at specified charges to other and smaller growers in the area. Under this system, the purchaser would be responsible for the equipment, its care and operation, and it is proposed that it be covered by insurance.

There are a number of areas in Cuba suited to economical production of rice even without irrigation. Such areas consist largely of the heavier, fertile clays, generally low and located

near the coast or swamps, where the water table is near the surface and assists in holding the necessary soil moisture. It is proposed that part of the equipment be made available in the near future for such areas and that the remainder be made available to the irrigated areas as soon as the irrigation projects are completed.

The following kinds of equipment are to be purchased:
(For details as to number and estimated cost, see Appendix.)

Tractors - Diesel-powered, track-laying type, equipped with disk plows, to be used especially for plowing but also for construction of irrigation canals and other work

Tractors - small, wheel type, to be used for fitting the land, drilling, harvesting and belt work

Drills - both small ones to be drawn by oxen and larger ones to be drawn by tractors

Binders - for cutting and tying the grain into bundles

Threshers - both small and large, the former to be equipped with small motors and the latter to be powered by tractors

Mills - both small and large

Small warehouses - for rice and for the equipment

The practice of sowing rice with double spaces between the rows followed by some growers and then cultivating and hoeing weeds while the rice is growing adds considerably to the cost of

production. It is suggested that experiments with rows closer together might permit a considerable reduction in labor costs.

A few growers in Cuba successfully use combines for harvesting rice, but the Ministry proposes to purchase only binders and separate threshing machinery. Combines, while reducing the harvesting work to one operation, necessitate taking the grain to special dryers or to the dryers in rice mills, in order to reduce the moisture content before rice may be stored. Further experiments with combines may indicate the advisability in some cases of purchasing combines instead of binders and threshers. Furthermore, experimentation is also recommended to increase the straw strength, to reduce the danger of lodging, which in some cases is so severe that it becomes necessary to harvest by hand.

There are already 4 or 5 fairly large rice mills in Cuba, in addition to a number of small mills, but these are not sufficiently widely distributed or of sufficient capacity to handle the proposed increased production. The Ministry has already assisted in establishing some of these mills. Customarily, milling charges vary from 15 to 20 cents per hundred pounds of rough rice.

It is proposed that the sale of equipment be amortized at the following rates: 10% per year for field equipment; 7 1/2% per year for milling equipment; and 5% per year for the warehouses.

Seed. The Ministry proposes to purchase seed in the United States for free distribution to the farmers for planting their

first crop. The Ministry has already followed a similar practice for a number of years and has thereby been able to improve and reduce the number of varieties and to encourage increased production. For this purpose, it is estimated that an amount of \$75,000 would be required, which would probably be sufficient to plant from 30,000 to 40,000 acres.

The Commission believes that rice can be profitably grown in Cuba in some areas without irrigation and in other areas with irrigation. The Commission also feels that the use of equipment such as that proposed will increase the profitability of rice production and is vital to the expansion of the industry. One of the most difficult problems in connection with such equipment is its proper distribution and care. The proposed method of selling equipment to responsible individuals appears to offer the best assurance for the proper operation and care of the equipment, provided that such individuals are required to assume the obligation of making the equipment and operators available also to other and smaller growers.

IRRIGATION OF RICE

The production of satisfactory rice crops is dependent upon: relatively high mean temperatures during the growing season; a dependable supply of water; soils that have a good water-holding capacity; topography that is comparatively level; and good surface drainage. Rice is satisfactorily grown in some parts of Cuba without irrigation under favorable soil and rainfall conditions. However, in most sections supplemental irrigation would eliminate the danger of decreased yield and, in some instances, crop failure due to a dry spell occurring at an inopportune time.

A large part of the rice now grown in Cuba without irrigation is harvested by hand by small farmers. Commercial plantings of rice could be harvested more profitably by machinery. The average yield of rice per acre without irrigation, depending upon rainfall entirely, is 1100 lbs. Data available indicates that under irrigation the yield could be almost doubled.

In the United States rice is grown in essentially the same way as other small grains, except that the land on which the crop is grown is submerged for 60 to 90 days or more during the growing season. Normally, when young rice plants reach a height of 6 to 8 inches the land is submerged to a depth of 1 to 2 inches. As the plants grow taller, the depth of the water is gradually increased until it reaches 4 to 6 inches. During the remainder of the growing season, or until the land is drained prior to harvesting, except for special reasons, the water should be held on the land at a constant depth of about 5 inches. To maintain a constant

depth of submergence, water must be applied from time to time to replace that lost by evaporation, transpiration, and seepage.

It is normally not necessary to flush the land to germinate the seed. In case it is necessary to irrigate for this purpose, the land should be drained promptly thereafter; otherwise the seed is likely to rot. From 24 to 48 inches of water is normally required to produce a rice crop, and of this amount from 6 to 20 inches is supplied by rainfall during the growing season.

Climatic conditions in Cuba are somewhat similar to those in the Grand Prairie section of Arkansas and the water requirements for rice should be about the same in both areas. Studies made in Arkansas in 1928 indicate that rice requires 30 to 36 inches of water, about half of which was supplied naturally by rainfall and the remainder by irrigation from pumping plants. Observations made in 1937 on five farms show that the amount of water applied varied from 22.4 inches to 37.8 inches with an average of 30.5 inches. The average amount supplied by irrigation was 21.8 inches and by rainfall, 8.6 inches.

Three systems have been used in irrigating rice in Cuba: (1) furrow irrigation on red sandy clay soils effecting the application of water whenever needed by crop; (2) irrigating by furrows the first two or three months and flooding the last 30 to 60 days of the growing period; (3) Irrigation by flooding for most of the growing period.

On many of the proposed irrigation projects in Cuba it is doubtful whether there is sufficient water available in the rivers to use the flooding method of irrigation entirely. It is suggested that the rice be planted after the first heavy rain in the latter part of April or early in

May. After planting, the land could be irrigated by furrows about once every three weeks for the first two or three months, depending upon rainfall and temperature. During the last two months the rice would be irrigated by flooding so as to carry the crop through the critical growing period. It is estimated that it would require about 18 to 24 inches of irrigation water (net application) and 20 to 25 inches of rainfall to mature the crop, depending upon the variety of rice grown and the length of the growing season.

WATER SUPPLY

For a successful irrigation project, an adequate water supply must be available at a unit cost, in terms of irrigable area, that is economically reasonable.

Water may be supplied for irrigation by gravity from rivers, by means of storage reservoirs or diversion dams, or by pumping from ground water or surface water supplies from rivers. The diversion of gravity water from rivers by means of low dams, without storage, is the method considered primarily in this report in connection with the irrigation of rice in Cuba.

Sufficient hydrologic data are not available upon which to base an accurate estimate of the run-off of the rivers of Cuba. Stream flow records are meager and not of sufficient length to determine the normal flow. Numerous rainfall records on the valley floors are kept by public and private agencies but only a few of these have been published since 1932. There are some watersheds where the relation between run-off and rainfall has been determined for short periods. These data, together with available rainfall records, have been used in estimating the approximate and mean minimum river discharge for the period May to September inclusive. Table _____ shows the area of the watershed, the rainfall, and the flow of the various rivers in Cuba which are considered as possible supplies of water for proposed irrigation projects. Detailed rainfall records are shown in Tables _____ to _____ in the Appendix.

From the limited data available, the conclusion is reached that there is sufficient rainfall and irrigation water to grow rice in all the projects in normal years. In one year out of five the water supply for

some of the projects may not be sufficient to irrigate more than 50 percent of the irrigable land and the yield of rice may be as low as 25 percent of normal, owing to insufficient rainfall. For projects such as the Cuyaguatije and the Sauga La Grande water shortages probably would not occur more than once in every 10 years. However, additional hydrologic data and further study is needed before accurate estimates of stream flow can be made

IRRIGATION PROJECTS

In 1937 the Department of Agriculture of Cuba undertook a study of the possibility of utilizing the waters of the rivers of Cuba for irrigation. Previous investigations had led almost invariably to the conclusion that although extensive dams and large reservoirs were desirable from a water supply standpoint, their cost would be prohibitive for irrigation projects. During 1938 and 1939 the Department made preliminary field surveys of some 40 rivers in Cuba for the purpose of determining the feasibility of diverting the river waters for irrigation by means of low diversion dams. These surveys included stream flow measurements, the location of possible dam sites, the suitability of soils, and the approximate acreage of land that might be irrigated. (Reports on most of these rivers are available in the files of the Department of Agriculture in Havana and the results are briefly described in the Appendix of this report). If the preliminary report on a river was favorable, more experienced engineers were sent to check the results, and if the second report was favorable, a more detailed engineering and agricultural survey was made. As a result of these studies eleven projects were selected and presented for consideration to the American Agricultural Mission by the Cuban Government. Detailed engineering plans and cost estimates were made on the Cuyaguatoje project. These were used as a basis for making cost estimates on the other projects. Detailed surveys of topography, soils, crops, and plans for irrigation systems were made and described in reports on the Buey and Yara. These reports, together with the engineering plans of Cuyaguatoje project may be used as a guide to additional surveys on the other projects.

The total cost of the proposed irrigation projects presented in the memorandum by the Cuban Government was \$1,979,438. While the American Agricultural Mission was in Cuba it was presented with proposals for two other irrigation projects, the Sagua la Grande with an estimated cost of \$261,600, and the Rio Hondo to cost \$105,000. The locations of the projects are shown in Figure 1. The main features of all the projects are shown in Table _____ and the estimates of cost in Table _____.

With the limited time available, it was not possible to make field inspections of all the projects presented for consideration. Reports by different engineers were reviewed and field inspections were made of the eight projects which appeared to be most representative and accessible by railroad, highway, or horseback. From these the Buey, Yara, Maximo, Sauga la Grande, and the Cuyaguasteje were selected for detailed analysis based on available water supply (run-off and rainfall), cost per acre, soils for growing rice and other crops in summer, suitability for crops in the dry season, availability of farmers to grow rice, number of irrigable acres, willingness of farmers to cooperate, topography, drainage, flood conditions, water rights, construction problems, labor conditions during construction, and time needed for completion. The results of this study are summarized in Table _____, which indicates that the Cuyaguasteje in the Province of Pinar del Rio, and Buey in the Province of Oriente, appear to be more desirable than the Yara, Maximo, and Sagua, and that there is very little choice between the last three projects named. These five projects would irrigate 40,455 acres (1220 cabs) of land and construction would cost \$886,214 at an average of \$21.91 per acre.

BUEY IRRIGATION PROJECT

The Buey Irrigation Project is located southwest of the City of Bayamo, Province of Oriente. (See Figure _____ in Appendix). It is proposed to irrigate 11,606 acres of rice (350 cabs) during the summer, and 2865 acres (87 cabs) of beans and other crops during the winter months. Water for irrigation would be diverted by means of a fixed type dam 3 meters high and 48 meters long in the Rio Buey. The project is traversed by a highway and railroad running between Manzanillo and Bayamo which makes direct connection with the main lines of Cuba.

The land to be irrigated is fairly level and is located on the north side of the river. A detailed topographic, soil and crop survey has been made by the Ministry of Agriculture ~~by Evelio Gonzalez Vargas~~ and a printed report in Spanish by Evelio Gonzalez Vargas has been published in the Proceedings of the Cuban Society of Engineers, December 1939. A total of 25,533 acres (770 cabs) of land were surveyed. On 4178 acres (126 cabs) of this land sugar-cane is being grown. The next important crop is corn. Black and white, and other varieties of beans are being grown and it is possible to grow two crops a year. Bananas, tobacco and coconuts are also grown successfully in this area. Apparently the soil is adapted to almost any crop. Cattle are being raised in the district, primarily for supplying milk to a condensed milk factory. The soil surveys indicate that 45.8 percent is first-class soil, 40.9 percent second-class soil, 10.5 percent third-class soil, and 2.8 percent fourth-class soil. First-class soils are those lying close to the rivers Buey and Guabadabuey. These are principally alluvial soils,

are fertile, have good drainage, and are easy to work. The second-class soils are principally in the central part of the project. They are covered more or less with brush and forest, of good fertility but in need of drainage. These are placed in the second class because of the cost of clearing the land for irrigation and ditching for drainage. The third class soils have been cleared of forest cover and are now being used for pasture. During heavy rains they are flooded due to lack of drainage outlet to the river. The fourth class soils are deficient in drainage and fertility, and have not been considered as part of the irrigable area. The best soils are the Julia and Santa Rita series which are sandy loam to a depth of 30 to 50 inches and grade into a clay sub-soil. Several soil samples were taken when the project was inspected on March 6, 1941 and indicate that the top soil was a clam loam with a heavy sub-soil.

Long period rainfall records on the valley floor are not available but a 16-year record at Central Mabey is shown in Table _____ in the Appendix. The mean annual rainfall is 52.33 inches, and the maximum and minimum 69.13 inches and 34.16 inches respectively. The mean rainfall from May to September inclusive is 34.57 inches.

The drainage area above the proposed dam is 110 square miles and the watershed is covered with grass, brush and trees. The river drains the northern slope of the Sierra Maestra. The discharge of the Rio Suey at the gaging station was estimated to be 140 cubic feet per second on March 6, 1941. (See Table _____ Appendix for other measurements). Several years' record of rainfall at Morgado in the lower third of the watershed are available for estimating run-off. These data, together with

the Central Mabay records, have been used to compute the summer flow of the Rio Buey at the dam site during the period May to September inclusive. The normal discharge was estimated to be 181 cubic feet per second (5.14 cubic meters per second) and the mean minimum flow 84 cubic feet per second (2.38 Cubic meters per second) On this basis the normal gross amount of water available for irrigation each month would be 11 acre-inches per acre, and the mean minimum, 5 acre-inches per acre. It is estimated that the distribution losses would amount to one-third.

The Ministry of Agriculture estimates the total cost of the project as \$186,401, of which \$28,800 would be for the dam, and \$67,600 for canals. It is estimated that it would take one year to complete the project.

It has been suggested that since the soils on this project are suited for growing bananas, 3516 acres (100 cabs) might be used for this purpose, providing a suitable site was found for a storage reservoir that could be built at a reasonable cost. Since it is necessary to irrigate bananas throughout the year, a reservoir having a minimum capacity of 10,000 acre feet would be necessary so as to assure an adequate water supply for four months during dry periods. A reservoir having a capacity of 15,000 acre-feet would store a six months supply of irrigation water. The estimated stream flow of the Rio Buey indicates that there is sufficient water for this purpose.

It is recommended that a diversion dam be built first and the irrigation system designed so as to irrigate both rice and bananas. Meanwhile the additional survey necessary to determine whether there is a suitable dam and reservoir site on the river could be made.

YARA IRRIGATION PROJECT

The Yara Irrigation Project is located near the village of Yara west of Manzanillo in the province of Oriente. (See Figure _____ in Appendix). It is proposed to irrigate 9948 acres (300 cabs) of rice during the summer months and 2487 acres (75 cabs) of beans and other crops in the winter, diverting water from the Rio Yara by means of a dam located near Estrada Palma. The diversion dam would be a fixed type consisting of a concrete structure built on piles, equipped with gates which, when closed, will raise the water 6.5 meters above the stream bed. A spillway for flood flows is provided having the capacity of the cross-section of the river occupied by the structure. The main canal, if built along the west bank of the river, should be protected from high flood flows. The land in the project was originally owned by an Army Captain and some years ago it was donated to a foundation for taking care of homeless children. However, about two-thirds of the land is now occupied by squatters who may have some legal rights.

Detailed topographic, soil, and crop surveys have been made by the Ministry of Agriculture and a typewritten report in Spanish by Evelio Gonzalez Vargas, Agricultural Engineer, is available. The area to be irrigated is fairly level with no excessive slopes. The top soil in some sections consists of a light brown clay silt texture, with a more or less loose structure. The sub-soil is usually heavier. A few soil samples taken in the field on March 6, 1941, indicate that the sub-soil is clay and suitable for rice growing under irrigation. The drainage is poor in the heavier soils and drainage ditches will be necessary when those

lands are irrigated. The soil survey indicates that 29.2 percent is first-class, 64.4 percent second class, 6.4 percent third class, and no fourth class soil. Various crops such as sugar-cane, corn, tobacco, and bananas are now being grown in the Yara district without irrigation. There is a large amount of land used for pasture of beef cattle.

No long-period records are available for the rainfall on the valley floor at Yara. A 16-year record at Central Mabay is shown in Table ____ in the Appendix. The mean annual rainfall is 62.33 inches and the maximum and minimum 69.13 inches and 34.18 inches respectively. The mean rainfall from May to September inclusive is 34.57 inches.

The drainage area above the proposed dam is 100 square miles and is covered with grass, brush, and trees. The river drains the north slope of the Sierra Maestra Mountains. On March 6, 1941, the discharge of Rio Yara at damsite was estimated to be 150 cubic feet per second (See Table _____ Appendix for other measures). Several years records of rainfall at Morgado in the lower part of the watershed are available. (See Table _____ in Appendix). These data, together with the 16-year record at Central Mabay, have been used to compute the summer flow of the Rio Yara at the damsite during the period May to September inclusive. The normal discharge for this period was estimated to be 165 cubic feet per second (4.67 cubic meters per second) and the mean minimum flow 76 cubic feet per second. (2.15 cubic meters per second). On this basis the normal amount of water available for diversion each month would be equivalent to about 12 acre-inches per acre and the minimum 6 acre-inches per acre.

The Ministry of Agriculture has estimated the total cost of the project as \$226,044 of which \$86,000 is for the dam. This seems to be a reasonable cost. However, it should be pointed out that flood flows will probably interfere with the construction work. Also that the project will take longer to complete than any of the other projects proposed. Construction period is estimated at 15 months.

MAXIMO IRRIGATION PROJECT

This project is located in the northeastern Province of Camaguey about 6 kilometers from the northern coast of Cuba. (See Figure ___ in Appendix). It is proposed to irrigate about 4974 acres (150 cabs) of rice during the summer period and during the winter period about 1526 acres (40 cabs) of beans or other crops. There is plenty of suitable land available and the water supply will be the limiting factor. The project is not close to a market, being about 15 kilometers from Central Senado sugar mill and about 5 kilometers from La Gloria, an American colony growing oranges. There is no highway near the project but the railroad of Central Senado connects with one of the mail railroad lines of the Island.

The proposed diversion dam is of the free flow type about 4 meters high and 25 meters long, and is designed to permit free flow of water during flood periods. It will be necessary to protect the main canal from overflow of the river during flood periods but the velocity will undoubtedly be low and this should not be a serious problem. Some land ~~has been irrigated~~ near the site of the proposed dam has been irrigated in the past from the Rio Maximo. The water was diverted from the river by building a temporary dam with sand bags. This resulted in the river changing its course.

The engineers for the Ministry of Agriculture have made a survey of the topography of the district but about 50 percent of the field work remains to be done so no contour map has been prepared. The land is low and may have to be protected from river overflow by levees.

Soil samples taken March 9, 1941 indicate that the surface soil is mainly clay and generally in need of ditching. It is similar to other coastal areas which are flat and subject to flooding by rains. The top soil is rich in organic matter and the sub-soil is a heavy plastic sticky clay. There are good varieties of sugar cane now growing on some of the land. About two-thirds of the area is owned by a sugar company which is willing to grow rice if water is made available.

No records are available of the rainfall on the valley floor in the vicinity of the project. However, it is believed that records reported by the Sugar Club for the years 1926 to 1932 inclusive for the North Camaguey Province will give a good indication of the rainfall to be expected on the valley floor as well as the upper watershed. The mean annual rainfall is 52.1 inches, and the maximum and minimum, 60.77 inches and 41.07 inches respectively, while the mean rainfall for the period May to September inclusive is 30.44 inches.

The drainage area above the proposed dam is 297 square miles (770 square kilometers). The upper part of the watershed is mountainous area and some of the stream flow is from springs. The discharge of the river at the dam site was estimated to be 2 cubic meters per second on March 9, 1941. From the rainfall records available the normal discharge is estimated to be 160 cubic feet per second (4.53 meters per second) and the mean minimum flow 99 cubic feet per second (2.8 cubic meters per second).

The Ministry of Agriculture has estimated the total cost of this project to be \$110,244 of which \$31,000 is for the dam.

SAGUA LA GRANDE IRRIGATION PROJECT

The Sagua La Grande project is located in the northwestern part of the Province of Santa Clara and northwest of the City of Sagua Grande which has a population of about 20,000. It is proposed to irrigate about 9,948 acres (300 cabs) of land by means of a canal having its intake on the west side of the existing dam which is now used to divert water for the purpose of developing electric power. Since the project is near Sagua Grande and is easily accessible by a railroad, there would be a good market for rice if grown. Railroads pass through Sagua Grande in four directions. The Rio la Grande is navigable from Port Isabela, the city of Sagua la Grande. A secondary highway is in process of construction south to Santa Clara.

The land to be irrigated is fairly flat and level. Profiles of proposed canals on both sides of the river have been run. Since the east side of the river may be subject to overflow it is proposed to build a canal on the west side only which would be approximately 6 kilometers long. There is plenty of land and soil surveys would be necessary to determine which land would be best adapted to rice. The soil is mainly clay and generally in need of drainage. It is subject to flooding by rains. Soil samples taken on March 10, 1941 indicate that the sub-soil is a very plastic clay. There is now growing on some of the land a poor variety of sugar cane but most of the land is used for pasture. It is not planned to grow anything but rice as the soil probably is not rich enough for winter crops of beans. Several years ago rice was grown in the area by private parties but the yield is not

available as the crop was not harvested. It is suggested that a small acreage of rice be grown in 1941 under the control of the Ministry of Agriculture for purpose of determining whether rice can be profitably grown on the soils in the proposed project.

Rainfall records for the northern part of the Province of Santa Clara indicated the mean annual rainfall to be 54.51 inches, a maximum 66.46 inches, and a minimum 45.98 inches. During the summer period from May to September inclusive, the mean rainfall is 30.85 inches.

The drainage area above the existing power dam is approximately 1,061 square miles; the watershed is flat and covered for the most part with grass, brush, and sugar-cane. The estimated discharge of the river on March 10, 1941, was 7.2 cubic meters per second. There was about 4.2 cubic meters per second flow in the power canal which is probably the maximum amount diverted as sand bags were being used to raise the height of the water behind the dam. From the rainfall data available it is estimated that the normal discharge of the Rio Sagua la Grande is 289 cubic feet per second (8.19 cubic meters per second) and the mean minimum is 180 feet per second (5.10 cubic meters per second).

The Ministry of Agriculture in a memorandum (See appendix) has estimated the cost of constructing the irrigation system as \$120,000. Electric power is not being used by a company manufacturing chlorine and it is estimated by the Ministry of Agriculture that for two months out of every four irrigation months electric power would have to be replaced by diesel power as all the water would be needed for irrigation. The

cost of replacing this power would amount to \$8,500 annually. This, capitalized at 6 percent, would give an additional capital cost of \$141,500.

CUYAGUATEJE IRRIGATION PROJECT

The Cuyagateje irrigation project is located in the southwestern part of the province of Pinal del Rio (See figure in appendix). It is near the towns of Guane and Mendoza. It is proposed to irrigate 3,979 acres (120 cabs) of rice during the summer and the same acreage of beans and other crops during the winter period. Water could be diverted from the Rio Cuyagateje which is one of the least variable rivers, insofar as stream flow is concerned, of the island. The dam, a ~~type~~ ^{free} type, would be meters high and meters long and located southeast of the town of Mendoza. At present there is a highway between Guane and Pinar del Rio which joins the central highway of Cuba. There is also a railroad from Mendoza to Havana, via Pinar del Rio.

A complete topographic map has been made of the irrigable area of the project with 50 cm. contour interval. Most of the land to be irrigated is fairly level. It includes two lakes having an area of acres (30.5 cabs) which will be drained by cutting a channel to the river. Prior to 1920, before lakes were formed, sugar cane was growing in this area. These are fresh water lakes and the soil should be very good. The soils of the project are alluvial and include clay loam and silty clay loam. At present tobacco, corn and beans are being grown on some of the land.

No long-period records are available for rainfall on the valley floor near this project. A 5-year record at Guane (1936-1940 inclusive) indicates an average annual rainfall of 50.7 inches, minimum 32.8 inches

and maximum 63.89 inches. The mean annual rainfall for the Province of Pinar del Rio is 50.61 inches, and the mean for the period May to September inclusive is 31.49 inches.

The drainage area above the dam site is 240 square miles and is covered with grass, brush, and trees. Several years record of rainfall for the province of Pinar del Rio is available for estimating the discharge of the river. The normal discharge was estimated to be 200 cubic feet per second for the summer period (5.68 cubic meters per second), and the mean minimum flow of 124 cubic feet per second (3.53 cubic meters). On March 1, 1940, it was estimated that 7.5 cubic meters per second were flowing past the dam site. The water was a brownish red color as a result of rains on the upper watershed. During the dry weather the river is usually clear.

The Ministry of Agriculture has estimated a total cost of the project as \$101,925 of which \$37,745 is for the dam. A detailed estimate has been made of the cost of this project which is used as a basis for estimating the cost of the other projects proposed by the Cuban Government. Detailed designs have been made of the proposed dam and other structures. Maps have been prepared showing the location of dam, main canals irrigable land. No soil or agricultural surveys have been made.

The project has an ample water supply and is recommended as being one of the most desirable of all those proposed.

REFORESTATION

It is the considered opinion of this Commission that the reforestation program presented by the Cuban Economic Mission is, with certain minor changes to be mentioned below, worthy of immediate adoption. We wish it were practicable to undertake an even more extensive program; but the limitations of personnel and other factors suggest a modest beginning, with expansion as conditions permit.

Obviously this program is one which cannot yield immediate returns; yet we believe that viewed in the light of the future welfare of the Island, it is one of the most promising projects which can be put on foot.

The plan as submitted by the Cuban Economic Mission consisted of six points, as follows:

1. Creation of nurseries for the production of timber trees for reforestation, to be located in regions suitable for the distribution of the seedlings. There are at present two such nurseries in existence, both with small capacity. During our discussions in Habana with Dr. Isaac Corral, Director de Montes y Minas, and Ing. Alberto Fors, it was agreed that eleven such nurseries could be utilized advantageously, and that each of these could well have a capacity of 750,000 seedlings annually. On our part, we do not feel certain that it will be practicable to establish this number the first year, but since we all feel that the program should be put on a five year basis, we see no objection

to setting the ultimate number of nurseries at eleven, to be established as rapidly as limitations on personnel and supervision will permit. These nurseries are to specialize in the production of Mahogany, Spanish Cedar and Teak seedlings, since it is felt that these three species are the most important; but they will also grow a certain quantity of other species such as ocuje (calophyllum calaba) for the lumber of which there is a good local demand. The cost of establishing these eleven nurseries and operating them over a period of five years is estimated at \$165,000.

2. An effective campaign of propaganda in favor of reforestation projects. This is an obvious desideratum, requires no funds to be specially allocated for the purpose, and needs little comment. It may be mentioned that there is, at present, a lively interest in reforestation projects on the part of many sugar mills and a good number of Cuban land owners.

3. Amendment of present laws to protect existing stands of timber and insure their utilization along rational lines. We believe this worthy of further study, with the ultimate objective of sound and logical legislation.

4. Agreements to be signed between sugar concerns and the Cuban government, looking toward securing their cooperation in the preservation of existing stands of timber and the development of reforestation projects. This we consider highly desirable.

5. Government planting of 90 caballerias of timber trees, scattered over various parts of the Island. This point was discussed in some detail with Dr. Corral and Ing. Fors, who were of the opinion that it would require three to five million seedlings to do this, and that the total cost would be about \$65,000. We are heartily in accord with this point.

6. Reforestation contracts with owners of medium-sized tracts of land, on the basis of government subsidies. It was suggested that the government would contribute \$200 per caballeria to assist in the planting and care of such projects, ^{125.00} ~~\$25.00~~ to be paid at the time of planting and \$25.00 per annum during the three succeeding years. Our Commission suggested a change in this program on the basis that it is not sufficiently practical: We consider that there is a strong probability many plantings would receive inadequate attention after the first payment of \$125.00 per caballeria had been collected. In discussion with Dr. Corral and Ing. Fors the following plan was adopted in substitution: The government to offer a subsidy of ten cents per tree for plantings made with seedlings distributed by the Ministerio de Agricultura on lands and under conditions previously examined and approved by representatives of the Ministerio. No individual or company would be paid this subsidy for more than ten thousand trees, and it would only be paid for trees still standing and in good condition at the termination of five years from planting. Nor would it

be necessary to plant all the trees in any given year; an individual or company would have the right to plant any portion of the ten thousand in any year up to the end of the five year period covered by the program, and claim the subsidy in instalments corresponding to the plantings made each year.

It is felt that this subsidy, though small, would stimulate planting by many of the smaller landholders, and it is hoped that under this plan it might be possible to establish five million trees during the five year period, at an ultimate cost to the government (exclusive of the cost of growing the seedlings) of \$500,000.

The total cost of the reforestation program remains the same as that originally submitted by the Cuban Economic Mission, i.e., \$730,000.

The Commission desires to express its admiration for the reforestation work already accomplished under the direction of Dr. Corral and Ing. Fors, and for the effective work being done at the Escuela Forestal by Ing. Fors in training young men for the sort of work to be carried out under the above program.

INDUSTRIAL LABORATORY

Among the recommendations of the Cuban Economic Mission was one for the establishment of a laboratory to investigate problems bearing upon various industries. The cost of this laboratory, including equipment, was estimated at \$179,208. The various fields of investigation were described as follows:

- A. By-products of the sugar industry.
- B. Oils and vegetable fats.
- C. Fibres, artificial and natural.
- D. Starches, dextrines, etc.
- E. Fermentation of wines, vinegars, alcohols, and solvents.
- F. Drugs, mineral oils, and other medicinal products.
- G. Problems of Tanning and other Industries.

No details were given regarding the organization and administration of this laboratory, nor regarding financing the work from year to year. This whole subject, therefore, was discussed in detail at several of our conferences with members of the Cuban government and other interested parties.

Following these discussions we were given a memorandum in which the views of the Cuban sponsors were set forth definitely. In this memorandum it was stated that the cost of constructing and equipping the laboratory would remain as originally estimated, viz., \$180,000. This sum would be borrowed by the state, interest to be carried in the ordinary budget of the Ministerio de Agricultura, in addition to such sums as would be necessary to amortize the capital in 25 years. Funds for operating the laboratory would be contributed by the following

organizations, through a tax levied by law:

Asociación Nacional de Hacendados
Asociación de Colonos
Los Industriales en general
Instituto de Café
Comisión de Propaganda y Defensa del Tabaco Habano
Comisión Nacional de Defensa de la Ganadería
La Universidad Nacional

It was further proposed that the laboratory should be governed by a Board composed of one delegate from each of the above seven entities, plus one representative of the Ministerio de Agricultura. The President, Secretary, and Treasurer of the Board would be elected by direct vote of the members with exception of the member representing the Ministerio de Agricultura, who would have no vote.

It was estimated that the total annual sum necessary to operate the institution would be \$100,000. The laboratory would be an autonomous organization, in which the government would have no right to intervene except through its representation on the governing Board. In order to make certain that all seven entities represented in the support of the institution should be satisfied at all times, it was proposed that the laboratory should maintain work continuously on at least one project for each of the seven groups.

Our Commission recognizes the desirability of carrying out technical investigations such as those mentioned. It further recognizes that there exists at present no institution in Cuba fully prepared to undertake all phases of this work. At the same time, it feels that the work could be done more economically by utilizing and expanding the facilities

already available at the Estacion Experimental Agronomica in Santiago de las Vegas, a few miles from Habana.

This experiment station was founded in 1904 and is well equipped with buildings, all of which were constructed or thoroughly repaired some ten years ago. Provision of laboratory equipment and possibly the provision of a few additional structures of no great cost would make it possible to conduct, here, practically all of the work planned for the Industrial Laboratory. There is the further argument that most of this work properly falls within the scope of an agricultural experiment station, as recognized in the United States.

The Estacion Experimental Agronomica is expending annually some \$81,000 on salaries; a further \$15,000 on labor; and some \$10,000 to \$15,000 in operations. Based upon our own observations, and upon discussions with numerous well-informed Cubans, it is our opinion that this station is not now accomplishing the results which the Cuban people have a right to expect, for the following reasons among others:

1. It lacks well-organized direction and leadership.
2. The technical staff is in some instances insufficiently prepared, though we desire to place on record our high regard for a number of the members.
3. Funds available for carrying on the work, particularly as regards field experiments, are wholly inadequate.

In view of all the above, it is our conviction that the recognized

need for a well-equipped, efficient Industrial Laboratory could best be met by some such plan as the following:

Place in charge of the Estacion Experimental Agronomica an experienced man, not of Cuban nationality, to facilitate reorganization of the work free from local political influence. It would not be planned to retain this man at the head of the institution indefinitely; he would remain until reorganization was complete and until there was a Cuban available who seemed qualified to continue the work. Let this man develop a program, through consultation with officials of the Ministerio de Agricultura and other interested parties. Provide him with sufficient funds annually to carry forward this program, which would eventually include all of the fields of activity suggested for the new industrial laboratory. Let this man gradually strengthen the staff of the station by making such changes as time might show to be desirable.

We consider the importance of this work so great that its continuity should not be jeopardized by having it depend upon the uncertainties of the national income. We believe it would be highly desirable to set up a fund, say of \$500,000, to be drawn upon as occasion might require for expanding the work and for conducting field experiments, many of which are required in conjunction with the diversification program discussed elsewhere in this report. This amount, in addition to the sums already provided for in the budget of the Ministerio de Agricultura, would probably assure successful operation of the work for at least five years.

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RURAL COLONIZATION

1. Need for a Program of Rural Colonization.

It is the consensus of all the members of the Agricultural Survey Party that there is pressing need for a plan of rural colonization in order to bring some measure of relief to the large number of Cuban workers who are affected by the so-called "dead season" period of the sugar industry. A program of rural colonization would contribute, not only to remedying a crying social need, but would afford also a suitable medium for giving practical application to the measures elsewhere recommended in this report for agricultural diversification.

So long as sugar production in Cuba remained at a level in excess of 4,000,000 tons, the effect of the sugar industry's seasonal lay-off was minimized by a number of factors. The lay-off period was relatively short, and even in the midst of the so-called "dead season" there was a fairly sustained demand for agricultural labor to replace ratoon areas going out of cultivation and to maintain acreages of usable ratoons, as well as a larger demand for industrial workers to repair and maintain the larger manufacturing plant, railroad, and transportation equipment required to process a normal crop of sugarcane.

Under the impact of world-wide restrictive and protective measures, Cuban sugar production has shrunk in the course of the last ten years from an annual level in excess of 5,200,000 short tons of sugar, during the period 1923-1930, to a current level barely in excess of 2,500,000 tons. With sugar production reduced to approximately 2,500,000 short tons a year it is not possible to continue a

do-nothing policy. It is recognized that when the one industry that furnishes the bulk of the economic sustenance of the country is compelled to operate at less than half its normal capacity, a do-nothing policy in the face of a ten-month seasonal lay-off can only feed the smouldering fires of social discontent, and invite violent political upheaval. There is nothing academic about the need of remedial action. The need is a stark reality.

2. Program Proposed by the Cuban Economic Mission.

Realizing the importance of the problem confronting large masses of Cuban laborers who are left without any visible means of earning a living during ten months of the year, the Cuban Economic Mission prepared a program of rural colonization to be undertaken on a scale which admittedly would not solve the problem, but which would at least serve as an emergency measure and provide at the same time a sound experiment on the basis of which future enlargements of the program could be developed. The essential features of that program were:

- (a) Available government lands, plus lands to be acquired at an estimated cost of \$300 a "caballeria" (33 1/3 acres) would be distributed in parcels of approximately one "caballeria" among 4,000 families, leaving approximately 1,000 "caballerias" in possession of the government for roads, schools, nurseries, etc.
- (b) The government would supervise, plan and control such matters as transfer of lands, operation of the land,

and determination of alternative uses of the land, under appropriate statutory provisions designed to protect the right of the occupants to reap the fruits of their efforts. (Cf. Appendix, Exhibit , Articles 34 and 35 of Decree No. 85 of January 16, 1938).

- (c) Agrarian units would be formed to expedite supervision, facilitate cooperation and make possible the joint use of expensive machinery supplied by the government.
- (d) The government would supply the donees with the implements necessary to begin operations on the land, including a sum of \$150 for the purchase of material to construct a dwelling house and a well.
- (e) The government would provide roads, schools and sanitation in each rural unit, out of funds other than the \$3,000,000 needed for agricultural activities.

3. What Has Been Done to Date.

As already pointed out, the distribution of land for colonization purposes was to be effected from two sources, to wit, government lands not already devoted to other purposes, and lands to be acquired at an estimated purchase price of \$300 a "caballeria".

So far a total of 836 "caballerias" and 156 "cordeles" (27,380 acres) have been distributed among 865 donees, mostly poor squatters who were already occupying the land. In their case the government has merely legalized a "de facto" situation. In addition, there are 3,537 "caballerias" (117,900 acres) operated by 2,255 persons, most

of them also poor squatters, whose occupancy is in course of being legalized. A full description of those lands and their location is given in Exhibits and of the appendix.

In the course of discussions with members of the Cuban government regarding the possibility of acquiring additional lands for colonization purposes, a number of localities that might prove suitable for colonization purposes and procedures for the purchase of the needed lands were considered. It was suggested by members of the Survey that since the area of the lands controlled by sugar companies appears from official statistics to be appreciably in excess of 200,000 "caballerias", and, moreover, since it does not appear likely that more than 40,000 "caballerias" - including sugarcane lands of independent growers - are required for what may be considered normal sugar production, now or in the near future, it seemed clear that the best hope of obtaining the substantial acreage needed for the proposed project would be through the sugar companies. Not only were those companies the largest holders of lands suitable for colonization purposes, but it was desirable and logical also that a program designed to meet the subsistence needs of some 200,000 workers who are subject to the protracted seasonal lay-offs of the sugar industry, should be developed on lands of the sugar companies and with their cooperation. This suggestion was heartily welcomed by His Excellency, Amadeo Lopez Castro, Minister of the Presidency of the Republic of Cuba, who offered to hold a round-table discussion with the managers of some of the larger companies. The conclusion reached at that round-table discussion, in which

members of the Survey participated, was that the purposes of the program, as well as the types and acreages of land required, were to be set forth in a written communication to the sugar companies in order that the matter might be submitted to the boards of directors of those companies.

4. Recommendations.

The members of the Agricultural Survey Party are in complete accord with the purposes and the method of acquiring the lands needed to carry out the proposed colonization program, as outlined in the letter addressed to the sugar companies by His Excellency, Amadeo Lopez Castro. An English translation of that letter is, accordingly, quoted "in extenso" as an integral part of the recommendations of the Survey:

Translation of a letter which His Excellency A. Lopez Castro, Minister of the Presidency of the Republic of Cuba, addressed to a number of Cuban sugar mills in connection with the possibility of establishing rural resettlement projects in cooperation with such sugar mills.

Dear Sir:

Owing to the greatly curtailed production of the sugar industry which customarily gives employment to the bulk of our agricultural laborers, the Government of Cuba is deeply concerned with the plight of those laborers who have been confronted for a number of years with progressively reduced opportunities for employment. This unemployment situation which in the beginning was thought to be a temporary one, has assumed the character of a chronic condition affecting Cuban laborers during practically ten months out of the year. It is proper, therefore, that this phase of our agricultural economy should be one of the main topics for consideration by the group of Cuban and American technologists who are at present studying the problem. In this connection it has been suggested that it might be advisable to investigate the possibility of devising some workable program of rural ~~resettlement.~~ *colonization.*

On the subject of the unemployment problem during the "dead season", experts in social questions recommended sometime ago the establishment of a cooperative program of horticultural products to be grown on lands of the sugar companies. The purpose was twofold, namely, to stabilize the situation of Cuban laborers on the lands of sugar companies since they are our principal source of agricultural employment, and to remove those workers from the class of migratory

laborers. Under that recommendation laborers were to be employed during the "dead season" in growing horticultural products, on a cooperative basis and with the assistance of sugar companies, for the purpose of meeting their subsistence needs. It was believed that the establishment of such cooperative projects throughout the island would provide an effective method of meeting the crying needs of our agricultural laborers, by rooting them to the land and taking care of their subsistence needs. In our opinion, however, that type of cooperative association, certain aspects of which have already been tried, has not met, nor can it meet with success because it is in conflict with a number of psychological factors inherent to our people and in particular to the inhabitants of our countryside. The age-long tradition of individualism of our agricultural population, the isolated mode of living of our rural folk, the absence of social institutions to bring them into greater contact with each other, and the ethnical differences which tie our racial groups to the particular localities in which they live, are bound to raise serious difficulties for any type of cooperative experiments which might be undertaken in connection with the development of Cuban agriculture.

Moreover, it is of the utmost importance to bear in mind that the usual types of horticultural products are not suitable to the food habits of our country people. The growing of such products would not solve their subsistence problem, and since such products would be an exotic type of food, not utilizable by our country people save perhaps as a cash crop to be sold in the towns, the very purpose of the kind

of subsistence parcels we deem desirable would be destroyed.

Bearing in mind the necessity for devising a sounder type of rural resettlement, the Cuban Government has considered the advisability of distributing government lands among those migratory laborers who are left without any visible means of subsistence, the moment the "dead season" sets in. The difficulty here, however, lies in the fact that the cultivable areas of government lands available for this purpose are reduced in number and, in a great number of cases, are already settled by poor squatters, so that all that can be done under the circumstances is to legalize the status of such squatters. The great masses of our laboring population who earn their living through such employment as they are able to obtain in the sugar industry, remain as greatly in need as before of a solution to their chronic unemployment problem. It is not believed that the granting of the right of occupancy free of charge but revokable in the discretion of the landowner would be efficient or desirable from the standpoint of finding a permanent solution to the unemployment problem. When occupancy is a matter of grace it cannot bring about the desired results, since such type of occupancy is associated in the minds of the laborers with the idea of a temporary condition designed to meet an emergency. It is believed by many people who have given serious thought to the matter, that the payment of a fixed fee or a share of the crop would encourage workers to exert themselves in the hope that they might eventually become owners of the land as a result of their efforts.

We are of the opinion that parcels of land comprising between 30 and 50 "caballerias" would be ideal for distribution among as many

families of agricultural workers. Of necessity, such lands would have to be fairly near to the industrial centers where sugar is manufactured. This would be mutually advantageous to the workers and the sugar mills since it would insure for both elements ready access to and knowledge of the needs of each other. The mills would have ready at hand permanent laborers of known aptitude, and the workers would have their subsistence requirements adequately provided for, through the use of land under appropriate technical supervision.

Owing to the present economic and financial condition of the country, the government would not be in a position to acquire such lands. In view, however, of the large areas which sugar companies cannot utilize, now or in the near future, owing to the curtailment of sugar production, it is hoped that your company will decide to cooperate with the government in its efforts to solve the unemployment problem during the "dead season" either by donating some of the unused lands of your company or selling them at a low price.

As a member of the committee which is studying the problem of rural resettlement, I submit the foregoing suggestions for your consideration on a strictly confidential basis. I shall be glad, of course, to furnish you any other details that you may desire, and I should greatly appreciate any suggestions or comments which you may care to make as to the feasibility of carrying out a program of the type described in cooperation with the management of your company.

Inasmuch as the resettlement program is to be taken up within the next few days with a group of agricultural technologists sent by the American Government to collaborate with us on the subject, I beg you to kindly let me have your answer as soon as possible so that appropriate consideration may be given to your views in the matter.

Please accept in advance my thanks for the cooperation of your company, which, I feel sure, will not be lacking in a matter of such vital import to the welfare of our country.

It is further recommended that, when the required lands are purchased for the proposed colonization program, an easy-payment plan of amortization be developed along the lines of the "variable payment plan" used in the United States in connection with tenant purchase programs, with such modifications as may be necessary to fit that plan to Cuban conditions. (Cf. Exhibit of the Appendix). The sound organization of the program herein recommended will require the use of administrative personnel, trained along agricultural lines, and free from all political influence. As pointed out elsewhere in this report, this will require substantial reorganization of the extension and educational work of the Ministerio de Agricultura.

In conclusion, it should be stated that the proposed colonization program cannot be considered as other than an experiment and a temporary palliative. The ultimate solution to the anomalous situation of a country which find difficulty in providing the barest means of subsistence to the bulk of its agricultural population in the face of an abundant supply of good agricultural land, will depend in large measure on the success of this initial experiment. Sound administration by government officials and sympathetic cooperation by the sugar mills are the essential prerequisites which will make it possible to enlarge the scope of the program in the future.

PROPOSED PLANS FOR THE CONSTRUCTION
OF CORN STORAGE WAREHOUSES

Corn is an important item in the Cuban diet. One author estimates that about 260 million pounds of corn meal are consumed annually as food, or about 50% more than the quantity of wheat flour. The value of such direct consumption is estimated at about \$9,000,000 annually. Practically all of Cuba's corn requirements during recent years have been grown in the country by small farmers. Yields are low, but compare with those in the southern United States.

As in most warm climates, including the southern part of the United States, stored corn suffers severe loss from insect damage unless special protective measures are employed. The simplest measures to prevent this damage, and those recommended in the southern United States, are to fumigate and store in tight cribs or bins.

The typical small Cuban farmers have very little in the way of any farm buildings and especially no storage facilities such as would be required to permit fumigation and to keep the corn free from further insect infestation. Consequently, the farmers find it necessary to sell their corn soon after harvest at very low prices, reported to vary from 40 cents to \$1 per hundred pounds of shelled corn. Yet several months later, the corn in Habana sells at about \$2 per hundred pounds.

In order to decrease the insect damage, provide adequate storage and stimulate more orderly marketing, it is proposed that four trial storage warehouses, with equipment for drying and fumigation, be constructed in the following cities in the most important corn-producing areas:

<u>Province</u>	<u>City</u>
Oriente	Palmarito de Cauto
Oriente	Holguin
Santa Clara	Placetas
Pinar del Rio	Artemisa

There already exists a large privately-owned warehouse in the province of Matanzas adequate for that region. It is estimated that these warehouses can be constructed and equipped at a cost of about \$25,000 each, or a total of \$100,000.

It is assumed that the method of operation of these corn warehouses would be similar to that proposed for the bean cold storage plants. Amortization and interest at the same rates mentioned for cold storage plants would amount to a total of only about \$9,000 annually for the four corn warehouses. It is anticipated that the issuance of similar storage certificates or warrants would permit the grower to obtain some financial credit on the corn in storage and thus obviate the necessity of selling immediately after harvest.

This project appears to be justified and to be highly desirable. The four warehouses would, of course, be sufficient to handle only a small part of Cuba's total corn crop, but would constitute an excellent trial. Other warehouse facilities already exist, as, for instance, at some of the sugar mills, but such warehouses are not at present suitable for corn storage nor equipped for drying and fumigation. It is felt that the construction of the proposed four warehouses as an experimental basis would later induce private interests to equip commercial warehouses for suitable corn storage.

PROPOSED PLAN FOR THE CONSTRUCTION
OF COLD STORAGE FACILITIES
FOR BEANS AND OTHER PRODUCTS

Beans of various kinds play a very important part in Cuba's food requirements and are also an important item of farm production. The total annual consumption of beans and chickpeas in Cuba is estimated to be about 145 million pounds, with a value of about 10 million dollars. Per capita consumption is several times that in the United States. About 70 million pounds consist of black beans grown in Cuba; in addition, about 34 million pounds of red or kidney beans are consumed, but only about half of these are produced domestically. In addition, about 22 million pounds of white beans are largely imported. Cuba, therefore, produces only about two-thirds of its total requirements of beans, the remainder being chiefly red and white beans imported principally from Chile, China and Japan.

One of the most important handicaps to the production of beans in Cuba is the fact that beans are infested with weevil which in the warm and moist climate multiply rapidly and cause very serious damage while the beans are in storage. Consequently, the farmer is unable to hold his crop on the farm for any length of time and is forced to sell soon after harvest at temporarily depressed prices. Most of the crop is grown during the fall and harvested in December, and consequently, when the farmer is forced to take his crop to the local bodega, he receives an abnormally low price, usually between 1.0 and 1.5 cents per pound. Following this season of heavy marketing, prices rise rapidly, frequently to

more than double the prices prevailing at the time of harvest. If he were able properly to grade and store the beans for several months, he would receive materially higher prices and would find it advantageous to increase production to the point of supplying the greater proportion of the country's requirements. Similar weevil damage in the southern part of the United States has been largely responsible for the fact that most of the bean production is concentrated in the northern states, where cooler climate greatly reduces the extent of the damage.

Bean weevil can be controlled either through fumigation or through cold storage. The former is said to affect adversely the cooking quality of the beans. Cold storage or refrigeration, even at the relatively high temperature of 12 degrees Centigrade (53.6 degrees Fahrenheit), is sufficient to completely control weevil damage, and storage at such temperatures is relatively inexpensive, although more expensive than fumigation. Furthermore, the same cold storage facilities are expected to be used also for other products, most important of which are potatoes.

It is proposed to construct six cold storage plants, one in each province, near the most important growing areas and accessible to good transportation either by road or railway. In addition to the equipment for cold storage, each plant would also be equipped to clean and grade the beans in order to establish ready marketability. It is proposed that immediately after harvest, the farmers send their beans, either by truck or railway, to one of the cold storage plants.

Proposed Cold Storage Plants

Province	City	Area of Beans Accommodated	Cold Storage Space	Estimated Cost	
				Per Cubic Foot	Total
		<u>Cabs /1</u>	<u>Cu. Ft.</u>	<u>Cents</u>	<u>Dollars</u>
Oriente	Holgufa	300	200,000	60	120,000
Camaguey	Olego de Avila	300	200,000	60	120,000
Santa Clara	La Esperanza	200	133,000	75	100,000
Matanzas	Jovellanos	200	133,000	75	100,000
Habana	-	80	50,000	80	40,000
Pinar del Rio	-	<u>80</u>	<u>50,000</u>	<u>80</u>	<u>40,000</u>
	Total	1,160	766,000	68	520,000

/1 One caballeria equals 33.16 acres.

where the beans would be cleaned, graded, weighed, bagged and stored, and a certificate or warrant be issued to the farmer, stating the quantity of each grade of beans delivered.

It is hoped that such certificates or warrants would be accepted as a basis of eventual sale by the farmer, and that prior to sale, banks, commercial concerns or other credit institutions would be able to advance credit to the farmer on the basis of such warrants.

Adequate commercial storage facilities already exist in Santiago de Cuba and in Habana, and therefore it is not proposed to construct additional storage in these cities. However, the rates of the existing commercial storage are relatively high, varying from 7 to 10 cents per hundred pounds per month, whereas the Government hopes to be able to provide satisfactory storage for about 3 cents per hundred pounds per month.

The total proposed investment for the six plants amounts to \$520,000, and this amount amortized over 15 years, and allowing for 4% interest, would involve an annual charge of \$46,000 per year. This charge for interest and amortization alone would be equivalent to about 1 cent per month per hundred pounds of the full capacity of the plants.

It is proposed that the Cuban Government construct the buildings and install the equipment and then turn the plants over to be operated by some responsible local firm under a contract with the Government, in which the latter would specify the rates to be charged

to farmers for the service, as well as other details of supervision and grading. Electric current would be used as power and is available at favorable rates. The maximum storage capacity of the proposed plants would be sufficient to handle only about half of the country's present production of beans.

This project appears to be reasonable and sound. There is little question that facilities should be provided for adequate storage of this vital crop, not only in order to stimulate increased domestic production, but also as a means for permitting growers to obtain much more satisfactory prices for their product without raising the cost to the consumer. It is also proposed that part of the storage facilities be used for potatoes and other crops.

RAINFALL AND TEMPERATURE

Cuba has a semi-tropical to a tropical climate suitable for production of most tropical plants. The temperature is uniformly warm and frost-free, and the rainfall plentiful in summer but light in winter. The mean monthly temperatures usually vary from a minimum of about 70 degrees in winter (December, January, and February) to a maximum of about 85 degrees in the summer. (July and August).

A conspicuous feature of Cuban rainfall is the high degree of dependability during the usual crop growing months - from May to November. Rainfall is fairly evenly distributed geographically, but is heavier over the western provinces and lighter over the eastern provinces. However, there are marked variations in seasonal distribution.

The mean average annual rainfall is approximately 55 inches. The dry months are December, January, February, and March. The months of May, June, July, August, September, and October are considered the rainy or wet months. The months of April and November are the dividing lines between wet and dry periods but generally these months are more often dry than wet. Thus Cuba has 4 dry months, 6 wet months, and 2 months that are uncertain. At times dry periods occur in July, August, or September, the time depending somewhat on the location. Thus it is important to analyze the rainfall records of different areas so as to determine the most frequent occurrence of dry spells in order that rice may be sowed so that its critical growing period may be over before the dry spells occur.

Table --Percentage Analysis of Several Proposed Irrigation Projects in Cuba

Item	Buey	Yara	Maxima	Cuyaguateteje	Sagua	Maximum Percent
Water Supply						
Runoff.....	10.5	10.5	14.0	16.0	13.0	17
Rainfall.....	8.0	8.0	9.0	11.0	10.0	13
Cost Per Acre.....	15.0	10.5	10.5	9.5	9.0	15
Soils.....	9.2	8.8	9.7	9.7	6.0	12
Suitability for Crops in Dry Season	7.0	6.5	3.5	10.0	1.0	10
Availability of Farmers to Grow Rice	8.1	6.3	3.8	8.1	5.6	10
Number of Irrigable Acres.....	5.0	4.3	2.3	1.5	4.3	5
Willingness of Farmers to Coop....	3.0	1.0	4.0	3.0	2.0	4
Topography.....	2.0	2.0	2.0	1.0	2.0	2
Drainage.....	2.0	2.0	1.0	2.0	2.0	2
Flood Conditions.....	2.0	1.3	0.7	2.0	2.0	2
Water Rights.....	1.0	0.5	2.0	1.5	2.0	2
Construction Problems.....	1.3	0.7	0.7	0.7	2.0	2
Labor Conditions for Construction..	2.0	2.0	1.0	2.0	2.0	2
Time Required to Complete.....	1.5	0.5	1.0	1.0	2.0	2
Total.....	77.6	64.9	65.2	79.0	64.9	100

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REORGANIZATION OF AGRICULTURAL INVESTIGATION,
EXTENSION, AND EDUCATION IN CUBA

This Commission believes that any program looking toward agricultural development of Cuba along the lines suggested in this report can only prove effective if it is preceded and accompanied by reorganization of those governmental agencies which deal with agriculture.

The MINISTERIO DE AGRICULTURA should be taken out of politics, at least insofar as concerns the technical personnel. The latter should be reorganized on a basis of efficiency and assurance of continuing employment, free from political influence. We feel that the Ministerio at present lacks sufficient technicians of ability and experience. We do want to acknowledge, however, our high regard for some of the technicians with whom we have had contact. This reorganization of the staff would call for a great deal more money than is covered in the scanty appropriations currently made for this important department of the government.

We feel that it would be sound to suggest that the Cuban Government request the United States Government to furnish the services of (1) an experienced man as Director (or in any other appropriate capacity) of the Extension and Education Service; (2) an experienced man to take charge of the Experiment Station and other investigational work of this

branch of the Ministerio (as suggested elsewhere in this report); (3) a competent Soil Technologist to direct the important study of Cuban soils so soundly begun by Bennett and Allison in the '20's; and (4) an experienced Hydrologist to conduct an extensive survey of available sources of water supply.

The EXTENSION AND EDUCATIONAL work, if properly organized, would make possible the rapid building up of the general level of agricultural practice among the small farmers of the Island, a thing urgently needed. The machinery is already available. There are six secondary agricultural schools scattered over the Island (one in each Province) and the school for Ingenieros Agronomos y Azucareros of the University of Habana. These schools - particularly the Granjas or Provincial Agricultural Schools - need to be taken out of politics and given more support.

The work of agricultural extension could be carried on admirably through the 126 Inspectores Municipales de Agricultura, who, for various reasons, are not today fulfilling all necessary functions. These men are in reality the key men in the development of Cuban agriculture as a whole--comparable to our county agents in the United States. Today most of them are doing little except to estimate data regarding agricultural production in their respective areas. They are almost wholly without funds with which to work. We have been told by several that they have no means of getting around their territories except those provided at their own expense.

We believe this work should be reorganized, the poor men weeded out, and the good ones given facilities to do their work properly, with assurance that their tenure will not be subject to political whims.

An experienced SOIL TECHNOLOGIST, with good knowledge of tropical soils, could advantageously be employed to organize and direct the study of Cuban lands, which was commenced so soundly by Bennett and Allison some 15 years ago. There are, in Cuba, several excellent young men working in this field of science, men who in time will be prepared to direct this work; but the urgent need for studies of land utilization, in connection with the diversification program, suggests the employment of someone who can head this work for the next few years at least.

DEPARTMENT OF STATE
Washington

October 22, 1940

E R R A T A

Please make the following corrections in the copy of the memorandum entitled "Statement of the Plan of Operation with Regard to the Proposed \$50,000,000 Loan" that has been sent to you:-

INTRODUCTION - The following words should be added to the last sentence on page 4:

"offer unlimited prospects if they meet with success in"

CHAPTER I - Paragraph 3 on page 9 should read.

"The budget now in force will show a deficit of approximately six million seven hundred thousand dollars and it is considered prudent in the next budget to provide for an extra three million three hundred thousand dollars to prevent a serious deficiency."

November 6, 1940

Hon. Sumner Welles,

Under Secretary of State.

Dear Mr. Welles,

In accordance with your request, this Department has examined the reports of the Cuban Mission, dealing with the use that would be made of the \$50,000,000 loan that it is proposed to obtain from the Export-Import Bank. Of this total, it is proposed in the Cuban report to devote \$7,800,000 for "agricultural, cattle and irrigation developments". This sum would be distributed as follows:

(a) Rural colonization	\$3,000,000
(b) "Warrant" refrigerators	520,000
(c) Corn warehouses	100,000
(d) Reforestation	730,000
(e) Tick eradication zones	400,000
(f) Irrigation	2,000,000
(g) Development of rice cultivation	789,575
(h) Cultivation of new vegetable species	81,217
(i) An industrial research laboratory	179,208
Total	<u>\$7,800,000</u>

After a number of meetings with members of the Cuban Mission and detailed discussions of the question between members of our staff, this Department wishes to make the following observations in regard to the agricultural items included in the \$50,000,000 loan request.

1. A sum of \$7,800,00 for agricultural projects is by no means excessive in relation to a total of \$50,000,000. In fact, a larger proportion of any loan might well be devoted to agricultural developments in view of the importance of agriculture in the economic life of Cuba and the urgent necessity for far-reaching adjustments

in Cuban agriculture.

2. This Department feels that the individual agricultural projects listed in the Cuban report all have merit but it is not prepared, without investigation in the field, to indorse the precise division of the funds between the projects suggested by the report. It is apparent, however, that the primary objectives to be sought under such agricultural developments should be increased production of subsistence crops in Cuba, on the one hand, and, on the other, the development of new export crops that can find markets in the Western Hemisphere and particularly in the United States.

3. It is strongly urged, that, before any actual work is undertaken on agricultural projects under the proposed loan program, field surveys be conducted by experts from the United States Department of Agriculture in order to assist in getting the projects under way in as effective a manner as possible. Furthermore, it is felt that the United States should contribute continuous investigation and technical direction as the work progresses. Definite funds should be provided for such assistance and it is suggested that this could be done by setting aside a certain percentage of the total that may be allotted for agriculture under the proposed loan, say, 10 percent, to be available over a period of years as the projects developed.

4. This Department regards as essential to the development of both subsistence crops and new export crops an effective system of agricultural credit in Cuba. We understand that no system exists at the present time and note that there is no provision for such a system in the report submitted by the Cuban Mission. The agricultural representative on the Cuban delegation informed representatives of this Department, however, that plans were under

way, independent of the present loan negotiations, looking toward the establishment of adequate banking and credit facilities in Cuba, including an effective agricultural credit system. This Department regards it as important that such a system be initiated and put into operation in order that it may contribute to the effective development of the agricultural projects proposed in the loan negotiations.

Sincerely yours,

Secretary.

Guatemala City

November 25, 1940

By air mail

Mr. A. A. Pollan
Boston, Mass.

Dear Mr. Pollan:

Regarding Dr. Popenoe:

Mr. E. N. Bressman, Assistant Director in the Department of Agriculture at Washington, wrote to Dr. Popenoe on November 15 thanking him for certain information on tropical products which Dr. Popenoe was able to give to the Department of Agriculture. The information referred to was undoubtedly much appreciated by the Department.

In his letter Mr. Bressman asks Dr. Popenoe for suggestions regarding good tropical horticulturists.

Mr. Bressman tells Dr. Popenoe that the Department will probably be interested in sending some good men to Cuba for about two months in connection with agricultural surveys, etc. Mr. Bressman asks if the United Fruit Company would be sufficiently interested to allow Dr. Popenoe to participate in this work for a couple of months. The Department thinks that possibly on account of our Company's holdings in Cuba we might be interested in some of the work that the Department will have done.

I told Dr. Popenoe this morning that I knew you would be very glad to cooperate with the Department of Agriculture in Washington to the extent of allowing him to work for them for a couple of months, as requested, provided of course that they would not require his services at a time when we could not conveniently spare him from the work he is doing for our Company.

I have told Dr. Popenoe, who receives copy of this letter, to reply to the letter from Mr. Bressman asking that he advise more or less when his, the Doctor's, services would be needed by the Department, so that Dr. Popenoe can advise us, and then - if we find it convenient to let the Doctor go on this two-month job - the Department will so be advised by your office as well as by Dr. Popenoe.

In his letter Mr. Bressman states that he is working up a project which will make provision for obtaining travel expenses and salaries for the men to be sent on this Cuban work. This would take care of part or all of Dr. Popenoe's salary while on this work -- it being understood that if Dr. Popenoe is out of pocket for the two-month job referred to, our Company will gladly make up the difference.

I will be glad to hear from you in connection with the above.

While talking to Dr. Popenoe this morning I advised him that the Government in Bogotá, as well as Manager R. H. Hamer, want him to go to Colombia early next year. The Government wants his assistance in connection with diverse crops, and Hamer wants Dr. Popenoe to help in the selection of lands for rehabilitation.

Mr. A. A. Pollan, Boston. -2-

Guatemala, November 25, 1940

I mentioned to Dr. Popenoe that on account of very recent events in Colombia, it may not be necessary for him to go there next January, in which case I would like to have him visit Santo Domingo -- in fact, I had planned that he could go there with me at the same time that Dr. Dunlap and Professor Morgan visit that country.

If our affairs get straightened out in Colombia, then by all means I prefer to have Dr. Popenoe go there to help both the Government and the Magdalena Fruit Company.

Yours very truly



W. E. Turnbull

cc ✓ Dr. Wilson Popenoe

Dear Doctor: I am returning herewith Dr. Bressman's letter which you kindly lent me.



Boston, Massachusetts
December 2, 1940

Mr. W. E. Turnbull
Assistant Vice President
La Lima, Honduras

Dear Mr. Turnbull:

Your letter of November 25th.

As long as it does not conflict with his work in
Colombia, we have no objection to Dr. Popence's going to Cuba
for about two months in connection with agricultural surveys
for the United States Department of Agriculture. This as
requested by the Department in letter to Dr. Popence from
Mr. E. N. Bressman, Agricultural Director.

Yours very truly,

A. S. Pollard
H

Copy to: Dr. W. Popence /

C
O
P
Y

December 13, 1940

Mr. Arthur A. Pollan
Executive Vice President
United Fruit Company
One Federal Street
Boston, Mass.

Dear Mr. Pollan:

You will recall that I discussed with you, a couple of weeks ago when you were here in Washington, our desire to have Dr. Wilson Popence of your Company to assist with an agricultural survey that we are planning in Cuba beginning January next year. At that time you indicated that you would make Dr. Popence available to us.

It is our plan to have four agricultural experts to make this survey and base much of their work on the recent request for a loan to develop their agriculture. We would expect Dr. Popence to handle the work on the possible development of new complementary agricultural products for that country. As I explained, too, we have funds for paying such expenses connected with the trip as travel and per diem, but do not have funds for paying salaries. The other members of the party will be employees of this Department. We would like to appoint Dr. Popence as collaborator for about two months and have you carry his salary. We feel that this work in Cuba is of great importance and also feel that the job can be well done if we have someone like Dr. Popence connected with the survey.

Will you kindly let me know if he will be available under the above condition?

Very truly yours,

(signed) E. N. Bressman
Assistant Director

C. S. Jones

December 26, 1940

Dr. E. N. Bressman,
Assistant Director,
U. S. Department of Agriculture
Washington, D. C.

Dear Dr. Bressman:

I have been in New Orleans for some time, hence the delay in answering your letter of December 13th, in which you express your desire to have Dr. Wilson Popence of our Company to assist with an agricultural survey that you are planning in Cuba beginning January of next year. We will be very glad to make Dr. Popence available to you for the purpose expressed. It is my belief that he can devote his entire time to this work during a period of approximately two months. If it should develop that we urgently require him for a few days on some special job, I assume it would be possible for us to take him for such a short period without interfering with your program. I note you have funds for paying expenses connected with the trip as travel and per diem, but do not have funds for paying salaries. This will be entirely satisfactory to us and we will be very glad to absorb Dr. Popence's salary. I might add further that no charge will be made against the Government for steamship travel if it so happens that Dr. Popence is traveling on one of the United Fruit Company ships. I am sending a copy of this letter to Dr. Popence together with a copy of your letter. Please let me know when and where you would like him to report.

Yours very truly,

Copy to: Mr. W. E. Turnbull
Dr. Wilson Popence ✓

W. E. Turnbull

COPY TO DR. WILSON POPENOE
Antigua, Guatemala

January 2, 1941

Mr. A. A. Pollan
Executive Vice President, United Fruit Company
One Federal Street
Boston, Massachusetts

Dear Mr. Pollan:

Many thanks for your kind letter of December 26, offering the services of Dr. Wilson Popenoe for the agricultural survey that we are planning in Cuba this month.

Right now, we have hopes of getting the survey under way about January 20. At first we had thought it might be advisable to have Doctor Popenoe come to Washington for a few days before joining the group there, but it now appears that that may not be necessary. We are, of course, delighted to have Doctor Popenoe's valuable services in this survey, which we feel is of great importance. I am sure that the work of the party in Cuba will reflect credit on all concerned.

I am leaving town the first part of next week, but Mr. L. A. Wheeler, Director of this Office, will keep in touch with Doctor Popenoe and advise him as to details regarding the survey.

Thanking you again for your fine cooperation in this matter,
I am

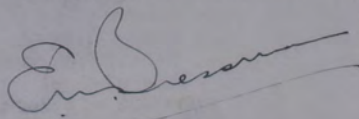
Very truly yours,

E. H. Bressman,
Assistant Director

EBB:ed

NOTE TO DOCTOR POPENOE

This will acknowledge your airmail letter of December 26. Doubtless January 20 for the Cuban survey will fit in with your plans. Mr. Wheeler, as indicated above, will advise you as to details or any changes from the present plan (to have you go direct to Havana about the 20th) that may occur. It might be necessary to appoint you as a collaborator from this Department, but I feel sure you would have no objections to that.



January 10, 1941

AGRICULTURAL SURVEY OF CUBA

1. - In the "Statement of the Plan of Operation With Regard to the Proposed \$50,000,000.00 Loan" submitted by the Cuban Economic Mission to the United States Government in October 1940 there was included a section dealing specifically with assistance to agriculture. After careful examination of this section the United States Department of Agriculture concluded that, in general, the proposals for agricultural reorientation were well-founded but that it was not prepared, without a first-hand survey, to comment specifically on the feasibility or desirability of any particular item. It did not feel, however, that the sum of around seven or eight million dollars was excessive in the light of the apparent need.

2. - Subsequently the Federal Loan Administrator indicated in a communication to the Department of State that the Trustees of the Export-Import Bank "will give consideration to applications for loans of a total amount not to exceed \$10,000,000 in connection with such self-liquidating projects of agriculture development and diversification as may be recommended by representatives of the Bank, Department of Agriculture, Farm Credit Administration, and the Federal Reserve System, in connection with appropriate Cuban officials."

3. - As a basis for possible recommendations along this line it is proposed that an agricultural survey party go to Cuba in the near future for the purpose of studying particularly the following subjects, all of which were included in the report submitted by the

Cuban Economic Mission:

- (a) The promotion of rice production in Cuba and, in general, the development of irrigation works.
- (b) The development of new crops for export to the United States or other parts of the Western Hemisphere.
- (c) The development of a system of rural rehabilitation.

While these would be the principal lines of activities that would be investigated, all of the proposals for agricultural development made by the Cuban Economic Mission would be studied by the survey party.

4. - The membership of the survey party would, it is hoped, include the following:

- Mr. Garibaldi Laguardia, Principal Agricultural Economist, Agricultural Adjustment Administration, U. S. Department of Agriculture.
- Dr. Wilson Popencoe, Tropical Agriculturalist, United Fruit Company, on detail to the U. S. Department of Agriculture.
- Mr. H. F. Blaney, Irrigation Engineer, Soil Conservation Service, U. S. Department of Agriculture.
- Mr. William T. Shaddick, Assistant State Director, Farm Security Administration, U. S. Department of Agriculture.
- Dr. Paul G. Minneman, Foreign Service Officer on detail to the U. S. Department of Agriculture.

5. - It is suggested that this party go to Cuba under the leadership of Mr. Laguardia for the purpose of making the studies indicated in cooperation with the appropriate Cuban officials. It would be understood that both salaries and travel expenses to Cuba and per diem while in Cuba would be paid by the United States Department of Agriculture. It is felt, however, that the Cuban

Government should contribute travel facilities in Cuba and certain clerical assistance, the latter to be worked out upon arrival. It is anticipated that the survey might require approximately two months. It is hoped that it could be started around January 20.

FRUITS AND VEGETABLES AUTHORIZED TO ENTER THE UNITED STATES
IN COMMERCIAL QUANTITIES FROM CUBA, UNDER PERMIT, UNDER THE
PROVISIONS OF QUARANTINE NO. 56

January 22, 1941

All Ports: Allium spp. (includes chive, garlic, leek, onion, scallion, and shallot), bananas, breadfruit, cacao bean pod, cassava, Chinese cabbage, Coriander greens (Coriandrum sp.), eggplant, lemons, limes (sour), mint, mustard greens, okra, pepper, papaya, pineapples, potato (separate permit), pumpkin, tamarind bean pod, tomato, waterchestnut, watercress, waterlily root, waterlily seed pod

North Atlantic Ports: Artichoke (Globe), artichoke (Jerusalem), asparagus, avocado, bean (faba, lima, and string)* through New York, beet (including Swiss chard), Brassica oleracea (includes broccoli, brussels sprouts, cabbage, cauliflower, collard, kale, kohlrabi, and Savoy), carrot, celery, Cichorium spp. (includes chicory, endive, escarol, or witloof), citrus fruit, cucurbits, dashen, Euphorbia longana, ginger root, kudzu, lettuce, Litchi chinensis, Melicocca bijuga, parsley, parsnip, pea, pigeonpea, radish, rhubarb, rutabaga, spinach, strawberry, turnip.

*All faba, lima, and string beans are required to be fumigated as a condition of entry. Such fumigation may be given at Havana or at New York.

South Atlantic & Gulf: Same as those in preceding list with the exception of beans (faba, lima, and string), Euphorbia longana, Litchi chinensis, Melicocca bijuga, and pigeonpea.

North Pacific Ports: Avocado, citrus fruit

"Ports" as used in this list mean those ports at which this Bureau maintains inspection service in the enforcement of foreign plant quarantines.

"North Atlantic Ports" are the ports of Baltimore, Philadelphia, New York, Providence, and Boston.

"North Pacific Ports" are those of Portland, Oreg., and Seattle, Wash.

Because of fruitfly risk a great many fruits are not authorized to enter the United States from any foreign country - among these are: mangoes, guavas, manny apples, star apples, sapodillos, penicillium, etc., etc.

Cuba

Habana. - Capital of the Republic and largest commercial center in Cuba (including suburbs), 728,197. Approximately 75 to 80 percent of Cuba's imports and about 25 percent of its exports clear through the port of Habana, which has an excellent harbor. Many large transatlantic liners call at this port during the winter tourist season. The city is very attractive and boasts of many modern improvements. Hotel accommodations are good. Principal industries: Cigar and cigarette making; breweries; textile mills; packing plants and canneries; bottling plants; cement and tile factories; stone works; foundries and machine shops; soap, perfume, and cosmetic factories; pharmaceutical manufacture; confectionery; bakeries; leather and shoes; furniture.

How Reached. - See section, "Transportation and Communication."

Hotels: - First-class hotels include the National and the Sevilla-Biltmore. Other hotels are Presidente; Parkview; Florida; Lincoln; Royal Palm; LaFayette; Ambos Mundos; Plaza.

Bayamo. - Province of Oriente; population, 75,793; 81 miles from Santiago de Cuba; 25 miles from Manzanillo. Principal products: Cattle, tobacco, swine. Industries: Chiefly agricultural; also tobacco and tile factories, and large condensed-milk, butter, and cheese factories.

How Reached. - By railroad or Central Highway.

Hotels. - Telegrafo; New York.

Note. - Bayamo is located in the largest cattle-raising district of Oriente Province.

Camaguey. - Capital of Province of Camaguey; population, 137,893; located near center of the Province, 355 miles from Habana, 250 miles from Santiago de Cuba, and 45 miles from Nuevitas, its chief port. Principal products: Cattle, sugar, molasses, lumber. Industries: Distilleries, sawmills; furniture, butter, cheese, match, and soap factories; bottling plants.

How Reached. - By railroad; by the Central Highway; or by plane.

Hotels. - Camaguey; Plaza; Inglaterra; Habana; Gran; Colon; Isla de Cuba.

Note. - Camaguey is an important city in the center of a large cattle-raising and agricultural district. Many wholesale firms, particularly in provisions and groceries, are located here and distribute to smaller towns in this and adjoining Provinces. Camaguey is the headquarters and a division point of the Cuba Railroad, and is the junction point for branches to the north coast (Nuevitas) and to Santa Cruz del Sur, center of the mahogany and cedar district on the south coast.

Ciego De Avila. - Province of Camaguey; population, 67,347; 287 miles from Habana; 317 miles from Santiago de Cuba; 17 miles from Jucaro, a port on the southern coast. Principal products: Sugar, cattle, and oranges. Industries: Sawmills, brickyards, and bottling works.

How Reached. - By railroad or by Central Highway.

Hotels. - Rueda; Plaza; Sevilla.

Note. - Ciego de Avila is a railroad junction in the center of a large sugar-growing district..

Cienfuegos. - Province of Santa Clara; population, 92,063; situated on south coast on Bay of Cienfuegos or Jagua, 227 miles from Habana and 41 miles from Santa Clara. Principal products: Sugarcane, coffee, and tobacco. Industries: Sugar mills; soap, candle, tobacco, brick, and tile factories; cabinet-making; manufacture of luggage and clothing; ice and soft drink factories; and distilleries.

How Reached. - By railroad, highway, boat, or plane.

Hotels. - San Carlos; Union; Suiza; Bristol.

Note. - Cienfuegos is one of the most important commercial centers in Cuba, ranking after Habana and Santiago de Cuba and holding seventh place in importance as a port for the export of sugar. There is some direct importation, but most of the imported products consumed here are cleared through Habana. Principal imports are provisions (including rice, flour, beans, chickpeas, oats), wines, liquors, drugs, hardware, petroleum products, coat and lumber. There are a number of wholesale houses and many retail concerns. American vice consul in residence.

Guantanamo. - Province of Oriente; population, 68,311. Port at Caimanera (U. S. Naval Base), Guantanamo Bay, which is 20 miles from Guantanamo by railroad; 40 miles from Santiago de Cuba; 572 miles from Habana. Principal products: Sugar, beeswax, lumber, coffee, and bananas.

How Reached. - By railroad or plane from Santiago.

Hotel. - Washington

Holguin. Province of Oriente; population, 140,451; 83 miles northwest of Santiago de Cuba. Principal products: Sugar, tobacco, vegetables, cattle and gold.

How Reached. - By railroad or by Central Highway.

Isla de Pines. Province of Habana; population, 10,165; 80 miles from Batabano. Principal products: Grapefruit, oranges, melons, and winter vegetables. Industries: Sawmilling, gold mining, marble quarrying, and sponge fishing.

How Reached. - From Habana by railroad to Batabano, and thence overnight by steamer. (

Hotels. - Santa Rita and Santa Barbara Inn, at Santa Fe and Santa Barbara, respectively; Anderson's and San Jose, at Nueva Gerona. Nueva Gerona is the chief business center.

Matanzas. - Capital of Province of Matanzas; population, 72,481. Port on Matanzas Bay; 63 miles from Habana and 541 miles from Santiago de Cuba. Principal products: Sugar, molasses, honey, beeswax, fruits, sisal and henequen fibers. Industries: Cordage factory; sugar mills; tanneries and shoe factories; foundries; brickyards; soap, match, and confectionery factories; fertilizer plant.

How Reached. - From Habana, by railroad and by Central Highway in about 3 hours.

Hotels. - Louvre; Seville; Paris; Velasco.

Note. - Matanzas is an important industrial city, easily reached from Habana. It ranks fourth in national importance as a port of export. Matanzas is about 30 miles from San Miguel de los Baños, a popular spa. American vice consl in residence.

Pinar Del Rio. - Capital of Province of Pinar del Rio; population, 64,470. Located in western end of the island 110 miles from Habana. Principal products: Tobacco, fresh fruits and vegetables, sugar, copper, and manganese.

How Reached. - From Habana, by railroad or by the Central Highway in about 4 hours.

Hotels. - Ricardo; Marina; Globo.

Note. - Pinar del Rio is a city of considerable importance. A large business is done with the surrounding districts. The chief wealth is in tropical agricultural products, especially tobacco, the finest grade being grown in this district (Vuelta Abajo).

Santiago De Cuba. - Capital of Province of Oriente; population, 106,860. On southeast coast, 604 miles from Habana, 40 miles from Guantanamo. Principal products: Sugar, iron ore, manganese, rum, tobacco, lumber.

honey, and beeswax. Industries: Breweries and distilleries; mining; agriculture, brickyards; sawmills and lumber yards; manufacture of ice, matches, candles, soap, cigars, preserves, and confectionery; foundries and machine shops.

How reached. - By railroad, by Central Highway, by airplanes, or by coastwise steamers.

Hotels. - Casa Grande; Venus; America; Imperial.

Note. - Santiago is second in importance among the cities of Cuba. Most of the leading wholesalers, distributors, and agents in Habana have subagents in Santiago who handle the eastern end of the island for them. It is an important port, and some wholesalers and retailers make direct importations. Several important mining companies are located near Santiago. American vice consul in residence.

Sancti Spiritus. - Province of Santa Clara; population, 92,006. Located 50 miles from the city of Santa Clara and 240 miles from Habana. Principal products: Sugarcane, tobacco, and cattle. Industries: Cigar and Cigarette factories; farming; cattle raising; condensed-milk factory.

How Reached. - By railroad or by Central Highway.

Hotels. - Plaza; Isla de Cuba; Perla de Cuba.

Santa Clara. - Capital of Province of Santa Clara; population 99,363. Located 179 miles from Habana and 41 miles from Cienfuegos. Principal products: Sugar, tobacco, and cattle.

How Reached.- By railroad or by Central Highway.

Hotels. Santa Clara; Plaza; Telegrafo; Florida; Central; Suizo.

Note. - Santa Clara is the Terminus for both the United Railways of Habana and the Cuba Railroad.

MEASURERS

Weight

1 Kilogram = 2.2046 pounds (U. S.)
1 Libra = 1.0143 "
1 Arroba = 25.3575 "
(25 libras)
1 Quintal (Cuban) = 101.43 pounds
(100 libras)

Length

Vara = 33.4 inches
Meter = 39.37 "
Kilometer = 0.6214 miles

Area

1 Are = .002471 acres
1 Hectare = 2.471 "
1 Caballeria = 33.16 "

Volume

1 Liter = 0.264 gallon (U. S.)
1.057 quarts
1 Bocooy = 175. gallons
(662.4 liters)
1 Pipa = 126. "
(476.93)

AUTHORIZATION—AMENDMENT

No. 33-(FAR)-1

March 12, 19 41

Name Mr. Wilson Popenoe Title Collaborator
Office of Foreign Agricultural Relations Official station Washington, D. C.

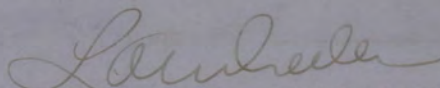
Letter of authorization issued to you on January 23, 19 41, is hereby amended as follows:

Date effective _____, 19 _____ Duration _____

16-14070 U. S. GOVERNMENT PRINTING OFFICE

Authorizing travel from Cuba to Washington, D. C., stopping enroute at various points within the state of Florida, for the purpose of securing information in connection with the agricultural survey in Cuba, and to participate in completion of the report on the survey; extending the period of travel to on or about April 1, 1941; and increasing the amount that may be expended thereunder from \$350.00 to \$550.00 (\$200.00).

In lieu of subsistence expenses and all fees or tips to waiters, porters or stewards while in travel status within Continental United States, a per diem of \$5.00 will be allowed, and while on shipboard a per diem of \$3.00 will be allowed where price of passage includes meals; otherwise the provisions of the original letter of authorization will be operative. Where more than one rate applies to a period of six hours or portion thereof, the higher rate will apply.



Director, Office of Foreign Agricultural Relations.

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF BUDGET AND FINANCE
WASHINGTON, D. C.

DIVISION OF
BUREAU ACCOUNTING SERVICE
ADDRESS REPLY TO
CHIEF BUREAU ACCOUNTING SERVICE
REFERENCE: DLM:MVG
FL-3

MAR 19 1941

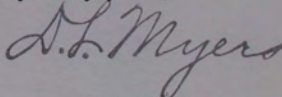
Mr. Wilson Popenoe,
Collaborator,
Office of Foreign Agricultural Relations.

Dear Mr. Popenoe:

Conforming to a request from the Dir., Off. of Foreign
Agricultural Relations,
I transmit herewith Letter of Authorization No. 33-(FAR)-1 dated
March 12, 1941 drawn on appropriation and providing authority
as follows:- "120/25994 Working Fund, Agriculture, Foreign Agricul-
tural Relations (Council of National Defense, Coordination between
American Republics, War) 1940-1942".

Amend Letter of Authorization No. 33-(FAR) by authorizing
travel from Cuba to Washington, D. C., stopping enroute at various
points within the state of Florida; extending the period of travel
to on or about April 1, 1941; and increasing the amount that may be
expended thereunder from \$350.00 to \$550.00.

Very truly yours,



Dwight L. Myers,
Chief, Bureau Accounting Service,
Office of Budget and Finance.

Enclosure:

Cuban Survey

Habana, Cuba, 4 March 1941

Strictly Confidential

Mr. A.A. Pollan,
Boston.

Dear Mr. Pollan:

In the program furnished us in advance by Washington, covering the Agricultural Survey of Cuba, nothing was said about bananas. After we got on the ground, however, we were informed by members of the Cuban government that expansion of commercial banana production for the export market formed part of their program for agricultural diversification, and that they would like our party to give some attention to this subject.

Nothing definite was said until February 15th. At a conference held on that day at the Ministerio de Agricultura (one of many which have taken place) Amadeo Lopez Castro, Ministro de la Presidencia, who has taken the leading part in this survey, on the side of the Cuban government, brought up the subject for consideration. In addition to the members of our party, there were present at this meeting the Minister of Agriculture, the Director of Agriculture, the Director of Industries, Senator Compte, and several other Cuban officials.

Lopez Castro spoke for approximately an hour on the subject of the banana industry. He stated that Cuban banana growers have been exploited by the banana companies; he stated that Cuban growers are handicapped by the fact that the United Fruit Company maintains a complete monopoly of the American market; and he brought out the fact that the United Fruit Company had been requested by the Cuban government in 1939 to assist in studying the possibilities of

expanding the banana industry in this Island, but that the Company had not even replied to this request.

The only other man who offered any extensive comments was the Director of Agriculture, Dr. Jose M. Santos, who said that little could be done unless Cuban growers could be assured of a regular outlet for their fruit.

During all this discussion no mention was made of the agricultural side of the problem. Finally one gentleman raised a question as to the possibilities of producing good fruit in quantity in Cuba. I thought the moment was opportune to stress this aspect - which is the basic one - so I made a brief statement that the future of banana growing in Cuba depended, in the last analysis, upon the agricultural factors - sufficient areas of good soil, water for irrigation, good cultural technique, and Sigatoka control.

Lopez Castro stated categorically that he was not in agreement and the matter was dropped. We were about to leave on a lengthy trip to Eastern Cuba and we broke up with the understanding that we would take advantage of this trip to investigate the possibilities from an agricultural standpoint.

During this trip we visited a large area between Bayamo and Manzanillo which has been considered suitable for irrigation; we visited the experiment being conducted by Hogen for Federico Fernandez Casas at Central America, between Bayamo and Palma Soriano; we visited the banana growing region around Banes, Cayo Mambi, and Baracoa. The Director of Agriculture accompanied us on this trip, and I took advantage of the opportunity to discuss with him, from time to time, the cultural technique used in Jamaica (since this offers the best comparison to Cuban conditions) and the methods of Sigatoka control which have proved successful in that Island.

Upon returning to Habana, another conference was attended, at which very little was said about bananas. I rather doubt that the matter will again come up for extensive discussion, but if it does, I shall maintain the attitude which I have maintained in the past, which is, that I am here on behalf of the United States Department of Agriculture to assist in the study of technical agricultural problems. I shall not allow myself to become involved in any discussion of the organization of the banana industry, the marketing of bananas, and the like.

It is our understanding at present that we will be called upon to prepare a general report upon the results of our survey when we get together in Washington about April 1st. Presumably a copy of this report will eventually be delivered to the Cuban government. No conclusions or findings of this survey party are to be presented to the Cuban government previously.

While it is still a trifle early to make definite plans, it is probable that Mrs Popenoe and I shall go over to Miami on the *Mymargo*, scheduled to sail from Habana on March 20th. I plan to spend about a week in Florida, assembling information on minor subtropical crops, then proceed to Washington, where I should arrive by March 31st at latest. I will get in touch with you promptly on reaching Florida. I am asking Guatemala and Honduras to forward mail in your care: it can be held until I reach Washington, where my address will be 401 Sligo Avenue, Silver Spring, Maryland.

With personal regards,

Sincerely yours,

W. Popenoe

Habana, Cuba, 20 March 1941

Confidential

Mr A A Pollan,
Boston.

Dear Mr. Pollan:

Some days ago I wrote you confidentially that the question of banana production for export had been raised by the Cuban government, in connection with the agricultural survey of Cuba which we have been conducting.

The survey is now complete, and we are leaving for Washington to prepare a report. We have discussed the subject matter of this with the American Ambassador, Mr. Messersmith, and have more or less blocked out the lines on which it will be prepared. The Ambassador is desirous that bananas should be included.

In my previous letter I told you how the matter came up. Lopez Castro talked for some time, at one of our conferences with members of the local Agricultural Department, regarding the difficulties they have had, in the past, with exporting companies; and in general regarding the difficulties of marketing. All this was from the angle that the trouble has not been with Cuban fruit, but with the organization of the marketing end.

I did not want to get involved in any arguments; in fact I did not propose to discuss the marketing end at all, but I thought it was not wise to leave the subject without making it clear that it had an agricultural angle. When opportunity arose, I therefore stated briefly that to me the problem was an agricultural one. Did Cuba have sufficient areas of good banana land, with water

for irrigation? Was Cuba prepared to devote adequate attention to the subject of cultivation, and of Sigatoka control?

I think Lopez Castro felt that he had gone too far in criticizing the fruit Companies. After all, the talk was in bad taste: our Commission is here to study agricultural problems; we have nothing to do with marketing; and he knew very well my background with United Fruit though momentarily I was representing the U.S. Dept of Agriculture. Since we returned from our trip to Oriente, Lopez Castro has said very little about bananas, though I know he is very much interested. A day or two ago the general subject was brought up for discussion by Leon Aisenstein, a Russian who works for Hershey but is very close to Lopez Castro.

In this discussion I was called upon for my views as a result of our field work, and I stated categorically that I saw very little hope for the present banana-growing regions, such as Baracoa and ~~Sama~~. It is admitted that these regions have not been growing much more than 100 stems per acre per year, and the growers themselves told us that their fruit is unmarketable during several months of each year, due to drought. I pointed out that it costs nearly as much to spray an acre which yields 100 stems of poor fruit as it does an acre which yields 250 stems of good fruit; and in the case of the poor acre the total spraying cost is so high that the fruit can not take it. General agreement was expressed among those present.

I further said that we had seen, during our travels, areas of good banana soil, but that we had not been able to determine, even approximately, the extent of these areas. And I further pointed out that we can not evaluate the Panama disease factor except on the basis of test plantings. I discussed the technique used in St

Catherine, Jamaica, where conditions are probably as similar to those of Cuba as in any region where good bananas are grown. I pointed out that there was not sufficient water for irrigation of large areas in the streams of Cuba, and that subterranean water would have to be used if any extensive development were undertaken. Finally, I said that the only way to determine the possibilities would be to make test plantings in likely areas, and find out just what must be expected from Panama disease; what cultivation is going to cost; and how much Sigatoka control will be required.

Frankly, I do not feel very optimistic regarding the future of banana growing here. Questionably the hillsides such as Baracca have a very black future. They can not pay for Sigatoka control. And while there are large areas of fairly good soil in Matanzas province and elsewhere, water is a serious problem; Panama disease is said by the local authorities to be present in nearly all parts of the Island; and it would take years to develop technique sufficiently good (cultivation, irrigation, etc) to produce really high grade fruit such as that we grow in St Catherine.

But I have not thought it wise to be too discouraging. They would say, right away, that United Fruit does not want Cuba to grow bananas. I have therefore limited myself to giving an honest opinion regarding the suitability of various soils, and have said that details can only be determined by field trials.


This is the line of argument that I propose to follow in preparing the report at Washington; but before doing so I would like your advice and suggestions. Will you please write to me at 401 Sligo Avenue, Silver Spring, Md., timing the letter to be there by the 31st, at which date I expect to arrive?

The early part of next week - that is, from Tuesday to Thursday, probably - I shall be at Gainesville, Florida, with Dr R V Allison of the College of Agriculture. That will be about the 25th and 26th. I will then move north to Washington. My understanding is that we shall have to spend quite a little time on our report, and on discussing with people at Washington what is to be done in Cuba. As I think you know, quite a chunk of money is involved. Our job is to suggest what should be done with this money, and to assist in developing a set-up which will insure its going into the right channels.

In my previous letter, I did not mention that I have been in contact with Mr Schuyler at all times and have been guided by his advice. You will understand the omission. And I trust you will pardon my taking the liberty of writing you direct: I did not know where to reach Mr Turnbull, and Mr Schuyler thought you ought to be advised in any case.

With best regards,

Sincerely yours,



UNITED FRUIT COMPANY

GENERAL OFFICES, ONE FEDERAL STREET

BOSTON, MASSACHUSETTS

ARTHUR A. POLLAN
EXECUTIVE VICE PRESIDENT

March 24, 1941

Dr. Wilson Popenoe
401 Sligo Avenue
Silver Spring, Maryland

Dear Doctor:

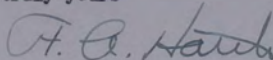
I was glad to receive your interesting letter of March 20th regarding your activities in Cuba. I realize that you were somewhat "on the spot" in any discussion of the banana business, and feel that you handled it very well. I am sure that all of us who know anything about Cuba know that banana raising on a commercial scale there is almost certain to be a flop, but to make the interested parties see it without laying yourself open to suspicion is something else again. I agree absolutely that in making your report at Washington you are absolutely right in giving your honest opinion regarding the suitability of the various soils and stating that details can only be determined by field trials. We certainly cannot afford to give anybody the impression, either in Cuba or Washington, that we are endeavoring to discourage for our own ends the growing of bananas in Cuba.

I was indeed sorry to learn of the death of our old friend General Galavis. I had breakfast with him in New York only a few weeks ago. I imagine the interest in his banana proposition will decline rapidly, as I doubt if he had anyone coming along with sufficient energy and drive to keep it going.

I assume you will see us either in New York or Boston while you are north.

With kindest regards.

Very truly yours



THE TONKA BEAN OR "SARRAPIA" INDUSTRY IN
VENEZUELA

Prague

The tonka bean, known as "sarrapia" in Venezuela, is the seed produced by a fabaceous tree (*ccumarouna adorata*), native to old Guiana, of which the state of Bolívar is now a part. The tree is found growing in largest numbers between the lower Caroua river and the Orinoco. It also grows well in many other parts of Venezuela, and if planted generally might become an even more important source of income to country.

The Tree

The tree reaches a height of a hundred feet and is easily distinguished by the yellowish color of its bark and its brilliant thick foliage. Ordinarily the trees do not grow in solid stands although small clumps are occasionally found. Such clumps are known locally as "Sarrapiales". Sparseness of trees make gathering more difficult and arduous.

The fruit of the tree looks something like a mango in shape and color but is somewhat smaller. The kernel, surrounded by a hard inner shell is the source of "coumarin", the concrete essence of the tonka bean.

The wood of the tree is remarkably close-grained, very hard and heavy, of a reddish color and in some respects resembles lignum-vitae. It is highly prized as a cabinet wood.

Commercial Uses

"Coumarine" is the concrete essence of the tonka bean and is a white crystalline substance, $C_9 H_6 O_2$, of vanilla-like odor. It is employed in various kinds of flavoring, in adding fragrance to soaps and tobaccos, in the scenting of snuff and in the manufacture of perfumes. While the product occurs in other plants and is made artificially, the tonka bean is the principal and most satisfactory source.

Cultivation

Almost all tonka beans exploited in Venezuela are of wild origin and native to the State of Bolívar and Amazonas Territory. These areas are generally far from transportation centers and with rare exceptions, the National Government is the proprietor of all properties.

Some hacienda owners have planted trees on a small scale, principally as shade for cacao in Borburata near Puerto Cabello and in Rio Chico of the State of Miranda. The tree grows well and yields good crops in the northern States of Monagas, Sucre, Anzoátegui and Carababo. It is generally believed that it will do well in almost all of Venezuela, especially in coastal regions and in the interior on lands of medium fertility and reasonably good soil.

The plants begin to bear in small quantities within 18 months from the time of planting. When 3 years old they bear good crops more or less regularly. The trees bear for 50 years or more producing the crop from March to June.

Harvesting.

The ripe fruits of the tonka beans fall to the ground or may be knocked down by birds, rodents and bats. Gathered by workmen and put to dry in the sun, they are then carefully broken and the kernel (tonka bean) is taken out. The latter is about the size and shape of an almond and the color of a dry prune.

All the work of removing the kernel from the hard inner shell is done by hand with the use of rudimentary tools such as hammers, and stones. The gatherers usually work on a contract basis and obtain remuneration depending on the size of the crop, local market prices, and availability of gatherers.

Up to now, apparently no thought has been given to the commercial importance of the hard inner shell of the fruit. It has a pleasant aroma of oily sweetness and may have industrial possibilities.

Preparation for Markets.

Before tonka beans are accepted in markets abroad they must be crystallized by subjection to an alcoholic immersion process. Rum is the form of alcohol used almost exclusively. The beans are first placed in a tight barrel and after being covered with rum are allowed to stand up to 3 months. The alcohol is then drained off and stored for future use. The swollen beans are placed in shallow trays and allowed to dry slowly in dark rooms. When well dried they have shrunken to the color and consistency of a dried prune, almond shaped in form and are covered with small white crystals.

Coumarine. Coumarine crystals, the essence of tonka beans, are removed from the tonka beans or kernel and form a separate article of commerce. This product is used for many flavoring purposes and sells at 20 bolívars, about \$6.25 U. S. Currency, per kilo and up.

Sarrapia. The bean or kernel, with the crystals removed is the sarrapia or tonka bean of commerce. Although nearly free of the crystals when sold to the trade, it still retains within it the greater part of its coumarine and this is extracted in tonka bean essence.

Tonka bean essence. Although small quantities of coumarine are used in snuff tobacco and to some extent in giving fragrance to chewing tobacco, the principal function of the tonka bean derives from the bean itself.

Tobacco companies grind up or macerate the kernel thoroughly and then place it to soak for three months in alcohol. The resulting liquid drained off is the essence of the tonka bean.

The coumarine, the rum soaked previously into the bean, and the immersing alcohol form a blend which is sprayed over tobacco intended for cigarettes and gives the aroma noticeable on opening a package of American cigarettes.

Sarrapia Crystalizada. The alcohol remaining after crystallization, containing part of the coumarine, lees, gum and other substances has been named "sarrapia crystalizada" or crystallized sarrapia. This product is kept for new operations while still suitable for drawing out the coumarin. If evaporated it would contain a high coumarine content.

Sarrapia in General. The word sarrapia, in local parlance may refer to the tree, the fruit, the kernel or tonka bean and even the remaining liquid in which the beans have been soaked. An exact chemical analysis of the bean has not been obtained. Estimates as to coumarine content run as high as 32 percent. Although prepared in a crude manner which seems to have changed little during the past 400 years, Venezuelan sarrapia is regarded as the best in the world and brings the best prices.

Exports

Figures below show exports of sarrapia from Venezuela for the 10-year period, 1931-1940. Since very little of the product is consumed locally, these figures closely approximate production. Figures are also given showing imports into the United States from Venezuela, Trinidad and Tobago. Also, our total imports of sarrapia from all are shown, together with percentage amounts imported from Venezuela, Trinidad and Tobago.

Year	Exports	Imports by	Total	% Imports	Value
	from	U. S. from	U. S.	from Ven.	of Ven.
	Ven.	Ven. Trin. Tob.	Imports	Trin. Tob.	Exports
	Pounds	Pounds	Pounds		Bolivares
1931	560,650	321,170	313,338	86.	1,252,961
1932	215,395	432,822	451,179	96	480,389
1933	34,305	326,375	381,535	86	82,340
1934	933,198	461,825	660,121	70	2,113,934
1935	67,353	343,728	514,751	67	181,497
1936	829,673	349,373	744,948	47	1,885,509
1937	49,306	326,679	620,225	52	148,900
1938	131,560	382,722	618,926	61	
1939		546,316	627,708	87	
1940		285,266	411,178	69	

From the foregoing table it is apparent that there is considerable irregularity of crop production and exports of sarrapia in Venezuela. Also apparent is the fact that a much more even demand for sarrapia exists in the United States over the specified period of years. As may be noted our imports range from nearly one half to nearly all of the Venezuelan exports of this item.

Quality and Prices

Venezuelan sarrapia is classified as first and second grade, the last referring to over-ripe, small, broken and defective kernels.

In 1936, a recent year of good production, second class ran barely 13 percent of the crop. Second class commands about 50 percent of the price received for first class sarrapia.

First class sarrapia in June 1938 was quoted in the American market at \$2.50 to \$2.60 per pound. In 1936, sarrapia producers were receiving about 200 bolivares per quintal (46 kilos or 101.46 lbs.), about 63 cents U. S. currency at the present rate of exchange, but considerably less at that time. By the time it had passed through various hands and reached the "Junta" or buyer-combine in Ciudad Bolivar the price had doubled to about \$1.20 per pound. After crystallization in Trinidad it sold on the New York market at about \$1.60 per pound, a fair average price.

Scarcity of sarrapia has often been responsible for a high price of the product. Also, Venezuelan sellers have at times forced the price to unreasonable heights. While Trinidad, Brazil and certain other countries produce sarrapia to a small extent, Venezuela has had a practical monopoly of the production of the product.

A well known tobacco company in the United States is said to be producing a synthetic article to replace sarrapia which may have the effect of lowering abnormal prices. There are doubts, however, that any synthetic product will be found equal to the natural product for use in connection with tobacco manufacturing.

Places of Shipment

Practically all of the tonka beans produced in Venezuela have in the past been shipped out of Ciudad Bolivar on the Orinoco River. From here the product goes by small steamers to Port-of-Spain, Trinidad where it is re-shipped after crystallization.

Outlook for the Industry

Although sarrapia growing should prove a highly remunerative industry in view of the value of the products obtained and their high prices, there are certain militating obstacles.

Irregularity of the crop has discouraged home planting and cultivation. The causes of almost complete crop failure in some years should be studied with the object of determining whether such factors could be controlled or modified under cultivated conditions.

Heretofore the high cost of the rum for crystallization locally has hampered full development of the industry and the receiving of all logical benefits of the crop.

On January 9, 1937, a Venezuelan decree was enacted which established a 10 percent ad valorem tax on exports of non-crystallized beans. At the same time special rates were made to crystallizers on the alcohol needed for treatment of their sarrapia.

Total export figures of sarrapia from Venezuela for 1939 and 1940 are not available and it is, therefore, impossible to say to what extent the decree of 1937 has benefitted the industry.

In 1938 our imports of sarrapia from Venezuela directly amounted to 19,096 pounds, 1939 to 29,514 pounds and in 1940 to 158,657 pounds. Imports from Venezuela in the latter year exceeded those from Trinidad and Tobago by 32,048 pounds, a very unusual situation.

Almost a complete government monopoly exists for harvesting the crop and ignorant peasants, remembering what has happened to thriving properties in the past, are slow to engage in new ventures.

The wild sarrapia is found in many places difficult of access and far from ports of embarkation. The man equipped with sufficient capital and intelligence is usually far removed, unaware of the crops' potentialities or indifferent.

Venezuela sarrapia appears to be the best in the world and new uses will doubtless be found for it. Possibilities of planting, cultivating, and harvesting tonka beans under scientific methods with satisfactory guaranties from the Government might well be given consideration.

United States import duty on tonka beans was reduced from 25 cents per pound to 12½ cents per pound on December 16, 1939.

Principal Sources of Material:

Consular Report from Stewart E. McKillin, Caracas, Venezuela, September 22, 1938.

U. S. Commerce and Navigation.

"Materias Primas - Sarrapia" by L. E. Williams, El Agricultor Venezolano, Setiembre y Octubre 1940.

UNITED STATES IMPORTS OF TONKA BEANS
10 years, 1931-1940

- 6 -

Countries	1931		1932		1933		1934		1935	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Total	373,338	333,276	451,179	393,323	381,535	332,487	660,121	634,005	514,751	597,294
Venezuela	2,776	2,476	20,698	18,299	5,547	7,216	25,317	38,871	38,317	56,883
Trin. & Tobago	318,394	286,423	412,124	368,199	320,828	311,113	436,508	517,984	305,411	467,949
France					796	712	1,056	708	929	667
Germany			4,779	4,099	50	45	1,544	788	1,839	430
Netherlands	8,587	11,069								
Spain										543
United Kingdom	32,954	23,657	1,481	409	854	141	4,561	2,115		1,005
Canada	9,141	9,308								
Salvador					331	250				
Brazil	1,486	343	12,097	2,317	59,129	13,010	191,091	73,479	167,712	70,360
Colombia							44	60		
Countries	1936	1937	1938	1939	1940					
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Total	714,948	770,514	620,225	718,966	618,926	795,397	627,708	945,126	411,178	376,331
Venezuela	4,379	7,590	32,988	48,327	19,096	30,595	29,514	43,497	158,657	143,048
Trin. & Tobago	344,994	528,369	293,691	473,358	363,626	610,416	516,802	787,971	126,609	182,334
Brazil	394,880	234,089	293,252	196,876	233,934	152,135	80,638	36,591	125,071	51,288
Colombia	695	446	123	62	2,060	2,001	254	345	841	1,651
Jamaica					110	94				
France			171	343	100	156	280	152		
Surinam							220	422		
Italy										

Compiled from Foreign Commerce and Navigation of the United States.

Mr. Prichard.
Attach to my report on
Tanka Blom in Venezuela -

Correction -
I will page 3 of report -
total imports by U.S. 1931
373,338 pounds
in stead of
315,338.

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UNITED STATES IMPORTS OF TONKA BEANS
10 years, 1931-1940

Countries	1931		1932		1933		1934		1935	
	: Pounds	: Dollars	: Pounds	: Dollars	: Pounds	: Dollars	: Pounds	: Dollars	: Pounds	: Dollars
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