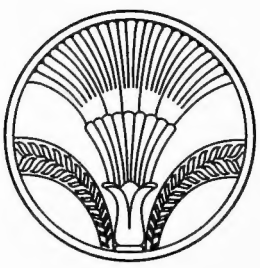
MANN
SB
985
.C9
C82
1917

CORNELL UNIVERSITY LIBRARY
3 1924 089 512 721

ALBERT R. MANN LIBRARY
AT
CORNELL UNIVERSITY



BULLETIN Nº 1
(ENGLISH EDITION)

APRIL, 1917

REPUBLICA DE CUBA

SECRETARIA DE AGRICULTURA, COMERCIO Y TRABAJO

DIRECCION DE AGRICULTURA

COMISION DE SANIDAD VEGETAL

THE COMMISSION OF

PLANT SANITATION

AND ITS WORK

HABANA

IMP. P. FERNANDEZ Y CA.

The original of this book is in
the Cornell University Library.

There are no known copyright restrictions in
the United States on the use of the text.

http://www.archive.org/details/cu31924089512721

BULLETIN Nº 1
(ENGLISH EDITION)

APRIL, 1917

REPUBLICA DE CUBA

SECRETARIA DE AGRICULTURA, COMERCIO Y TRABAJO

DIRECCION DE AGRICULTURA

COMISION DE SANIDAD VEGETAL

THE COMMISSION OF

PLANT SANITATION

AND ITS WORK

ALBERT R. MANN
LIBRARY
AT
CORNELL UNIVERSITY

HABANA

IMP. P. FERNANDEZ Y CA.
17, OBISPO 17
1917

COMISION DE SANIDAD VEGETAL

John R. Johnston, PRESIDENT.

Pathologist of Estacion Experimental Agronomica.

Dr. Mario Sánchez Roig, SECRETARY.

Professor - Historia Natural - Granja Agricola, Habana.

Patricio Cardín Peñarredonda, MEMBER.

Entomologist Estacion Experimental Agronomica.

INSPECTORS:

Rodolfo Arango

Guantanamo.

Daniel Nicles

Baracoa.

DEPUTY INSPECTOR

Jaime Puncet Gonzalvo

CONTENTS

LIST OF PLATES

THE COMMISSION OF PLANT SANITATION AND ITS WORK

INTRODUCTION

One of the most important steps for the protection of the agricultural interests of this Island was taken by the President of Cuba when he signed the decree, July 3, 1916, creating the Commission of Plant Sanitation.

For many years Cuba, like many other countries, has suffered tremendous losses in some of the crops owing to diseases and insects, and new pests have carelessly been introduced, while still more are active in adjacent countries and are liable to be introduced if the greatest care is not taken to prevent them.

For thirty or forty years the Budrot of the Coconut has swept over the Island until the growing of coconuts on a large scale is confined almost entirely to a small section of the Island about Baracoa in the Province of Oriente, and the total exportation of the nuts has been reduced from over 20,000,000 to 4,000,000. For at least ten years the banana disease has spread through Havana and other provinces wiping out the plantations of the manzano and of the Johnson varieties. Unless precautions are taken this disease will reach the important banana district of Oriente and there cause the same damage. Recently there has been discovered existing in the Island the Mosca Prieta which appears to have been here only a few years. The greatest amount of this insect is found in Guantanamo and as the Island of Jamaica is the nearest place having the pest it is supposed to have been introduced from there. The Mosca Prieta is reported to kill trees in the Bahama Islands and in the district of Guantanamo has already seriously injured many by causing the

yellowing, curling and subsequent falling of the leaves. This pest threatens to injure not alone the citrus plants but also many other kinds of fruit trees. In addition to these pests there are insects and diseases in Florida on the north, in Jamaica on the south, in Mexico on the west, and in many other places: insects and pests which do not yet exist in Cuba, which should be prevented entrance by every possible means.

Remedies for the Budrot of the coconut and the banana disease have been sought in vain for many years by investigators of many countries. Careful researches have revealed the cause and nature of these diseases, and moreover have revealed the fact that neither of these diseases can be cured by direct treatment. Both of these diseases can, however, be avoided to a great extent by the destruction of diseased material.

Without question the two most important problems in the control of insect pests and plant diseases in our country is the destruction of the existing insects and diseased plants, and the prevention of new importations of insects and diseases. The destruction of diseased material and of insects can be accomplished by any one, but it is necessary for the Government as a whole to educate the people individually in these methods of control. It is necessary for the Government to see that the people attend to this matter in the case of highly infectious diseases like the Budrot of the coconut and the banana disease, and in some cases to aid in this work itself. The matter of preventing the shipment of diseased or infested plants from one part of the Island to another, or from a foreign country into Cuba, will have to be carried out largely by the Government.

For these reasons, and to attend to these problems, the President of Cuba at the request of the Secretary of Agriculture by decree created the Commission of Plant Sanitation.

FORMATION OF THE COMMISSION.

DECREE 838.

WHEREAS in different parts of the Republic there have appeared diseases of plants, mostly imported from other countries, the existence of these having been demonstrated in the Province of Oriente as affecting the orange groves and the coconut plantations, and in the Provinces of *Havana* and *Pinar del Rio* the banana plantations, etc.

IN CONSIDERATION of the fact that it is indispensable, in preventing the spread of these diseases to all the national territory with serious damage to our agriculture and provoking quarantine in those countries with which we have constant commerce, to take all measures to combat these plagues and avoid diseases that might be imported.

IN CONSIDERATION of the fact that article 243 of the Organic Act of the Executive Power in defining the faculties that correspond to the Secretary of Agriculture, Comerce and Labor, says: "he has in charge anything relating to the study and extirpation of the diseases that affect animals and plants".

In use of the faculties that pertain to me, and at the proposal of the Secretary of Agriculture, Comerce and Labor,

RESOLVED:

First. — To create in the Department of Agriculture, Comerce and Labor, a commission that will be called Commission of Plant Sanitation, pertaining to the Office of Agriculture, composed of three members that will be J. R. Johnston, Pathologist of the Agricultural Experiment Station, as President; Patricio Cardin, chief of the Department of Entomology of said Experiment Station; and Mario Sanchez, Professor of the Agricultural School of Havana, in order that the following may be carried out:

A. — Study the diseases and insects that are present or that may be present in the plants in whatever part of the National territory.

B. — According to the studies made, to take, with the approval of the Secretary of Agriculture, without other requirement, the profilactic measures that may be considered necessary in order to combat the diseases, using the resources that will be mentioned further on.

C. — For the organization and direction of the work relative to the measure refered to in the paragraph preceding, letter B, the Commission may send any of its members to any place it is considered necessary, for which purpose the President of the said Commission will issue the necessary transportation requests, a book of which will be facilitated by the Secretary of Agriculture, Commerce and Labor, and during the time that they remain away from the Office on official business, they will receive a per diem of five dollars, which will be paid by the Secretary from the funds placed at his disposal in a succeeding paragraph.

D. — The President of this Commission or other member in his absence may order the removal of the machinery and other materials, to whatever place is necessary in order to combat the diseases that may appear in any plantation.

E. — In the same way, the Commission, the member who undertakes the work of disinfection of any crop, or any of the inspectors which have been appointed by the Commission for this purpose with the proper instructions, may proceed to employ laobrers to clean or destroy infected plants, and also contract whatever other service is considered necessary, (first consulting and obtaining the approbation of the Secretary, which should be done in the most rapid manner,) whose wages or expenses will be paid from the funds designated for this purpose, to which end the Paymaster of the Department of Agriculture is especially authorized to facilitate the amount agreed upon, the expenditure of which will be accounted for by whoever receives it in, at most, sixty days, counting from the day of its receipt.

F. — When the case of infection is of such gravity that only by the destruction of the crop can the plague be exterminated, the Commission will submit the case to the Secretary of Agriculture, Commerce and Labor, who will take such measures as he considers ne-

cessary, both in accord with the owner of the plants and with the necessities of the case.

G. — This Commission will meet as often as it may be necessary, and report to the Secretary of Agriculture at least every fifteen days, as to the progress of the work, and study in its meetings, under the auspices of the President of the Commission, the problems of greatest importance.

H. — When there is necessity for laboratory work, or any work related to that which is conducted at the Agricultural Experimental Station, the Commissioners may request permission from the Director of said establishment, who will grant it.

Secondly. — The Secretary of Agriculture, Commerce and Labor is authorized to impose fines that do not exceed fifty dollars on those owners of plantings who do not fulfill the instructions that are given by the Commission to avoid the spread of diseases and insects in the fields where they have appeared, for which purpose there will be conceded the time that is considered necessary.

Thirdly. — For the expense that may be necessary for the purchase of apparatus and other material, as well as in the pay of wages, per diems, salaries of inspectors that are appointed for this service, the Secretary of Agriculture, Commerce and Labor will appropriate $ 10,000 from the funds that are credited in the current budget to "Imprevistos", which sum may be requested by the Paymaster from said Department in the form designated by the Secretary, all at once if that is agreed upon, and it will be credited by the Secretary of the Treasury.

Fourthly. — In accord with the statements in the last paragraph of Article 394 of the Organic Law of the Executive Power, it is authorized to name three inspectors, to whom may be assigned the monthly salary of $ 150, and, when necessary, a per diem of $ 5, to aid the Commission of Plant Sanitation, which by this decree is named, who will put themselves at the immediate order of said Commission, without conflicting with the superior authority of the Secretary of the Department; the term of employment of these inspectors will last through the fiscal year, if necessary.

Fifth. — The Commission named will submit to the Secretary of Agriculture proposals concerning the quarantine regulations that should be made against the importation of plants and the means that ought to be employed in those cases in which they may be admitted.

Sixth. — Said Commission is also authorized to issue certificates for plants destined for exportation.

Seventh. — The Secretary of Agriculture, Commerce and Labor will see that this Decree is fulfilled.

Written in the Presidential Palace of "Durañona", Marianao, July 3, 1916.

(Signed) M. G. MENOCAL,
President.

(Signed) EMILIO NÚÑEZ,
Secretary of Agriculture, Comerce and Labor.

To carry out the work of the Commission three inspectors were appointed, one for the sole purpose of undertaking the control of the Mosca Prieta at Guantanamo, one to undertake the sanitation of the coconut groves, and one to work on the banana disease. It was decided that as long as the work on the Mosca Prieta was the most urgent [illegible]

The Inspector located at Guantanamo, the center of the Mosca Prieta infestation has employed one or more assistants and up to ten laborers in the work of inspecting the district to locate places infested and to spray the infested trees. Records of all the towns, all the farms and all the houses in the towns are being made, and a duplicate record of these places sent to the office in Havana. Inasmuch as one spraying of the tree is not sufficient, records are also kept of all the places sprayed, with the date of the spraying.

The inspector located temporarily at Baracoa is recording all the farms where diseased coconut trees exist, copies of these records being sent to Havana. The farmers are advised as to the best means of destroying the disease, and copies of the decrees respecting the disease and the edicts are distributed among the growers.

The inspector in charge of controlling the banana disease has for the most part made his headquarters in Artemisa. This town is near the center of the industry of the manzano banana. All farms are visited and cases of infection recorded, and the owner counseled as to the best means of destroying the disease. Unfortunately the Mosca Prieta appeared in Havana in December so this inspector had to be ordered to drop the banana work to aid in controlling the insect. Since then an inspector, several deputy inspectors, and ten to fifteen laborers have been employed in Havana and vicinity on this work.

All inspectors and deputy inspectors of the Comission are furnished with cards of identification to facilitate their work, and all the laborers have insignia of the Commission.

QUARANTINE AGAINST PLANTS ENTERING CUBA.

In addition to developing the work of the various inspectors in their districts as designated, the Commission has further had to plan for strengthening the quarantine against the introduction of new pests from foreign countries. In order to give a complete idea of the regulation governing the introduction of plants from foreign countries into Cuba, the decrees promulgated before the creation of the Comission will be mentioned as well as those made since that time.

LAW OF JUNE 16, 1906, QUARANTINE AGAINST CITRUS FROM MEXICO.

This law was passed as a precaution against the introduction of the Mexican orange maggot or Morelos Fruit Worm *(Anastrepha ludens)* which attacks citrus plants and in addition guava, mango, sapodilla, peach and plum. The law is as follows:

Article 1. From the date of the publication of this law in the Official Gazette of the Republic, it is absolutely prohibited to import citrus plants from Mexico.

Article 2. All citrus plants introduced through the Custom House of the Republic proceeding from foreign countries, will be submitted to rigorous disinfection that will guarantee the death or destruction of all the parasites or germs that might be on them.

TOMAS ESTRADA PALMA,
President.

DECREE No. 1133, AGAINST CITRUS PLANTS FROM ALL COUNTRIES.

In 1914, it appeared that a disease of citrus plants called citrus canker had been introduced into the state of Florida and was causing serious damage to the citrus plants, and that this same disease had been introduced into all the states bordering the Gulf of Mexico, and that it ocurred in Japan and the Philippines, hence the preceeding law was enlarged as follows:

First: That while the Customhouses are being fitted up with the necessary apparatus for the fumigation of citrus plants as was ordered by the law of June 16, of 1906, it is prohibited to import citrus plants from any other country as well as from Mexico.

Second: The Secretary of the Hacienda will see to it that this decree is carried out.

Third: The Secretary of Agriculture, Commerce and Labor will see that the Comision de Fitopatologia fulfils and observes all the regulations concerning the introduction of foreign plants, and that adequate means are adopted to avoid the spread of any epidemic among the plants.

Nov. 23, 1914.

(Signed) M. G. MENOCAL,
President.

DECREE
AGAINST THE BLACK FLY (ALEUROCANTHUS WOGLUMI).

On the recommendation of the Commission of Plant Sanitation the following decree was issued:

WHEREAS: There has appeared in the municipality of Guantanamo, Province of Oriente, a new insect pest, called "Black Fly" *(Aleurocanthus woglumi)*, which attacks citrus, guava, mango, coffee, zapote, granado, false grape, star-apple, and mammey apple, extending rapidly and occasioning serious damage to the plants attacked;

IN CONSIDERATION: of the fact that it is the duty of this Department to avoid the propagation of anything injurious to agriculture in general, and in use of the faculties that pertain to this Office,

RESOLVED:

1. That every proprietor or tenant of land infested with the "Black Fly" will be obliged to notify the Secretary of Agriculture, Comerce and Labor of such condition in the quickest way possible and employ the remedies recommended by this Department for the destruction of the insect.
2. Under no pretext whatever can there be removed from an infested farm any plant or part of plant of the group of citrus trees, or any guava, mango, coffee, zapote, granado, false grape, star-apple, or mammey-apple or any other plant infested by the Black Fly.
3. The importation of these plants from India, the Islands of Bahama, or Jamaica is absolutely prohibited.

Habana, July 20, 1916.

(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

DECREE AGAINST THE BANANA DISEASE.

On the recommendation of the Commission of Plant Sanitation, the Secretary of Agriculture, Comerce and Labor issued the following decree:

WHEREAS: There exists in the Republic of Cuba a disease, called Panama Disease, injurious to banana plants.

In consideration of the fact that this disease has not yet appeared in the Province of Oriente, and that it occurs in the Islands of Porto Rico and Jamaica as well as in Panama and other countries,

RESOLVED:

1. That the importation of banana plants into Cuba is prohibited unless they are accompanied by a certificate of their origin in which it is stated that they come from a district free from diseases.

2. That no banana plant of the varieties apple and Johnson can be taken into the Province of Oriente from another part of Cuba.

3. That every owner or renter of a farm where this disease exists must notify the Secretary of Agriculture, Comerce and Labor in the quickest way possible and adopt the precautions that are indicated by this Department for the control and eradication of this disease.

4. That no person may carry plants of the mentioned varieties from a field infested with the disease; neither may he carry away any plants whatever with soil on the roots, nor soil in any form from said infected field.

5. That every person breaking these regulations will be subject to a fine.

Havana, July 26, 1916.

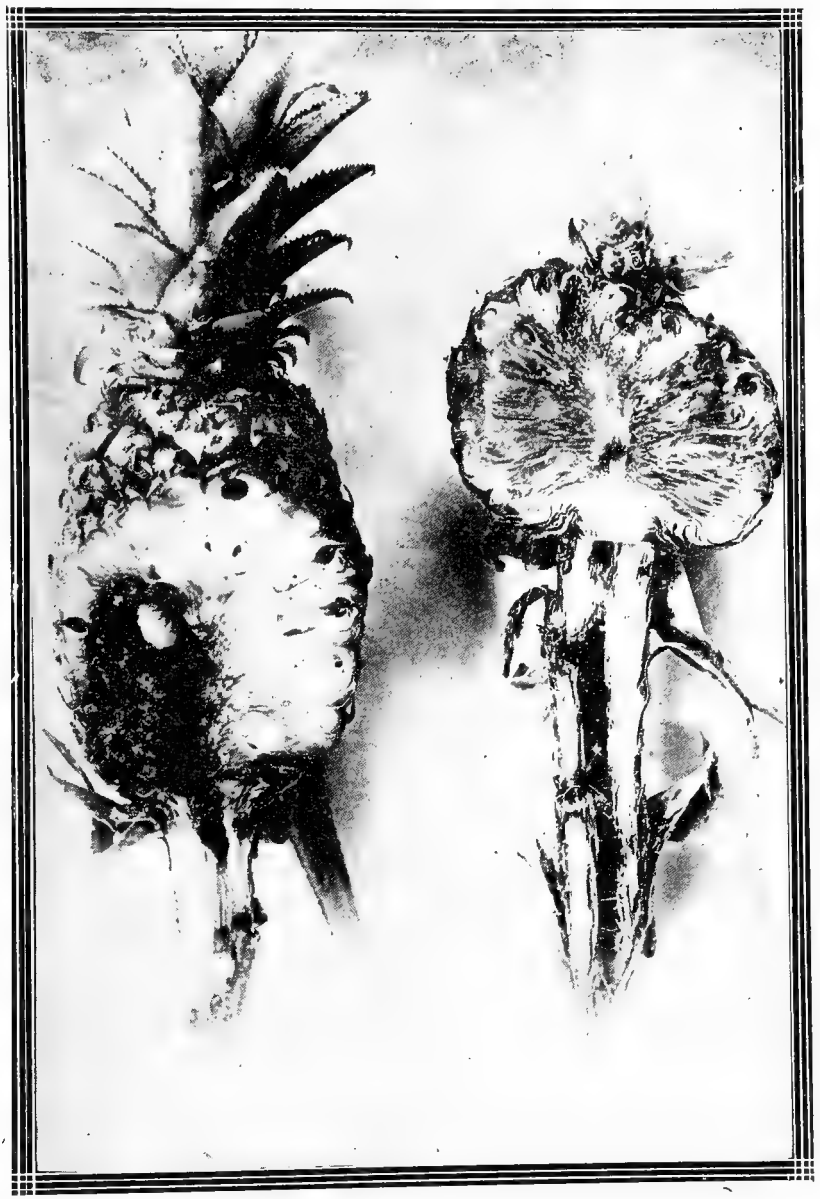
(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

There are numerous other insects and diseases which should be prevented by all possible means from entering this country. Investigations are being made at present on the necessity for quarantines against the following pests and diseases.

1. — The Mediterranean fruit Fly *(Ceratitis capitata)* which attacks and seriously injuries fruits of the avocado, banana, oranges, cucumbers, figs, grapefruit, green peppers, mangoes, papaya, pineapple, caimito and others.
2. — The potato wart attacking the Irish potato in New Foundland, Great Britain, Germany and Austria-Hungary.
3. — The avocado weevil *(Heilipus lauri)* occurring in Mexico and Central America.
4. — The Downey Mildews and the Physoderma disease of corn in Japan, Philippines, India, Australia and adjacent countries.
5. — The pineapple weevil *(Metamasius ritchei)* of Jamaica.
6. — The banana weevil *(Cosmopolites sordidus)* of Jamaica.
7. — The pink bollworm *(Gelechia gossypiella)* of cotton in Mexico and others countries.

In addition to the proposal to issue absolute quarantines against the above mentioned pests it is also planned to prohibit the entrance of many plants unless accompanied by certificates of inspection. By these various means the work of preventing the entrance of serious diseases and pests will be much facilitated.

Plate N.° 1



Pineaple attacked by the Black Weevil in Jamaica.
Photo. by A. H. Ritchie.

FOREIGN QUARANTINES AGAINST PLANTS FROM CUBA.

This subject has two important phases: (1) if any country has found it necessary to quarantine against Cuban plants, the Commission of Plant Sanitation has for its duty to find out the cause for such quarantine and do all that it is possible to remove it, and (2) owing to partial or complete quarantines, certificates of inspection are necessary to accompany plants from Cuba to other countries, and it is the duty of the Commission of Plant Sanitation to provide such certificates of inspection.

As regards the countries issuing absolute quarantine against Cuba, these are few as far as records show, and as this matter has developed farther in the United States than elsewhere it is natural to look for the most regulations there.

The United States of America has no quarantine specifically against Cuba, but they have certain absolute quarantines which include Cuba with other countries, as follows:

QUARANTINE No. 8 OF THE FEDERAL HORTICULTURAL BOARD.

> Prohibits the importation from any foreign locality and country, excepting ....., of cotton seed, (including seed cotton) of all species and varieties and cotton seed hulls, on account of the pink bollworm.

This insect has not been reported from Cuba although no thorough examination of the cotton plants of the Island has been made to prove that it does not exist here.

QUARANTINE No. 15 OF THE FEDERAL HORTICULTURAL BOARD.

> Prohibits the importation from all foreign countries of living canes of sugar cane, or cuttings or parts thereof, on account of certain insects and fungous diseases of the sugar cane occurring in such countries.

Cuba at present has only one serious disease of sugar cane that does not exist in the United States, that is the root disease due to *Marasmius sacchari,* but that it is so widespread and of such a nature that it is considered impracticable for the Commission of Plant Sanitation to undertake the question of its eradication.

QUARANTINE No. 19 OF THE FEDERAL HORTICULTURAL BOAI

Prohibits the importation from all foreign countr of all citrus nursery stock, including buds, scions, a seeds, on account of the citrus canker and other da gerous citrus diseases.

Extensive investigations of the citrus diseases of Cuba ha been made and nothing has been found that does not alrea occur in the United States with the exception of the Mosca Prie The Commission of Plant Sanitation has treated with the Fede Horticultural Board to obtain the withdrawal of the quaranti on citrus seed, but the authorities in Washington as well as the in the State of Florida have spent such large sums of money attempting to eradicate citrus trouble already existing there, a in addition to this fact, Cuba is in such close comunication wi Florida where exist so many serious troubles of citrus, that th have decided not to remove even the quarantine on the citr seed from Cuba.

In addition to the above quarantines which prohibit t shipment of the mentioned plants from Cuba to the United S tes, it should be noted that no living plants, seeds, or other pla products for propagation, except field, vegetable and flow seeds, and other plant products not for propagation, can be ent ed into the United States through the mails.

The State of Florida has a few quarantine regulations r comprised in those of the Federal Government as follows:

RULE 14. STATE PLANT BOARD OF FLORIDA.

The importation into the State of Florida of bana plants or bulbs and the importation of coconut tre plants or nuts is hereby prohibited. Providing th this rule does not apply to the importation of cocon with the husks removed and not to be used planting.

This rule of course applies to Cuba where these two parti lar diseases are causing so much damage and at present cons tute two of the most important problems on which the Commiss of Plant Sanitation is working.

The Governor of the Bahama Islands has issued a regulat prohibiting the importation of pineapple slips from Cuba. T reason for this is not known to the Commission, but this mat is now being investigated.

As regards partial quarantines or those cases in which ce

ficates of inspection are necessary, the following rules apply for hose persons in the United States who wish to import nursery tock from Cuba.

According to regulation 5 of the Service and Regulatory Announcements the person wishing to import nursery stock into he United States from Cuba must secure a permit.

According to Regulation 6, the packages of plants must be nspected at the time of packing in Cuba by an official inspector, ind a copy of the certificate attached to each package.

According to Regulation 7, each certificate must give the late of the inspection, name of exportor or grower, district where grown, a statement that the stock has been inspected by a duly uthorized official and found or believed to be free from insect ests and diseases.

Quarantine regulations of other countries are not known, ut in general it may be said that persons wishing to ship living lants of any kind from Cuba to any foreign country should have he plants inspected and should attach copies of the certificates o each package of plants.

All such certificates may be obtained after inspection at the Office of the Commission of Plant Sanitation.

LOCAL QUARANTINE AND INSPECTION REGULATIONS

While the work of the Commission was aimed to consist artly in the inspection of plants for their shipment to foreign countries and issuing certificates of inspection for these, undoubtedly the most important duty of the Commission was the control of existing pests and diseases in Cuba.

REGULATIONS FOR THE CONTROL OF THE BLACK FLY.

The first and most urgent line of work was in the control and eradication of the "Black Fly". To this end a decree was issued by the Secretary of Agriculture as given on page 13.

According to this decree:

Every proprietor or tenant of land infested by the "Black Fly" is obliged to report the invasion to the Secretary of Agriculture by the

quickest possible means, and to employ the means suggested by this Department for the destruction of the insect.

Under no pretext whatever may a person remove from an infested locality a plant or part of plant of the group citrus or any of guava, mango, coffee, zapote, pomegranate, false grape, star-apple, mammey apple, or any other plants infested by this "Black Fly".

Edicts were prepared and printed on heavy paper, with illustrations, as in the accompanying cut, and these were posted in conspicuous places in various parts of the infested districts, and copies were sent to the various periodicals for publication.

The Edict for Guantanamo is as follows:

It is absolutely prohibited to remove live plants from Guantanamo, Jamaica, El Palmar, Montesano, or any other place in this zone, since with these plants the pest known as the "Black Fly" is liable to be carried to other places, causing serious injuries to the plantations of coffee, citrus and other plants.

It is requested that every person acquainted with any infringement of these regulations will report it to the inspector of Plant Sanitation in the Municipal Building of Guantanamo.

The permits to remove plants from one place to another may be solicited from the inspector of Plant Sanitation who will issue them after the inspection of the plants, the permits being gratis.

Havana, July 22, 1916.

(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

After the discovery of the "Black Fly" in the Vedado, Havana, new edicts were prepared to read as follows:

It is absolutely prohibited to remove plants from any part of Vedado or from the "Quinta de los Molinos" to any other part of the Republic, until they have been examined and provided with the corresponding necessary certificates issued by an Inspector of the Commission of Plant Sanitation, since with these plants may be carried the plague known as the "Mosca Prieta" to other places, causing serious injuries to the oranges groves, lime trees, mangos and other plants.

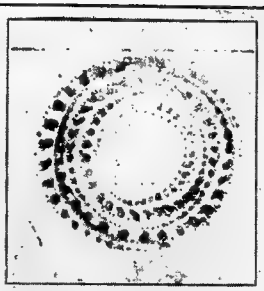
The permits for the removal of plants from these places to any part of the Republic may be solicited from the Commission of Plant Sanitation, so that when the plants have been examined they may be supplied with the necessary certificate, which will be furnished free.

Havana, 23 Dec. 1916.

(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

To provide for removal of plants from a zone infested with the "Mosca Prieta" to other parts of the country, after inspection, if the plants are found to be free from this insect they are

Plate N.° 2



Sección de un tallo de Plátano atacado por el hongo causante de la enfermedad de "Panamá".

EDICTO

Vista de una Platanal extensivo atacado por la enfermedad de "Panamá"

QUEDA TERMINANTEMENTE PROHIBIDO llevar matas de plátanos manzano o Johnson de campo alguno infectado por la enfermedad llamada "Panama", tampoco llevará otra planta cualquiera con tierra en las raices, ni tierra en ninguna forma de dicho campo infectado.

No se permite la entrada de ninguna mata de plátano de las variedades manzano y Johnson en la provincia de Oriente procedente de alguna otra parte de la República.

No se permite la importación de matas de plátanos en esta Republica a no ser qua vengan acompañadas de un certificado de origen en el que se hará constar su procedencia y que provienen de un área libre de la enfermedad "Panama".

Se suplica, que toda persona conocedora de alguna infracción de esta orden, lo participe en el acto al Sr. Inspector de Sanidad Vegetal, en la Secretaría de Agricultura, Comercio y Trabajo, Habana.

Los permisos para trasladar plantas de un lugar a otro serán solicitados del Sr. Inspector de Sanidad Vegetal para que una vez efectuada la Inspección extienda los certificados correspondientes, de Sanidad, que serán absolutamente gratis.

Habana, Julio 26, 1916.

(f) Emilio Núñez,

Secretario de Agricultura, Comercio y Trabajo.

Specimen poster distributed throughout infested districts.

permitted to be removed with a tag attached containing the following certificate:

Republic of Cuba No.....

Secretary of Agriculture Commerce and Labor

Commision of Plant Sanitation.

TO WHOM IT MAY CONCERN:

I hereby certify that the plants contained in the accompanying package have been duly inspected by me on the day of..... 191..

And that said plants, according to the declaration (verbal) of the person interested have been cultivated in the property on street.....

The undersigned declares that the said plants are free from the "Mosca Prieta" and other injurious insects and diseases.

INSPECTOR OF THE COMMISSION
OF PLANT SANITATION.

DECREE CONCERNING THE DISEASE OF THE COCONUT.

WHEREAS: There has existed for some time in this Republic a very serious disease named coconut budrot which attacks coconut trees causing great losses in the plantations of coconuts.

IN CONSIDERATION of the fact that it is the duty of this Department to avoid the spread of this disease, in use of the faculties that pertain to this office:

RESOLVED:

1. That every proprietor or tenant of land infested by Budrot is obliged to report it in the quickest manner possible to the Department of Agriculture, Commerce and Labor, and to employ the methods provided by this Department for the extermination of the said disease.

2. That any agriculturist or owner of a plantation can denounce his neighbor who has an infested farm and in such cases the Commission of Plant Sanitation will take the necessary measures to destroy such infestation.

One of the most important points of this decree is the authority given owners of plantations to denounce neighboring plantations affected by this disease, and authorizing the Commission to see that the plantations are freed from the disease. One of the chief difficulties encountered in the work has been that although many planters have been willing to clean up their own plantations, the fact that their neighbors refused to do so allowed

constant infestation to pass from the diseased grove to the clean one and rendered the work of any one farmer much more difficult than it should be, and prevented him from ever actually attaining success.

In addition to the decree an edict was prepared as follows, and posted in various conspicuous places in the coconut districts:

That every proprietor or tenant of land infested with the Budrot of the coconut is obliged to report it to the Department of Agriculture, Commerce and Labor as quickly as possible, and to employ the methods recommended by this Department for the extermination of the said disease.

That any agriculturist or owner of a plantation can denounce his neighbor who has a farm infested with this disease, and in such cases ,the Commission of Plant Sanitation will take the necessary measures to attend to such cases.

Havana August 3, 1916.

(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

REGULATIONS FOR THE CONTROL OF THE BANANA DISEASE.

This decree in one of its parts (p. 14) says:

That no banana plant of the varieties apple or Johnson can be introduced into the Province of Oriente from any other part of the Republic.

That every proprietor or tenant of land where this disease exists must notify the Department of Agriculture, Commerce and Labor in the quickest way possible and adopt such means of control and eradication as are recommended.

That no person is allowed to cary plants of the said varieties from a field infested with this disease: neither is it permitted to remove any other plant with soil on the roots, nor soil in any form from the said infested field. That every person breaking these regulations will be subject to a fine.

(EDICT)

It is absolutely prohibited to carry plants of apple or Johnson bananas from a field infested by the Panama disease, or to carry any other plant whatever with soil on the roots, or soil in any form from said field.

It is not permitted to carry any banana plants of the varieties apple or Johnson into the Province of Oriente from any other part of Cuba.

It is not permitted to import bananas plants into this Republic if they do not arrive accompanied by a certificate of their origin which states that they come from an area free from the Panama disease.

It is requested that every person acquainted with any infringement of these rules will report it to the Inspector of Plant Sanitation in the Department of Agriculture, Commerce and Labor, Havana.

The permits to remove plants from one place to another may be requested from the Inspector of Plant Sanitation who will issue them after the inspection gratis.

Havana, July 26, 1916.

(S.) EMILIO NÚÑEZ,
Secretary of Agriculture, Commerce and Labor.

NURSERY CERTIFICATES

A register of all nurseries is maintained in the office of the Commission. All the nurseries are inspected at least once in six months and oftener if required. The nurseries that are free from serious diseases and insect pests, and have only a minimum of the common ones, are given certificates as shown below.

If the nurseries have any serious pests they are quarantined and not allowed to send out any plants whatever until they are freed from such pests. If the nurseries have an excessive amount of common insects and diseases, the gardeners are instructed how to proceed to reduce the amount, and if that is done, certificates are then issued as follows:

DEPARTMENT OF AGRICULTURE, COMERCE AND LABOR.

COMMISSION OF PLANT SANITATION

The Commission of Plant Sanitation hereby certifies that on the.... day..... of..... was inspected by the Inspector of Plant Sanitation..... of.... in the farm..... property of..... with an area of cultivation of..... situated in..... Province of.....

Resulting that the..... apparently is free from diseases and parasites (animal or vegetable) that threaten to become epidemic, and that of the common insects and diseases there is only a minimum number.

And for the information of whomsoever it concerns, is issued the present certificate on the..... of 191..... which terminates in..... of.....

President of the Commission of Plant Sanitation.

Secretary of the Commission of Plant Sanitation.

REGULATIONS FOR THE SALE AND DISTRIBUTION OF PLANTS.

WHEREAS: There exist in the Republic insects and diseases injurious to useful and ornamental plants.

WHEREAS: The transportation and sale of live plants furnishes an easy means for the propagation of these diseases.

IN CONSIDERATION of the fact that by the principles expressed in Article 243 of the Law of the Executive Power it is the duty of the Secretary of Agriculture, Commerce and Labor to avoid the propagation of the plagues that threaten agriculture in general; in use of the faculties that pertain to this office

RESOLVED.

1. That every nursery, garden or plantation that raises plants for sale shall be registered by the Commission of Plant Sanitation.
2. That every proprietor of nursery, garden or plantation that sells live plants must be provided with a certificate of the Commission of Plant Sanitation in which it is stated that the nursery, garden or plantation in question is found apparently free from diseases and parasites (animal or vegetable) that threaten to become plagues.
3. That every package of plants shipped from a nursery, garden or plantation must carry a tag with the number and date of the certificate issued by the Commission of Plant Sanitation.
4. That all persons who sell plants without the corresponding certificates will be subject to a fine.
5. The inspections must be made at least every six months and in case of plagues as often as is considered necessary by the Commission of Plant Sanitation.
6. This decree will take effect within three months counting from the present date.

All nurseries shipping plants to any place whatever are required to place upon the package a copy of the certificate of the Commission or some sort of card indicating their certificate number.

RULES REGARDING MAIL MATTER

Up to date there has been no decree regarding the inspection of plant material passing through the mails. In order, however, to obtain some idea of the importance of this subject, the Commission through the Secretary of Agriculture obtained permission from the Administrador of the Post Office to examine all material that entered through the Office of Havana. The material has been examined as to whether it consisted of living plants or seeds, the kind of plant, and its condition.

At present there is under the consideration of the Commission the advisibility of recommending a decree to prevent the entrance of live plants by mail.

MISCELANEOUS WORK OF THE COMMISSION

ADMINISTRATION

The Commission is composed of three members who hold meetings at least once a month, and usually oftener, as the work demands. The President acts as the executive head in order to facilitate matters, but all matters of import are decided by the Commission as a whole.

In addition to the register of the nurseries, records are maintained of all the places inspected in the Vedado and the vicinity of Havana for "Mosca Prieta", the names of the owners of such places and the number and kind of infested plants, and the date of treatment, of all the places in Guantanamo and vicinity inspected for "Mosca Prieta" and treated; of all the farms in the banana district where the banana disease in found, and also the farms in the coconut district where the budrot of the coconut in found.

As the intensive work of the various inspectors has spread the information as to the purposes of the Commission, and interest has increased, it has been suggested that there be appointed one of the leading planters in each of the various districts as correspondent of the Commission. This has been suggested to several, and promises to be an important means of keeping in touch with the different communities. Such correspondents will have official acknowledgement, will receive the comunications from the Commission to their district, and will send to the Commission reports as to the conditions in their respective districts.

CITRUS CANKER

Citrus canker is a bacterial disease affecting most varieties of citrus trees, and is so serious that the authorities in the State of Florida and in Washington have spent almost one million dollars in an attempt to eradicate it.

Cuba is so close to, and in past years received so much citrus stock from Florida that it was early feared that the disease had been introduced into Cuba. To ascertain whether this were so the Secretary of Agriculture Comerce and Labor in 1914 authorized the Entomologist and the Pathologist to make an inspection of the entire Island.

The Florida people have naturally taken a good deal of interest in this question, as should the citrus canker be found here it would be necessary for Florida to quarantine Cuban oranges and grapefruit, as has already been done with citrus plants.

The following letter from the Plant Commissioner will serve to show the interest of the Florida people, and the reply to the letter will give an idea as to the present conditions in Cuba so far as the citrus canker is concerned.

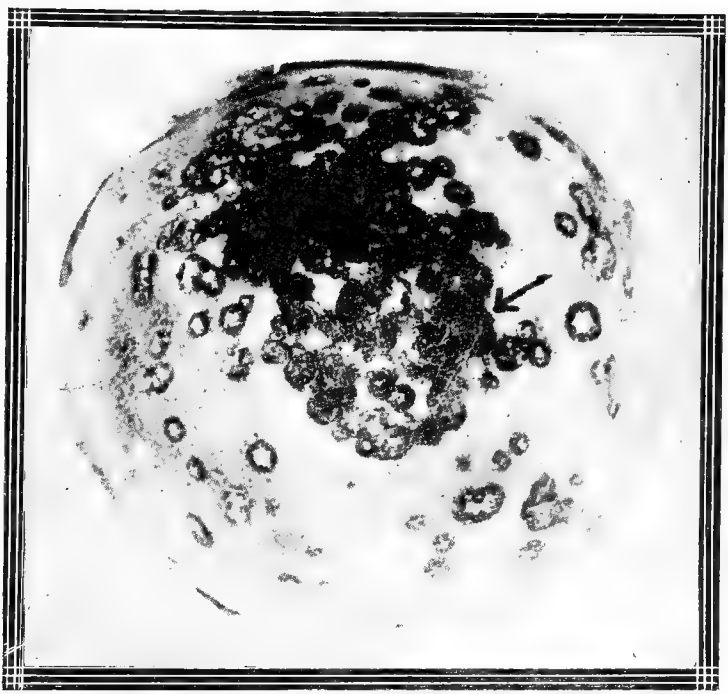
Letter from Wilmon Newell, Plant Commissioner, Florida, to J. R. Johnston, June 27, 1916.

I am writing to inquire whether any systematic steps have been taken in Cuba to determine whether or not citrus canker occurs there, and whether its distribution has been determined. We have reason for believing that this disease does occur in Cuba. Griffing Bros, Nursery at McClenny and Miami, Florida during 1913 - 14 and 1914 - 15, sent out shipments throughout Florida and the Gulf States, many of which have since developed infection. We know that this firm at the same time shipped a considerable number of trees to Cuba, and we have been told that the firm known as Armand y Hermanos at Marianao, Havana, received and distributed over the Island of Cuba in the neighborhood of 2700 trees from Griffing Bros. Nursery. Of the trees shipped in from Florida during the same period, about one and one-half percent have since developed canker infection. In other words, wherever there are 100 of these trees, there is an even chance of canker existing and if there are about 30 or 40 to one, that canker occurs on some of them.

It has been impossible for us to find out what disposition the above firm made of these trees, as this firm acted as dealer only and the trees were supposed to have been distributed in small lots to any parties who desired them. I would be glad to know whether any investigations have been made by the government along this line and what the results were. The possibility of canker infections coming to us from Cuba seems to be a very real danger, and even though we do not now admit any citrus nursery stock from Cuba, there is a possibility of its coming to Florida on shipments of fruits.

We would not wish to make our quarantine against Cuba any stricter than it is at present, unless convinced that the Cuban authorities are neglecting to use proper effort and diligence in locating and controlling any canker infections which may occur on the Island.

Plate N.° 3



Citrus canker in Florida.

Letter from J. R. Johnston to Wilmon Newell, July 1, 1916.

In regard to your letter of June 27 regarding the presence of citrus canker in Cuba, I have the pleasure to inform you as follows:

In a letter dater Oct. 14, 1914, I wrote to Prof. Rolfs as follows: "Can you assist us in ascertaining the names of firms who have shipped citrus plants to Cuba and the names of those to whom they were shipped? I understand that Griffing Bros. of Miami have shipped some. It is probable that through your personal acquaintance with these people it would be easier for you to secure the names for us. You will understand that we are anxious to get on the trail of the citrus canker to ascertain if it occurs here. So far none has been reported but it seems more than likely that it may be present unknown to us."

In reply to this letter Prof. Rolfs stated that he was referring the matter to Dr. Berger.

In a letter dated Oct. 23, 1914, Dr. Berger kindly answered as follows: "Enclosed I am sending you the names of shipments from the Griffing Bros. at Miami that went to Cuba last year. I trust that you will be able to trace the same. I am also sending you preserved specimens of canker as requested. Would advise that you address the Griffing Bros. of Mac Clenny, Florida, requesting them to give you list of shipments from that nursery to Cuba, if they have made any."

This list mentions only two shipments to Cuba, one to V. Robinson, Cuba, 6 buds; and one to Armand y Hno., Marianao, Havana, Cuba, 2700 trees.

Mr. H. A. Van Hermann, at that time the Horticulturist of this Station investigated these shipments, and reported as follows: Robinson's shipment was only buds and showed no disease then or since. Armand's shipment was opened up and proved to be in such bad condition it was immediately closed up and returned to Florida.

In a letter dated Oct. 24, 1914, Mr. Beattie wrote me as follows: "I have been informed that shipments of nursery stock are reported to have been made from a nursery at Silver Palm, Fla. to Cuba, which nursery has been found recently to be seriously affected with the citrus canker".

Mr. Beattie further stated that he was intending to visit Florida and asked me to meet him, but I could not make arrangements to go until the last of December.

In a letter dated Oct. 28, 1914, I wrote to Griffing Bros. at MacClenny, Fla. as follows: "I would greatly appreciate it if you would give me a list of shipments of citrus stock which you have made to Cuba, if any at all. We understand that the citrus canker is at present causing a great deal of trouble in Florida, and it is therefore eminently desirable to locate the disease here if there should be any".

No reply was recived to this letter but I had the pleasure of meeting one of the Griffing brothers at Miami in January, and he assured me that there had been no other shipments of citrus from Florida to Cuba from their nurseries.

In a letter dated Oct. 28, 1914, I also wrote to Mr. Stirling at Miami as follows: "I would greatly appreciate anything you can do to assist us in obtaining lists of citrus shipments to Cuba in order that we trace up localities where stock possibly infected with citrus canker has been received.

We already have a list of the shipments made by Griffing Bros. of Miami but I did not know but there might be others.

At the same time we would appreciate any notes as to your methods of treatment of the canker.

We have not yet found this disease in Cuba, but are anxious to be ready for it should it appear, or if possible to prevent its introduction".

No reply to this letter was received, but I talked matters over with Mr. Stirling in January without obtaining more information as to shipments.

In "Modern Cuba" for November 1914, I published a description of citrus canker with one illustration, in order that the citrus growers of Cuba might obtain some idea of the diease and if found would report it.

On the 23rd of November, 1914, the President of Cuba issued a decree absolutely forbidding the further importation of citrus plants.

The Secretary of Agriculture made a request from the Customs House Service for a list of all living plants imported during the years 1913 and 1914. A long list was obtained but nothing new resulted from this.

On Dec. 24 the Secretary of Agriculture authorized me to make a trip to Florida for the purpose of acquainting myself with the citrus canker in the field in order that I might be prepared for inspection work in Cuba. Accordingly I spent from the 29th of December to the 8th of January in Dade Country. Mr. Frank Stirling and Mr. Joy Heck kindly facilitated my visits to the infected groves.

On Dec. 14, 1914, the Secretary of Agriculture ordered an inspection of all the citrus groves of the Island of Cuba to be made either by the Entomologist or by myself. As a matter of fact practically all the inspection has been done by us jointly. The work was started in January 1915 after my return from Florida, and has continued at intervals to the present. On May 30 of the present year a report was made to the Director of the Estacion Agronomica by the Entomologist and myself of the progress of the inspection work. This report states that all the colonies from one end of Cuba to the other where citrus was grown for export had been visited and the canker was not found in any of them. As a matter of fact the inspection covered practically all groves whether they were producing fruit for export or not.

The report does not cover the Isle of Pines which is yet to be officially inspected, but as a pathologist has been working on the Island for about two years there is little prospect of any canker being found there.

During the visit of Mr. Krome to this Station last year he informed me that Mr. Tenney was looking up a list of shipments to Cuba and he stated that I would receive further information on this point. Nothing has been heard about this.

Some weeks ago I visited Armand Bros. in Marianao, talked with Mr. Armand and visited his place. There is no citrus canker visible on his property nor has he any serious disease within the last two or three years. He states, as I have mentioned on a preceeding page, that the shipment to which you refer in your letter was returned to the original shipper, without taking the plants from their packing.

Mr. David Sturrock, who is now resident here, states that he was employed at Griffing's Nursery when the package from Armand's was returned He informs me that the plants were in bad condition and were burned.

Mr. Krome and some associates I understand have been or are

at present taking a look about Cuba. Mr. Neville of Havana tells me that Mr. Krome states to him that the Armand plants were returned to Griffing Bros. and were destroyed by them. Should there be any further doubt on this subject would it not be well to wire Mr. Krome to investigate the matter here himself, if he has not already done so?

I believe this is all the data I have on the subject. I trust that you will agree with me that the Cuban Government is doing what is necessary to protect the interests of Florida as well as her own, as the work has already cost a considerable sum of money without our finding any signs of the presence of the canker.

If there are any further particulars regarding our work here that are necessary to know for the protection of the Florida interests we are always glad to furnish them so far as we are able. At the same time if you have any facts regarding shipments of plants that we should know for the protection of our interests, I am sure that you will be very glad to furnish them to us.

Letter from Wilmon Newell to J. R. Johnston, Oct. 11, 1916.

I was duly in receipt of your letter of September 23rd, with which you enclosed copy of your letter of that date to Mr. R. E. Althouse, Secretary of the Federal Horticultural Board, regarding the Board's quarantine against citrus in Cuba. I have since received from Mr. Althouse a copy of his letter of Oct. 3rd to you.

I have taken the liberty of sending to Mr. Althouse a copy of your letter of July first, 1916, to me, which I believe fully summarizes the situation with respect to suspected shipments from Florida to Cuba, and do not believe that I am violating any confidences in sending him this copy. I have written him that, so far as the shipment to Armand Bros. is concerned, we are now thoroughly satisfied that this shipment was returned to Miami without any trees being taken out and planted in Cuba, the shipment being destroyed after it reached Miami. Also that we are well satisfied with the careful attention which you have given to the trees on the place of V. Robinson. I do not know to what extent the Federal Horticultural Board takes into account the possibility of citrus canker having been introduced into Cuba from other places than Florida. It seems that such an introduction from Texas or Louisiana may have been possible and of course there exists also the possibility of its introduction from some other country. I merely mention these as possibilities.

Letter from J. R. Johnston to Wilmon Newell, Oct. 17, 1916.

I have your letter of Oct. 11 in answer to mine of Sept. 23 regarding the Federal Horticultural Board's quarantine against citrus in Cuba.

I note your reference to the possibility of introduction of citrus canker from other localities than Florida, and will keep that in mind.

It appears to me that there is little hope now for ascertaining anything more in regard to shipments and that we will have to be content with continual inspection in the field. You know that now we get into the field frequently ourselves. The inspectors are on special work but at the same time they will report anything found on citrus.

Thus I believe we are at least in a good position to protect ourselves against the spread in Cuba should it by any chance be here or get in at any time.

Letter from Wilmon Newell to J. R. Johnston, Jan. 16, 1917.

A few weeks ago at Leesburg, Florida, I met a representative of the Southern Fruit Auction Company of Chicago. This representative was very enthusiastic over citrus conditions in Cuba and stated that he had made several trips there within the last few months for the purpose of buying fruit. Among other things he said in substance that the grapefruit groves at Pinar del Rio, in the western part of Cuba, were going back and were apparently suffering severely from some cause, the nature of which he did not know.

I am merely passing this information to you for what it may be worth. Possibly you are already familiar with the conditions referred to at Pinar del Rio and know to what extent our information is authentic. It occurs to us that it is a bare possibility the trouble in question might be citrus canker, but our informant did not have sufficient information which would indicate whether or not there was a probability of this disease being present.

Letter from J. R. Johnston to Wilmon Newell, Feb. 25, 1917.

In regard to your letter of Jan. 16, I may say that the information you have received from the visitor to Cuba respecting the conditions of the Pinar del Rio groves to be absolutely incorrect.

There are in the Province of Pinar del Rio some abandoned groves but one cannot properly report them as going back from disease. It is difficult for one ignorant of the conditions in Cuba to give reliable reports of conditions here. Many groves of the Island have been abandoned not because the trees would not grow well or bear good fruit, but entirely owing to the discouragement of the owner from lack of capital, uncongenial surroundings, and ignorance of the first principles of obtaining a living from a piece of land.

As I have before reported we have visited and still maintain our visits to all the districts of the Island, and can state positively that neither abandoned groves nor groves well cared for are suffering from the citrus canker.

The only possibility, and it is a real possibility, is that some person not in the citrus business has a few citrus trees in his yard and that these are infected. Thousand of farms and yards in the cities have a few trees, and we have not been able to visit all these. What we have done and are still doing is to visit all the "groves".

The difficulties encountered show well in our Spiny White Fly work. Numerous wealthy residents of Havana own farms in the country and occasionally have removed plants from Havana to the country.

This is now prohibited, but at the same time we are obtaining a list of these farms and are visiting them to look for the Spiny White Fly. In one case only at Hoyo Colorado, some 20 miles from Havana, a single farm has become infested in this way, but there is no citrus grove there.

THE BLACK FLY (ALEUROCANTHUS WOGLUMI) IN CUBA.

Letter from Wilmon Newell to J. R. Johnston, dated May 24, 1916.

We have been considerably interested lately in learning as much as possible regarding the Aleyrodid *aleurocanthus woglumi* described a few months ago by Prof. Quaintance of the Bureau of Entomology in manuscript and which is known to occur in Jamaica and certain islands of the Bahamas.

A member of our staff, Dr. J. H. Montgomery, has just returned from a trip of investigation to the Bahamas and has found that this pest is very destructive there, particularly to lime trees. Prof. Quaintance quotes you as saying that the guava is one of the plants subject to attack by this insect and from this information I infer that this pest occurs in Cuba.

Will you kindly write me whether or not you know this pest to occur in Cuba and if possible, the extent of its distribution and the extent of its ravages.

The writer believes that close co-operation along the lines of keeping informed regarding the various pests and diseases which are likely to be injurious either in Florida or Cuba will be of the utmost importance to all parties concerned.

Letter from J. R. Johnston to Wilmon Newell, dated, May 31, 1916.

Your letter of May 24 in regard to *Aleurocanthus woglumi* has been received.

In reply I would state that in August 1915 a few specimens of this insect were received by our Entomologist who determined them as *Aleurocanthus woglumi* by comparing them with material brought over by me from Jamaica in the month of June of the same year. The specimens were reported to occur on a few citrus trees in a yard outside of Guantanamo, and were sent in not so much as something serious as something new.

This constitutes the first report of the insect in Cuba. The only notes we had as to the importance and the distribution of the "black fly" were in a written description given me by Mr. Ashby of Jamaica.

At Christmas I attempted to obtain personally from Prof. Quaintance further information as to the importance and distribution of the insect, but could ascertain only that it was common in plants of India and had probably been introduced from there to Jamaica. Very little was known as to its importance. Our Entomologist subsequently had his identification of the insect verified by Prof. Quaintance, and he presented a paper on the subject to the Sociedad de Historia Natural of Felipe Poey in Havana.

The Entomologist and myself have been on a citrus survey of the Island and we did not find any of this insect until toward the end of the work when we went to the plantation where it was reported, making the visit not because the plantation was in a citrus center but because of this report. There we found that it had spread considerably and was possible covering a radius of two miles. It occurred in various citrus trees, on mango, coffee, and on guava. This constitutes the only record of its ocurrence in Cuba. The focus is at Guantanamo, a district far removed from any of the citrus exporting colonies so that its control should be a comparatively easy matter. We have just returned from the completion of this survey and the examination of this center and have just made our report to the Government, and although the insect occurs over only a small center at present, plans are being made to restrict it to that center and eventually eradicate it.

Letter, from Wilmon Newell to J. R. Johnston, dated June 10, 1916.

I beg to thank you for your full and explicit account of May 31st regarding the occurrence of *Aleurocanthus woglumi* in Cuba.

I note that this insect apparently occurs in a very limited area at Guantanamo. I am wondering whether there are any exportations of any kind to Florida from Guantanamo, and also whether there is any likelihood of freight cars being loaded at Guantanamo for shipment via Havana and the car ferry to Key West. From what we knom of the distribution of the ordinary white fly, *Aleurocanthus woglumi* would he readily transmittable in freight and passenger cars regardless of the nature of the shipments which these cars might contain.

If the Cuban government will undertake immediately the supression and eradication of this pest in the district where it now occurs, and if the Cuban government can offer us assurance that no shipments of any kind will be made out of the infested section to Florida, or through Florida to other points, it may not be necessary for us to impose a quarantine against the shipment of plants and plant products from Cuba.

At the last meeting of the Plant Board, held on June 5th, the following rule was adopted:

The importation into Florida of all trees, plants, vines, shrubs, cuttings, scions, leaves and parts of plants from the Bahamas, India and Jamaica, in which countries the spiny citrus white fly *(Aleurocanthus woglumi)* is known to occur, is hereby prohibited: provided, that this rule shall not be construed as prohibiting the importation of fruits and vegetables intended for use as food products when such fruits or vegetables are not infested or infected with any injurious insect or disease or the importation of which is not otherwise speci-

fically prohibited: provided, further, that this rule shall not prohibit the importation of lumber, logs, sisal hemp or manufactured articles.

Unless we can receive adequate assurances that the Cuban government will take steps to prevent the possibility of this insect being transmitted to Florida in shipments, it will be necessary for us to place a similar quarantine on shipments from Cuba.

Dr. J. H. Montgomery, a member of our staff, returned recently from a trip of investigation to Nassau and adjoining islands, and found that *Aleurocanthus woglumi* has proven very destructive in Nassau during the past ten months, many lime trees having been killed outright and other groves having been cut down in their entirety by the growers as the latter had abandoned all hope of saving them from destruction from this pest. Apparently it is far more destructive than any species of white fly which occurs in Florida and from the conditions existing in Nassau we have every reason to fear the possible introduction of this pest as a calamity second only to the introduction of citrus canker. It therefore behooves us to take every possible step to prevent its introduction. This will require rather drastic measures in view of the large number of plants on which the larvae might be transmitted, and also the fact that the adults could evidently be readily carried for long distances in the holds of vessels or in railway cars.

We sincerely trust that your government will take initiative steps in this matter which will obviate the necessary of our placing a quarantine on shipments from Cuba, but prompt action will be necessary to avoid the imposition of such a quarantine by our State Plant Board.

Letter from Wilmon Newell to J. R. Johnston, dated Oct. 5, 1916.

I beg to thank you for your letter of Sept. 10th, with which you enclosed a copy of Mr. J. C. Hutson's report on the control work on *Aleurocanthus woglumi,* in the vicinity of Guantanamo, Oriente, Cuba.

You can realize, I believe, that it is a source of much gratification to us to know that this injurious pest is being vigorously dealt with in Cuba, therefore this step certainly will operate to protect us against the introduction of this pest into Florida. This particular insect has been very destructive in the Bahamas and we have been in almost constant communication with His Excellency, Sir William Allardyce, Governor of the Bahamas, for the past few months regarding possible control measures.

Letter from J. R. Johnston to Wilmon Newell, dated Dec. 15, 1916.

I regret to have to inform you that the Spiny White Fly *(Aleurocanthus woglumi)* now occurs in part of the city of Havana. The pest is limited to Vedado, a part of the city some distance from the port. It is not very abundant, and seems to have originated not a

great while ago from an introduction of mango plants from Guantanamo, the only other point of infection now known.

The limits of this infestation appear to be definitely ascertained and moreover inspectors are constantly following it up. The few known (12) existing points of infestation are being sprayed and will be watched from now on.

Letter from Wilmon Newell to J. R. Johnston, dated Dec. 29, 1916.

Please accept my hearty thanks for your kindness in writing me under December 15th regarding the occurrence of the spiny citrus white fly in a portion of the city of Havana.

So long as efficient work is being done by your Commision for keeping this infestation under control and so long as shipments of fruit and other products from the infested section are not being sent into Florida, I do not believe it will be necessary for our State Plant Board to impose any quarantines against Cuban plants, particularly on account of the occurrence of this pest in the Island.

I will of course appreciate your keeping me informed from time to time as to any developments, especially in event the pest is found to extend over a larger area and to such an extent as to create a danger of its being introduced into Florida.

REPORT

concerning the work carried out by the Señor Emilio D. Cassi on the destruction of the Marabu (Dichrostachys nutans).

On May 22nd, 1916, there was sent to me a letter of Sr. Emilio Cassi, as follows: "Hon. Sr. Sec. of Agriculture, Habana. — Señor: — The writer has for some time carried on studies and experiments to destroy the plant called Marabu, that has invaded such a large territory, and has caused such great damage.

The experiments realized up to date have been carried out using chemical liquids, vines of the Family Convolvulaceae, hymenomycetous fungi, various bacteria and certain insects, and the results forescast a positive success not far off.

But still it is necessary to conclude various experiments that really may be considered as proofs, and I find myself without the necessary resources to carry these to a successful conclusion, since I have spent everything in my first experiments.

If you could secure from that Department which you with such great faith and self-sacrifice direct, some aid, without doubt I could bring my work to a successful end, facilitating in this manner, to the agriculturists of Cuba, sure scientific means of eliminating from their

The ''marabu'' (Dichrostachys nutans). Showing the dense growth.

lds a pest that we have lamented so long, but one that up to date tle attempt has been made to eradicate.

In hope of your effective cooperation, I remain.

Very respectfully yours,
(S.) EMILIO D. CASSI.

ılvario, Havana."

In order to carry out the task entrusted to me, I solicited om the Director General of Agriculture on June 29 the author- ation necessary to go to the nearest localities where Sr. Cassi .s carried out some of his experiments to see the worth of s treatments. The said communication was referred to the resident of the Commission of Plant Sanitation, who requested e to make the following report.

In the request that Sr. Cassi sent to the Department as well in the documents that later were obtained there appears no planation of the technique employed nor of the chemical subs- nce, as for instance of the proportions. Altogether the writer .s only been able to appreciate the efficacy of the treatment by s results and never by the scientific explanation of the chemical bstances, nor of the organisms (fungi, bacteria, and vines) at were used by Sr. Cassi to destroy the Marabu.

In the different places in which were carried out the ex- riments are still found many plants in complete vigor; more er we must take into consideration the certificate of Sr. Juan Roig, Chief of the Department of Botany of the Estacion gronómica as follows: I hereby certify that Sr. Emilio D. Cassi r some time has occupied himself with great interest in the idy of some means of destroying the injurious plant called arabu, having tried various means for its extermination, which to the present have not given all the results hoped for; but nich indicate the interest the said gentleman has taken in this 'air. Moreover, I am informed that the said Sr. Cassi is contin- g his investigations aimed at present at finding some natural emy of the said plant, such as other plants more vigorous or ngi or other diseases that will destroy it; a task that to my nd in progressing well and merits the official aid of the Depart- nt of Agriculture. And at the petition of the interested party, give the present certificate. Santiago de las Vegas, March 6, 16. (S.) *Juan T. Roig.*

In adition a letter signed by Sr. Salvador Hernández in Ca- güey (June 10, 1914) in which he certifies to having used a uid in the proportion of one bottle to 20 of water, and after tting the plants the liquid was applied and no subsequent routing took place. This proceeding is said to be employed to

kill the zarza, guana, guayaba, and moreover marabu, with good results. We have been able to see plants treated in this way and moreover we have heard of various cases in which after several months sprouting began. Dr. Aristides Agramonte on March 10, 1916, certified in the following form the studies of Sr. Cassi:

I hereby certify that Sr. Emilio D. Cassi for many months has been studying the application of bacterial organisms to the destruction of certain injurious plants as marabu among others, with probabilities of success. And for the information of whom it may concern I issue this certificate. Dr. Aristides Agramonte, Professor of Bacteriology and Experimental Pathology in the University of Havana, March 10th, 1916.

As may be seen this certificate does not express in a definite manner what organisms are employed, and definitely states only that the results will probably be successful although there are no results as yet.

Sr. Pedro Puig, Secretary of the Provincial Administration of Camagüey, certifies to having been present at an experiment made by the Sr. Cassi with the application of a liquid substance to exterminate or kill the Marabu; having been able to observe the satisfactory result if there were used a proportion of the liquid 1 to 5 or 1 to 10.

In this certificate is seen a discrepancy that exists regarding the proportions of the solution, since while in some cases there is dissolved one part of the liquid in 5, and 1 in 10 in other cases, and there are even those who recommend using the liquid pure.

Sr. Diego Acosta, Official Paymaster of the Secretary of Public Works in the District of Camagüey, manifests the following:

I hereby certify that I have used the liquid that is sold by Sr. Emilio Cassi and known by the name "Destroyer of Marabu", with the following result: In a proportion of 20 bottles of water to one of liquid the solution was put on the Marabu and around the trunk, and in 15 days I had noticed that there had died 10% of the plants. Not satisfied with this result, I prepared the liquid in a proportion of 1-10, and carried out the treatment cutting the plant almost to the ground, and slashing the stumps, applying immediately the solution, so that all of the plant died, without, up to date (4 months afterward and with plenty of rain) having any shoots appear.

And at the request of the Sr. Emilio Cassi, for whatever use he may consider it necessary, I write this certificate in Camagüey, Nov. 6th, 1914. (S.) *Diego Acosta.*

In the foregoing certificate is seen the excellent results of the preparation that Sr. Cassi sells under the name "Destructor of Marabu", and we have not been able to ascertain, up to the

present, the chemical composition of the preparation, even in the register of trademarks in the Department of Agriculture, Commence and Labor, Office of Trademarks and Patents.

The President of the Provincial Council of Camagüey certifies in the following form the work realized by the Señor Cassi:

The undersigned, members of the Provincial Council of Camagüey, hereby certify:

That we have been present at an experiment made by Sr. Emilio Cassi and Papini, upon the application of a liquid substance to exterminate or kill the plant called Marabu, having been able to observe a satisfactory result when there was used a proportion of the said liquid of one bottle dissolved in 5 or 10 parts of water.

And at the request of the said Sr. Cassi, we issue this certificate in Camagüey, on the 30th of May, 1914.

(S.) *Florencio Simancas, Pedro Juarez R., Ricardo Ortega.* (Seal of the Presidency of the Secretary).

Sr. Jose Leon Almanca, living on the farm "San Blas" in Camagüey, states in the following terms:

Sr. Emilio Cassi: — Camagüey, My Dear Sir. — I take pleasure in informing you I have experimented with your liquid for destroying Marabu, and can say that I have used it in the proportion of 11 parts of water to one of the liquid, and the result has been excellent. All the plants of Marabu which I treated, and I can say that the treatment was not very great, but in three days all the plants were dead. Six days afterwards I examined the roots of some of them and I have found them in a real state of decomposition, some with the bark fallen away. In view of this experience, I believe the liquid is better than crude petroleum.

This laudatory communication for the treatment of Sr. Cassi indicates the proportion of 11 parts of water to one of liquid, which shows again the difference of opinion regarding the proportion of the product to be employed.

From the preceding paragraphs it is seen that the Sr. Cassi has been occupying himself with the problem of the destruction of the Marabu in the field, employing different means and carrying out a series of experiments almost all of which were satisfactory, which demonstrates that he may be in the road to discover a real enemy of this plant, for which reason we believe it desiderable that the said gentleman present a detailed account of the products employed, the priority of any discovery being safeguarded for him.

The foregoing is what I have to report on this subject.

Very respectfully yours,

(S) Mario Sanchez Roig.

Havana, Oct. 17th, 1916.

AN INSECT PEST OF THE SUGAR CANE.

REPORT TO THE DIRECTOR OF THE AGRONOMIC STATION BY THE PATHOLOGIST.

In accordance with the order dated June 28 from the Director of Agriculture to study the disease of sugar cane in the vicinity of Jagüeyal, I have to report as follows:

There are many spots of land in the colonia of Sr. Francisco Bravo in which the cane is either dying or dead. In some cases there are stalks of cane three or four feet high that have grown well for a time as shown by several long joints of cane, and then have suffered some injury so that the upper joints are very short and the tops are dying. In all cases these upper short joints are thickly covered with mealy-bugs *(Pseudococcus sacchari)* in sufficient numbers to account for the damage.

All of the stunted canes, whether plant canes or ratoon canes, show abundance of mealy-bug at the base of the stalks, and when the stool is removed from the ground it is possible to see the roots literally covered with mealy-bugs.

In many places the poor cane has been burnt off, the fields plowed, and new cane planted. Usually cane replanted on these infected areas fails to germinate, or if it does germinate the shoots are weak and do not produce good cane. Examination of many seed that had been in the soil from one week to three weeks showed the buds covered with mealy-bugs in number sufficient to account for the weakening and death of the shoots.

The mealy-bug feeds directly upon living cane, either the roots or the stalk, and obtains its nourishment by sucking out the juice of the plant. A few insects do not cause a great deal of injury but large numbers as are present in the vicinity of Central Jagüeyal cause serious injury and death to the plant.

The probability of other factors contributing to this trouble were considered. Termites were found in abundance in many places among the roots and in the stubble of the cane, but only in dead parts. A few white grubs were found after digging up the cepas but there was no visible evidence of injury to the roots due to these grubs. No fungi were present in any quantity to render them suspected of causing injury to healthy plants. Soil conditions were equally as good in the infected areas as in the non-infected. The only conclusions, therefore, that I have reached is that the mealy-bugs alone are responsible for this trouble.

The extent of the infested areas was not definitely ascertain-

ed. Several spots of several acres in extent were seen, and there were several small spots. This same trouble is said to exist not only in the colonia of Sr. Bravo but also on other colonias of Central Jagüeyal and of Central Stewart.

This plague constitutes by far the most acute problem among those relating to insect injuries in sugar cane in the Island of Cuba. It absolutely kills the cane, it is distributed over a wide area, appears to be speading, and occurs on most excellent soils.

It is most assuredly worthy of further study to determine its exact distribution, and to ascertain means of control. The insect is one well known in many cane countries and there are certain means known to assist in control but no direct remedy or means of eradication.

I would respectfully recommend that the following measures be taken immediately:

(1) That an entomological assistant be detailed to make a complete survey of the fields about Central Jagüeyal and Stewart to ascertain the distribution of this insect.

(2) That experiments be made at Central Jagüeyal with the view to determine if possible some poison with which to cover the cane seed in order to prevent the attack of the mealy-bugs on the young shoots.

(3) That the Australian Lady-bird beetle *(Cryptolaenus montrauzieri)* be introduced into Cuba and be disseminated in the fields to assist in destroying this mealy-bug.

(4) That the mealy-bug fungus *(Aspergillus Flavus)* be developed in large quantities and sprend in the infected fields to further assist in the destruction of the mealy-bug.

Extract from a letter to the Cuban Sugar Cane Corporation from the Commission of Plant Sanitation, Sept. 14, 1916.

In addition to the report that you already have, I will add the following in regard to this "Disease" in cane, due to the mealy-bugs. In cane attacked by these insects there is no remedy other than to burn the affected fields, which of course is done only in extreme cases. If a field has been abandoned because of this pest it should be plowed, all the trash burned, and maintained free from weeds at least for a period of two months. Cultivating every two weeks should keep down the weeds and stir up the soil and expose the insects to the sun, a proceeding which will prevent the insects from multiplying, and will kill many. In planting cane, seed should be taken from the field in a clean condition, before removing to another field, so as to avoid carrying the insects about. The common ants contribute greatly to the spread of the mealy-bugs, but with the care just described, they will soon be exterminated.

In case that the infected area is very extensive to treat in this

way, the worst field should be cleaned up this year and the rest the following year, and the practice of using clean seed should be followed in all the fields.

These troubles in general have their origin from the fact that many individuals little expert in colonias of cane make contracts with some Centrals promising to prepare a certain number of acres and these in their turn contract with others that they entrust directly with the planting for a sum less than that they receive from the Central. As a consequence the ones in charge of the planting do not take pains with the selection of the seed, and from this there results, if not in the first planting, often in subsequent crops, the appearance of pests and diseases that cause enormous losses to the Centrals in their plantations and in others, since the insects and diseases are easily transported from one field to another.

REPORT OF AN INSPECTION TRIP TO THE PASTURES OF THE RANCH "LA HORQUETA", CAMAGÜEY, IN ORDER TO INVESTIGATE A PLAGUE IN THE FIELDS OF PARANA.

INTRODUCTION.

The report having been made by the Provincial Governor (temporary) through Sr. Cor. Rodolfo Parrado of the presence in the jurisdiction of Camagüey of a plague of insects destroying the pastures, the affair was put into the hands of the Commission of Plant Sanitation, who designated the writer, a member of the commission, to carry out an investigation. On Oct. 10th, and in company with Sres. Parrado, Iglesias and other ranchmen of that locality, we went to the ranch "La Horqueta", located some eight leagues S. E. of the City of Camagüey, comprising some 150 caballerías, covered almost entirely with the grass "Parana" and dedicated to cattle raising.

OBSERVATIONS.

The grass called "Parana" or "Paral" *(Panicum numidianum)* was observed completely dry over large areas, in spite of the fertility and freshness of the soil, Sr. Parrado informing us that he estimated some 20 caballerias to have been lost, all of pasture land, and in fertile clearings.

Other ranchmen made similar reports, estimating that 40 or 50 caballerias may have been destroyed in all that territory.

Plate N.° 5

Monecphora bicincta. The insect enlarged in the center and natural size in the corner.

CAUSE OF THE DRYING AND DEATH OF THE "PARANA".

According to the examination made of many dried plants, finding in them many remains of insects, from the number of nymphs of the insect that were found at the base of the plants still alive, and from those that were found and collected, there can be made the definite statement that the cause of the damage was the insect *Monecphora bicincta* Say. We were informed that there was a large numer of these insects flying among the grass months before.

THE INSECT MONECPHORA "SALIVITA".

The insect *Monecphora bicincta* Say, belongs to the large group of sucking insects or the hemiptera and to the family Cercopidae, thus being related to the stink bug, the spiny white fly of citrus of Guantanamo, of the scale insects, of the mealy bug of cane, and of many other insect pests of importance to agriculture.

These insects are distinguished particularly by being covered by a juice which they extract from the plant on which they feed, and resembles the human saliva, for which reason we believe it desirable to call the insect by the name spittle insect "Salivita".

HISTORY OF THE INSECT IN CUBA.

From the year 1910 (Sept. 30th) were received in the Experiment Station specimens of these insects, which were sent from Perico, Matanzas, by the Sugar Company of Tinguaro, it being reported that they had been present in large numbers and that they were flying over all the plants. Later and on different occasions the writer collected the insect on the lands of the Experiment Station, at Santiago de las Vegas, Havana. They were especially abundant in one lot that having been in grass, was plowed, and on breaking the soil many insects were caused to fly up. In September of last year (1915) they were found in abundance, sucking the juices from the roots of the cane, forming there the characteristic spittle (salivita) disappearing when the dry season arrived. In La Gloria (Guanaja) in the north of the province of Camagüey, were collected adults that flew among the grass. In Baracoa in April of the present year (1916) were also collected by the writer adults in the grass. Also Mr. U. C. Loftin, Entomologist commisioned by the United States Department of Agriculture to study in Cuba the parasites of the moth

stalk borer of cane, reported in January of 1916 that he had seen these insects in the sugar cane over almost all the Island, but in small numbers. Finally the recent plague of this insect at the ranch of La Horqueta and others adjacent in Camagüey is evident proof of the general distribution of the insect over the Island, multiplying until it constitutes a plague, apparently only when the season is very damp, and there exists a desirable food in abundance.

SIMILAR PLAGUES IN THE BRITISH WEST INDIES.

In the British West Indies, insects *(Tomaspis spp.)* very similar to the foregoing are well known from the damage they cause in the sugar cane and other grass plants and are designated by the common name of frog-hopper and frog-spittle (Insects with the saliva of frogs). In the Island of Trinidad these insects have been very destructive, being according to F. W. Urich, the two species most common, *Tomaspis varia Fab.* which is more abundant, and *T. bicincta.* Insects of this same group also occur in the countries of Central America and Northern South America, Mexico, Nicaragua, British Honduras, Costa Rica, and Demerara.

LIFE HISTORY AND HABITS OF THE INSECT.

In its adult state, that is, the state of the complete development, the insect has the appearance of a small butterfly, with a thick body of a size approximately 10 mm. long by 5 mm. wide. The body is reddish, marked with black, and the anterior wings (those which are seen when the insect is in repose) are of a color dead black with two transverse reddish stripes. These insects are easily found upon the leaves of the grass and they fly with rapidity from 2 to 5 meters when molested. They are most active from dawn until the sun becomes most hot, then hiding under the trash close to the ground.

The eggs are laid on the soil very close to the plant in the places most protected from the sun. The eggs take to hatch some 12 to 20 days, in a wet period, but if the weather changes and becomes dry they remain in good condition without hatching for more than four months, waiting for a wet period, this being the reason why they multiply so when the season is continually wet.

Immediately upon hatching, the small insect adheres to some roots or some tender part of the plant where it begins sucking out the juices and covers it self with a secretion which protects it, and for this reason we have believed it appropriate to call

Plate N.° 6

The frog-spittle formed at the foot of the sugar cane by the insect Monecphora bicincta.

A good bunch of the grass ''parana'' dried by the insect Monecphora bicincta.

the insect "Salivita", since it much resembles the human saliva. In this state called the nymph, the insect grows and gradually levelopes, changing its skin 4 times, it being observed from the third change that the wings are beginning to form, and at the fourth change these are complete. When the nymph is in the first stage, that is to say still small, it is found only on the lower part of the plants, near the roots, but in the third and fourth stages it goes higher on the plant and some times in the angle formed between the leaves and the stem of the plant. To attain complete developement it takes from 32 to 40 days, and it may move to another part of the plant that is more juicy.

The time of the year in which this insect seems to reproduce itself in greatest numbers is in the rainy months from July to November, especially in these last months, September, October and November, according to the weather.

PLANTS ATTACKED.

The plant in which this insect has been found in greatest numbers is the pasture grass called "Parana", "Panama", or "Paral" *(Panicum Numidianum)* It is also found attacking the guinea grass *(Panicum maximum)*, when this plant is found among the Parana, it having been found completely dried out to the extent that it can be pulled up without any force, notwithstanding that it is well rooted. In the grass "Don Carlos" *(Sorgum halapense)* at the Experiment Station, this insect was found, and in Camagüey this insect was found in the grass "Vetiver" *(Andropogon muricatus)*, and in other grasses that were not determined. In sugar cane *(Saccharum officinarum)* it may often be injurious, but the plague can easily be arrested by removing the lower leaves and cleaning the field of grass.

IMPORTANCE OF THE DAMAGE.

In the parana grass the damage has been considerable at the ranch La Horqueta and in neighboring ones to the south-east of Camagüey. In pastures which were very fertile and new and where the grass grows with great vigor was observed large areas up to 20 caballerias in extent, completely dry, although the plants remained intact, since the damage done by the insect consists in sucking the juices at the foot of the plant, and the roots near the collar, which are the parts most juicy. In the nymphal stage or when it looks like a salivita is when it is most injurious. In the adult stage it feeds itself in the same way by sucking the juices,

an insect lacks food in one place he tries to emigrate to new pastures. The damage caused by this plague this year in the Province of Camagüey may be estimated at more than 20 to 25,000 dollars, since no less than 40 to 50 caballerias of pasture have been completely dried out by this insect, without hopes of the grass growing again, or if it lives it is so impoverished that it quickly goes to seed, and its place is taken by bad weeds and stronger brush.

The losses in sugar cane we have not been able to estimate since the plague was not very extensive nor of long duration here, but in Trinidad (British West Indies) it causes considerable damage, sucking the juices from the plant and causing the leaves to turn yellow and dry up, although it is said that if the weather changes and becomes drier so that the plague ceases, the sugar cane will sucker again.

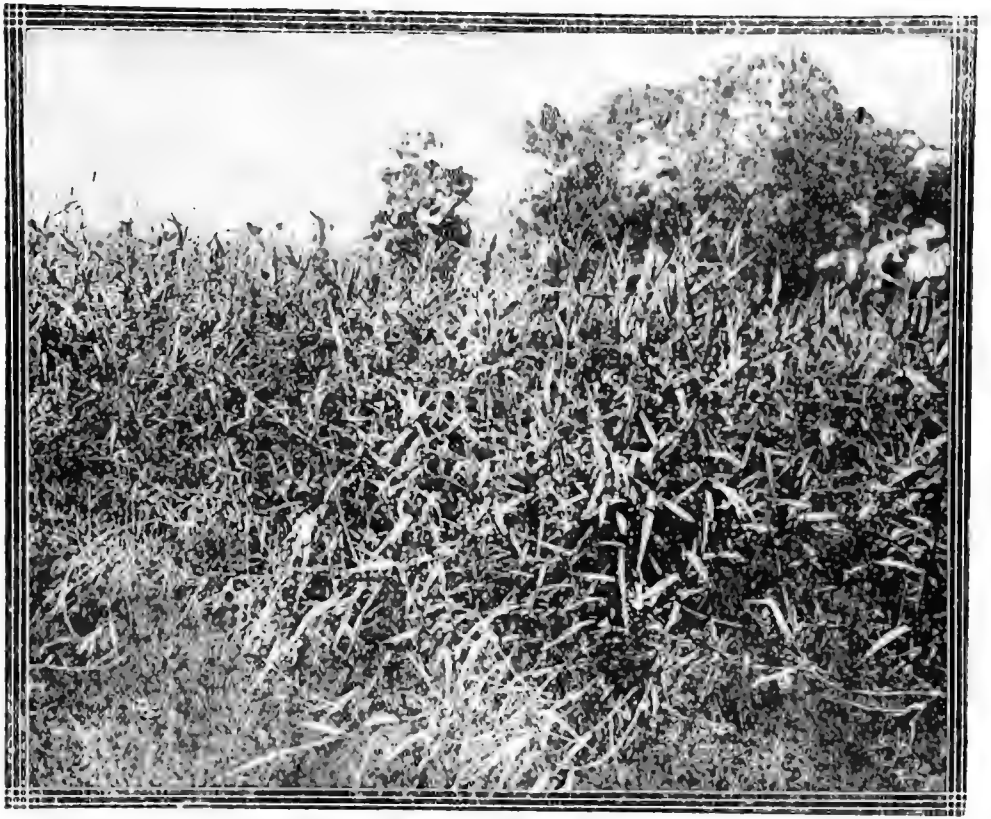
METHODS OF CONTROLLING THE PLAGUE.

Owing to the special conditions in the pastures of the Province of Camagüey that have been almost all in timber and in them still remain many trunks of trees, it is difficult to take such means as would be applicable on smooth lands, free from obstacles and of much less extension.

When there has been reached the extremity of having completely lost all of the parana, as in this special case, there is no longer hope of saving anything of the pasture, and every means should be taken to destroy the eggs and nymphs and adults. In this case there can be advised nothing more than to set fire to the pasture as soon as the weather is suitable, a fireguard being formed just a little outside the limits of the plague, so as to include all of the insects.

When it is first observed that the grass is infested and that the number of the insects is already large, every means should be tried for their destruction, which may be done in various ways. For the purpose of destroying the adults one of the methods that has been used with success in Trinidad consists in locating trap-lights in the fields at certain distances from each other. These trap-lights consist of a powerful light with a reflector located above some container with coal tar or kerosene, in such a way that the insects that are attracted by the light fall into the container. This apparatus may be more or less elaborated according to the ingenuity of the one making it.

Another means that would be more appropriate in this case and that is more recommended for the treatment of large areas consists in passing over all the field a wooden beam in the manner



A lot of the "parana" grass free from the insect Monecphora bicincta.

Fields of the grass ''parana'' destroyed by the insect Monecphora bicincta.

of a rake with a wall about a meter high, as shown in the illustration, the apparatus being painted with tar that sticks to the insects that are aroused by the raking and fly against the apparatus. This apparatus is naturally made according to the necessities of the case and the skill of the constructor.

NATURAL MEANS TO CONTROL THE PLAGUE.

In Trinidad there has been used with considerable success a fungus called the green muscardine, which produces a disease in the insects. It is contagious and destroys a number. The fungus develops best in the atmospheric conditions in which develops best also the Monecphora, so that we believe it would be of considerable utility to spread it in the fields when the plague develops again. Mr. J. R. Johnston, Pathologist of the Experiment Station reports that this fungus exists in Cuba and believes that it would be of some use in the control of this plague.

SUMARY.

The insect that has caused so much damage in the parana in Camagüey is the hemipterous cercopid *Monecphora bicincta* Say. (Salivita).

The parana grass *Panicum numidianum* is most attacked.

The insect is found well distributed in Cuba, but only when there exists a great abundance of its preferred food and when conditions of humidity are right does it multiply enough to constitute a plague.

The life of the insect is presented in three distinct phases: the egg that is laid in hidden places near the foot of the plant on the soil, the nymph which forms the salivita and lives in the places richest in juice and moisture, like the roots and nodes, and the adult that flies about and lays the eggs.

The means most recommended for destroying the plague is to collect the adults which lay the eggs as this is the stage easiet to trap by means of lights, and by means of rakes painted with tar or tanglefoot.

To avoid the propagation of this plague, burn those fields where it has appeared and has not been controlled in time to prevent drying out the pasture, for the purpose of destoyng the eggs that remain there and likewise the adults and the nymphs.

Among the natural means that may be applied at present there is only the green muscardine fungus.

CERTIFICATES OF INSPECTION FOR EXPORTED PLANTS

In regard to the issuing of certificates for plants to be shipped to foreign countries, two important problems have arisen, neither of them of such a nature as to be easily overcome.

The first problem is due to the very existence of plant quarantine regulations themselves. Various countries have these regulations. The United States has certain ones, and the various States have others in addition.

Insect pests and diseases are occasionally appearing in new countries, and rarely are they disappearing. These conditions, however, cause the quarantine regulations for their control to be in a more or less constant state of fluctuation; that is to say, new regulations are being made and old ones modified or abolished.

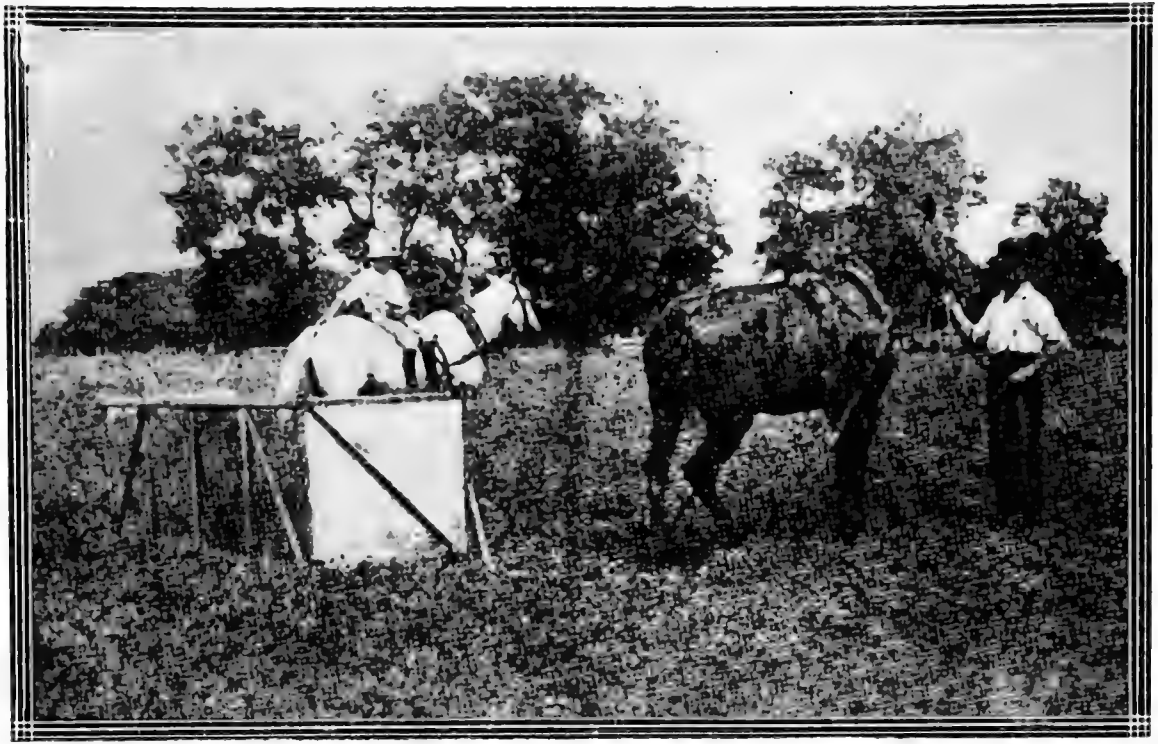
For any one country to obtain up-to-date advices as to these regulations seems impossible, or at best difficult.

As a result of this, certificates are occasionally given by the inspector of one country for plants to be sent to another country which has a quarantine against such plants whether certified or not. The issuing of the certificate of course has done no harm unless it was to mislead the shipper into a sense of false security. At best it reflects as a piece of foolishness on the one who issued the certificate.

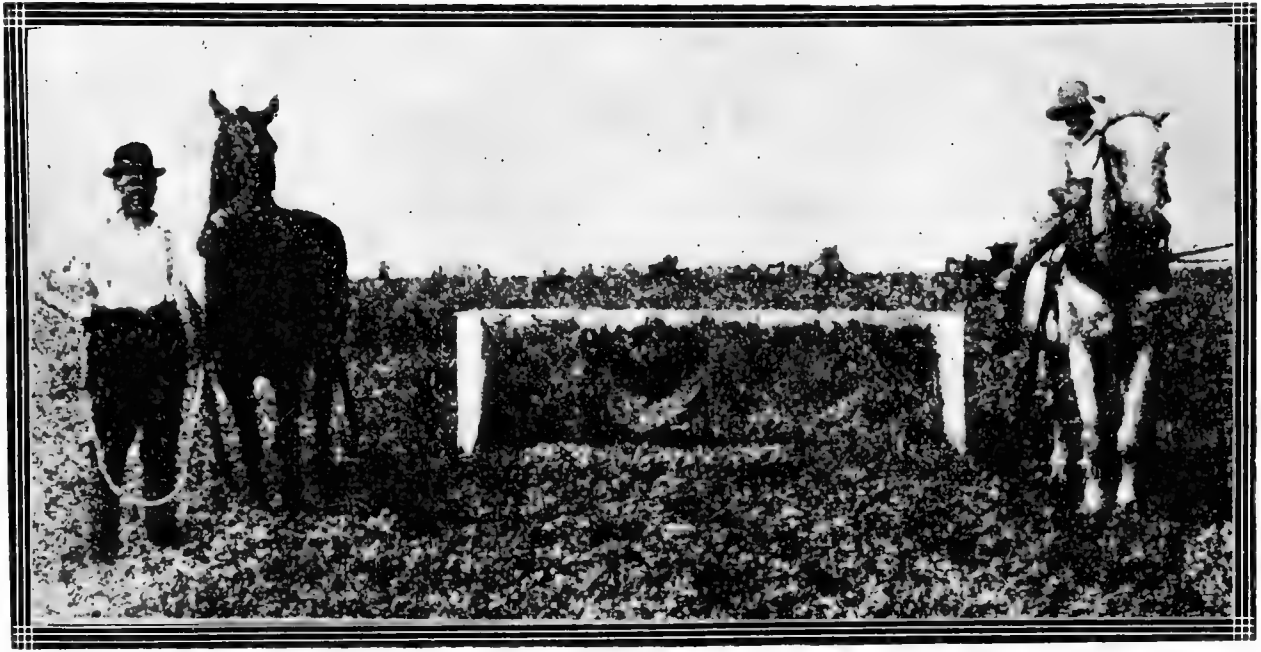
The President of the Commission of Plant Sanitation has already elsewhere published a solution of this difficulty that is, the creation of a Central Quarantine Board for all the American countries. Such a Central Board to make a special duty to maintain on file copies of the quarantine regulations of all the American countries and to notify each and every country of any changes.

Pending such a very desirable arrangement between the different countries, each country has to do what it can to ascertain the various regulations of the neighboring countries.

The other difficulty encountered in this work is two fold, and is due to the lack of knowledge of the insects and diseases of the country. In Cuba there are many insects and diseases unknown to the inspectors and to the investigators of that country as well as of other countries (see page 52). So far as the insects are concerned, for the most part they can be seen. So far as the diseases are concerned, any sympton of disease can be seen, but the presence or absence of spores or of mycelium or other inconspicuous parts of a disease-producing organism may be difficult or impossible to see with the naked eye.

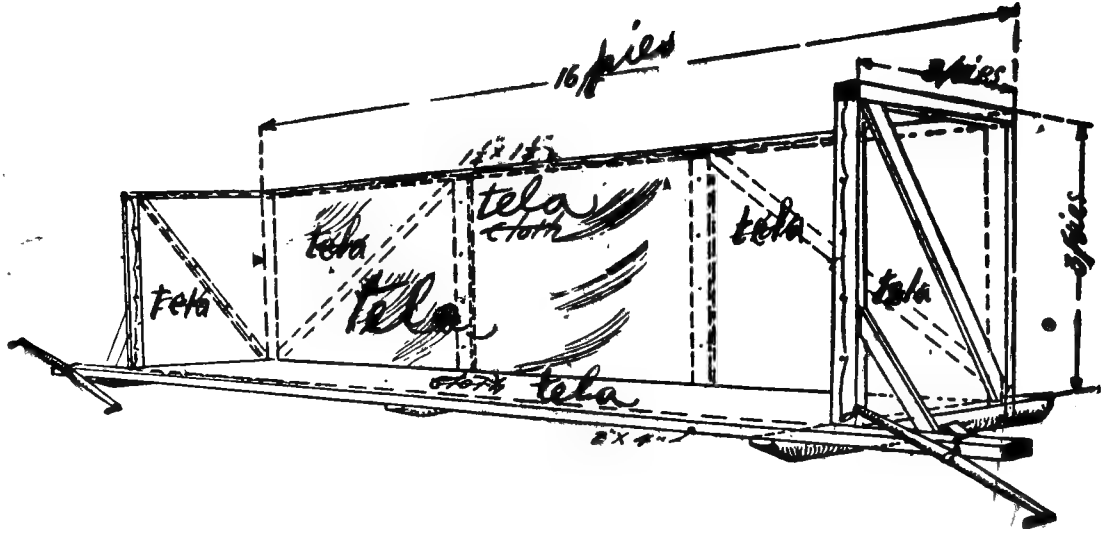


Rake to trap insects that damage the pastures. Side view.



Rake to trap insects that damage the pastures. Front view.

Plate N.° 12



Copy of a drawing of one of the rakes that is used in the United States to trap insects that damage the pastures.

To illustrate this point extracts from various letters will be given as follows:

Letter from J. R. Johnston to Wilmon Newell, dated June 29, 1916.

I would like to call your attention to a recent shipment of royal palms that was sent from Cuba to Miami, Fla. for use on the Deering Estate. The shipper has been informed that part of the lot was condemned on account of a fungus on the trunk. I would greatly appreciate complete information as to the specific fungus and the nature of the disease for which the material was condemned if this report be true.

Letter from Wilmon Newell to J. R. Johnston, dated July 18, 1916.

With reference to yours of the 29th, will say that the report of our Deputy Port and Railway Inspector at Miami shows that on June 21 he inspected a carload of royal palms from Santiago consigned to the Deering Estate of Miami, of which sixteen were destroyed or badly damaged by a fungous disease. My understanding is that the palms destroyed were so badly damaged by the fungus that it would have been useless to plant them anyhow.

We have not yet received at this office any specimens from the shipment and I do not know whether any have been preserved or not. From the description which I have received of the trouble, it appears that the palms which were destroyed were useless anyhow and even though the fungus were not identified, their destruction when so badly infected with any disease would have been fully justified.

Letter from the Secretary of the Federal Horticultural Board to the shipper of the royal palms, dated July 22, 1916.

Under date of June 20, 1916, there arrived and were entered by you to W. D. Sturrock, Miami, Fla. under permit No. 587. These plants were certified by the inspection service of your country as being free from injurious insect pests and plant disease. We are advised by Prof. Wilmon Newell, Plant Commissioner, of the State of Florida, Gainesville, Florida, that an examination of the palms on arrival indicated that sixteen of them were badly affected, in fact, practically destroyed by a fungous disease which has not yet been identified. In view of the fact that the destination of these plants is only about forty eight hours removed from Cuba, and certainly not over three days removed from the original shipping point, Santiago, it is evident that they must have been in a diseased condition at the time they were shipped. A repetition of shipping diseased plants will compel us to cancel all permits to import from you and to refuse to issue further permits.

A similar letter was sent by the Secretary of the Federal Horticultural Board to the Inspector who had certified that the Royal Palms were free from injurious insects and diseases with the additional statment that "The continuation of diseased shipments as free from diseases and insect pests will compel us to invoke the second paragraph of regulation 7 of the enclosed circular, namely the cancellation of all outstanding permits and the refusal to issue further permits for the importation of nursery stock from Cuba".

Letter from J. R. Johnston to Wilmon Newell, dated July 29, 1916.

In regard to the disease of the royal palms shipped to Miami, I can readily see that little else could be done other than destroy the affected trees. I regret exceedingly hower, that the Inspector did not either send to the Pathologist of the Plant Board or to yourself some specimens of the fungus causing the disease or refrain from using the term disease in his report.

I have been working among royal palms for many years, have studied their diseases, and I personally inspected this lot that went to Miami, and further examined the palms remaining in the field where these were obtained, without as yet having seen what is properly a "disease" of the trunks.

Naturally the report of the Inspector to the effect that this lot was diseased on arrival in Miami aroused my interest, not only because it was a report of something new to me but actually new to science. I realized that there are still many things unknown to us in Cuba, and here seemed an apportunity for obtaining some new data.

It is apparently impossible for an inspector to identify every disease that he meets, but I would take liberty of suggesting that you urge upon the inspectors the desirability of sending specimens to your Pathologist for identification.

Such a procedure would be of great help to us should a similar case arise again.

Mr. Althouse of the Federal Horticultural Board has upon receipt of your report to the effect that these palms were diseased written to the original shipper to the effect that should he ship diseased plants again further permits will be refused him. You will thus readly see the desirability of complete and accurate reports on all rejected plants.

Extract of a letter from J. R. Johnston to the Federal Horticultural Board, dated July 29, 1916.

As regards these letters I would call vour attention to the fact that the palms were certified by the Inspection service of Cuba as being freen from disease when they left the shipping point, and in Miami these same palms were inspected by the Deputy Port and Railway Inspector and some of them were reported diseased. On the one hand ar

entomologist and a pathologist who are acquainted with diseases and insects of royal palms in general and this lot in particular who declare the palms free from injurious insects and diseases, and in the other hand an inspector who is neither an entomologist nor a pathologist (according to report) and who does not know the diseases and insects of royal palms in Cuba declares them diseased.

Under these circumstances I think the Secretary of the Federal Horticultural Board would have been justified in writing to the Plant Commisioners for more explicit information, and that he should have done so before writing to the shipper, and failing to receive more explicit information should have refrained entirely from expressing his intention of withdrawing permits should the offense be repeated.

Letter from Wilmon Newell to J. R. Johnston, dated Sept. 14, 1916.

Will say that I have recently returned from a trip to Miami, where I gave this matter careful investigation. Specimens of the fungus infected trunks of the palms were preserved and I am sending you one of these specimens in separate package. The specimens were of course covered to a greater or less extent with saprophytic fungi after being taken from the shipment, and were later preserved in formaldehyde, so that I doubt very much if the specimen will be of any value in determining the nature of the trouble.

I am sure that, had you been able to personally see the condition of these palms when they reached Miami, there would have been no question in your mind as to the necessary of immediately destroying the worst infected ones. Sixteen of the palms out of the twenty-six in the case were practically destroyed by fungi when the car arrived at Miami. These were burned. The remaining ten were cleaned as well as possible, scrubbed with Bordeaux mixture, set out, and again sprayed, with Bordeaux. Most of these ten have since died, and the remaining ones do not give much promise of remaining alive.

Letter from J. R. Johnston to Wilmon Newell, dated Sept. 20, 1916.

The specimens of diseased palms have been received. I greatly appreciate your efforts to help us to ascertain the cause of the trouble in the palms. I hope that your pathologists have made some examination of the material, for I regret to say that this specimen does not enable us to decide the cause of the trouble.

Continued examination of thousands of palms trees in Havana province still fails to show any disease present. Several reported cases have always shown up as due to insect injury.

I trust that you bear in mind that we do not maintain that the palms arrived in good condition. We do believe, however, that their bad condition was due entirely to same physical injury before they were removed from the soil, or that they were injured in the removal

or subsequent handling. We cannot pretend to guarrantee the methods of shipping plants from Cuba that they will not arrive at their destination wilted or rotted or even dead. We can only make inspection and issue certificates regarding the disease and insects present.

Extract of a letter from Wilmon Newell to Wm. D. Sturock, Miami, Florida dated Oct. 10, 1916.

Prof. John R. Johnston, Experiment Station, Santiago de las Vegas, Havana, Cuba, has been very anxious to investigate this trouble which attacked these palms and as he has been very insistent that he has not been able to find any disease of the Royal Palm in the Island of Cuba, in fact, inspected these very palms before they were dug without finding them diseased, I would suggest that if possible you cut out a section of one of these diseased palms, showing the diseased tissues and send it to him at the above address..... I believe that we should offord Prof. Johnston this opportunity of examining the trees which must unquestionably be infected with something severe, otherwise those planted out would not have continued to show infection.

Letter from J. R. Johnston, dated Oct. 18, 1916 to Wilmon Newell.

I greatly appreciate your letter of Oct. 10 with reference to the palms, and wish to thank you for the trouble you are taking to settle this matter. We shall be very glad to examine any material that is sent us and do what we can ourselves to settle this question. At the same time to be frank I must state that I have no faith in any examination of the palms in Miami as I believe them to be so badly injured that anything developing on them will be purely saprophytic, and that really the only place to study these palms is here in the field where they were obtained.

Letter from Inspector of the Federal Horticultural Board to J. R. Johnston, dated Sept. 22, 1916.

I have just received a letter from Wilmon Newell. He sent me with the letter a small specimen cut from the infected palm trunks by the inspector, which was for some time preserved in formalin and then taken out of the formalin. The specimen is in such shape that I do not make anything out of it.

..... I wonder if this statement will enable you to tell me what

the trouble may be. Inasmuch as the palms come from your own section, it may be that the trouble is one with which you are thoroughly familiar.

Letter from Inspector of the Federal Horticultural Board to J. R. Johnston, dated Oct. 24, 1916.

If the plants left Cuba in such condition that you were unable to detect any disease as being present and if there is no disease of such a nature as that described at Miami on other plants of the species in Cuba, I hardly see how the condition of this shipment could have due to any specific disease. As you say, their bad condition must have been due to some physical injury followed by a rot. That is probably all we can make out of the matter.

---

letter from Inspector of the Federal Horticultural Board to J. R. Johnston, dated Jan. 13, 1917.

You may be interested to know of one last chapter in connection with the royal palms, concerning which you wrote me at length last October. Mr. William D. Sturrock, Superintendent of the James Deering property, informed me that he was about to remove the dead trees and offered to send me a specimen. I wrote him that I would be glad to see it and later received a large box containing several pieces of the trunk and leaf bases. Examination revealed the presence of a number of molds and saprophytic fungi but we were unable to find any organism which seems in any way responsible for the death of the palms. I am unable to say anything then to clear up the mystery regarding the death of these plants, but the absence of any apparent parasite on the material sent me would seem to indicate that the plants were injured en route to Florida, and died from the effect of transit conditions rather than from the action of any parasite.

The preceding rather voluminous correspondence regarding this one shipment of royal palms indicates clearly the necessity for the most careful examination of all material that is certified here in Cuba, as well as the desirability for further work on the plant diseases of the Island.

If it is difficult for the inspectors of Cuba to know all the diseases here it is much more difficult for foreign inspectors to do the same. As seen in the preceding letters if the inspectors in the United States had known that there was no serious disease of the royal palms in Cuba, they would have sought an explanation of the trouble in other directions.

Other illustrations occur: a package of seeds of *Erythroxylon coca* were sent from Cuba to Washington. The seeds were not removed from the fruit but this was picked fresh from the bushes and packed in a sawdust for shipment. The bushes and the fruits were absolutely healthy. On their arrival in Washington the fruit had somewhat dried and moulded. The inspector found on the fruit species of Gloeosporium and of Pestalozzia. Now some species of these fungi do cause harm and whether these particular ones were causing any harm to the fruits in Cuba, the Inspector could not say, therefore to make sure of not introducing any pests, he ordered the fruits to be planted in the quarantine greenhouse or returned to the shippers, and as there was no room for planting, they were returned, notwithstanding the fact that they had been shipped clean.

During the past summer a large number of avocado seeds were shipped to the United States. Many of them arrived at their destination entirely rotted due to the action of fungi, but these shipments were not rejected by the Inspector because it was known to him that this sort of rot was common and was not due to a disease which would affect the seedling avocado or the growing plant.

These examples illustrate some of the difficulties encountered and the necessary for care in inspection of various crops.

TECHNICAL WORK OF THE COMMISSION

Strictly speaking the only technical work of the Commission is confined to the testing of various spraying apparatus and mixtures for use with them. Spraying is not much practiced in Cuba, and probably for that reason a good class of spray pump is difficult to find here. There are for sale pumps of various sizes and kinds, bucket pumps, knapsack sprayers, small tank machines and barrel pumps. It would really seem desirable that the Commission have on exhibition in their office various kinds of spraying machinery, to show to people interested in this thing.

Aside from the important work of the Commission in the control of certain serious pests, it would seem desirable, that there actually be undertaken some demonstration work, illustrating the advantages to be gained by spraying and showing the best kinds of apparatus and those suitable for various types of work.

As regards such technical work as concerns the identification if insect pests and plant diseases, all that work is referred to the Estacion Agronomica at Santiago de las Vegas, to which it properly belongs. At present it happens that the Entomologist and the Pathologist of the Estacion are both members of the Commission. The Commission as such is not supposed to attend to technical details of this nature. There is, however, an important work along this line that should be treated. The Commission of Plant Sanitation is authorized to issue certificates of inspection for plants to be exported to other countries. In order to do this efficiently the members of the Commission or the Inspectors must be acquainted with the various insects and diseases of the Island; the better acquainted they are with these pests, the more efficient they may become as inspectors. It happens, however, that there is no complete list or description of all the known insects and diseases of Cuba, and mereover there are many insect pests that are not known, and many plant diseases the cause of which is not known. Thus the Commission is severely handicapped in the begining on account of these conditions. In order to present to the public the actual situation as regards this matter the Commission has compiled a list of all the known insects and the undetermined pests, the plant diseases whose cause is known, and those the cause of which is not yet known. The actual data available from publications in Cuba is undoubtedly far from complete, a fact much to be regretted. It is believed, however, that a publication of these lists will serve to call attention to this situation and therefore bring aid to its improvement. Following is the list:

LIST OF INSECTS AND DISEASES OF CUBA

HOST PLANT	DISEASE	INSECT PEST
Ajonjolí (Sesamum indicum)	Cercospora	
Ají (Capsicum sp.)	.....	Aleyrodes trachoides Heliothis armiger Phlegethontius sexta
	Sclerotium sp. Cercospora Capsici Colletotrichum sp.	
Aguacate (Persea gratissima)	.....	Oiketicus poeyi Lecanium sp. Aspidiotus destructor Solenopsis geminata Pachnaeus azurescens Pachnaeus litus Apate carmelita Tetranychus bimaculatus Thrips Aleurocanthus woglumi
	Sphaerostilbe cinnabarina Pestalozzia sp. Flower blight Root rot Mildew of the leaves Chlorosis Fruit scab	
Aguinaldo blanco (Ipomaea sidaefolia) ..		Agromyza jucunda

HOST PLANT	DISEASE	INSECT PEST
Alcanfor (Cinnamomum camphora)		Oiketicus poeyi
Alfalfa (Medicago sativa)		Hedylepta vulgaris
	Cercospora medicaginis	Zinckenia perspectalis
Algarrobas (Pithecolobium saman)		Leafeating catterpillars
		Erebus odora
Algodon (Gossypium barbadense)		Anthonomus grandis
		Disdercus andrae
		" sanguinarius
		Alabama argillacea
		Aphids
		Heliothis armiger
		Mites
		Disdercus sturellus
	Mycosphaerella gossypina	
	Blight	
	Ramularia areola	
	Bacillus sp.	
Almendro (Terminalia catappa)		Oiketicus poeyi
		Scarabids
Anon (Anona squamosa)		Bephrata cubensis
		Aspidiotus destructor
		Howardia biclavis
		Asterolecanium pustulans
		Gonodonta maria
		Aleurocanthus woglumi
	Colletotrichum sp.	
	Cercospora apii	
Apio (Apium graveolens)	Puccinia coronata	
Avena (Avena sativa)	Helminthosporium gramineum	

HOST PLANT	DISEASE	INSECT PEST
Ateje (Cordia collococca)		Eriophyes cordiae
Bagá (Anona palustris)	Gloeosporium sp.	
Berenjena (Solanum melongena)	Phomopsis vexans	Phthorimaea operculella
	Sclerotium Rolfsii	Lineodes integra
	Gleosporium melongenae	Micromina olivia
	Bacillus solanacearum	Anthonomus varipes
	Wilt	Epitrix parvula
	Scab	Tetranychus bimaculatus
		Heteroderes amplicollis
Boniato (Ipomoea batatas)	Phyllosticta bataticola	Cylas formicarius
	Albugo ipomeae panduranae	Agromyza jucunda
		Eriophyes ipomeae
		Aleyrodes trachoides
Cacao (Theobroma cacao)	Diplodia cacaoicola	Thrips
	Cacao knot	
Café (Coffea arabica)	Cercospora coffeicola	Cemiostoma cofeela
	Rhizoctonia sp.	Saisettia hemisphaerica
	Chlorosis	Selenaspidius articulatus
		Lecanium sp.
		Howardia biclavis
		Pseudococcus citri
		Apate carmelita
		Bruchus sp.
		Oiketicus poeyi
		Shell snails
		Aleurocanthus woglumi
Caimito (Chrysophyllum caimito)		Eriophyes chrysophylli
		Apate carmelita
Caimitillo (Chrysophyllum olivaeforme)		Eriophyes chrysophylli
Calabaza (Cucurbita pepo)		Heliothys armiger

HOST PLANT	DISEASE	INSECT PEST
Canistel (Lucuma nervosa)	Uredo sp.	Robinsonia fromula
		Howardia biclavis
Caña de azúcar (Saccharum officinarum)	Melanconium sacchari	Diatraea saccharalis
	Marasmius sacchari	Heliophila unipuncta
	„ stenophyllus	Remigera repanda
	Leptosphaeria sacchari	Cirphis inconspicus
	Schizophyllum alneum	Laphygma frugiperda
	Hypochnus sacchari	Chalepus picipes
	Cercospora vaginae	Ligyrus zapedum
	„ Kopkei	„ tumulosus
	Helminthosporium sacchari	Elateridae
	Colletotrichum falcatum	Metamasius sericeus
		Diaprepes sp.
		Pseudococcus sacchari
		„ calceolariae
		Delphax saccharivora
Castilloa elastica	Diplodia rapax	
Cebada (Hordeum vulgare) (v. Trigo) ..		
Cebolla (Allium cepa)	Macrosporium porri	Thrips tabaci
Cedro (Cedrela odorata)	Cercospora sp.	Mealy-bugs
		Leaf-hoppers
		Pachnaeus azurescens
Ceiba (Ceiba pentandra)	Cercospora sp.	Scarabids
Ciruelo amarillo (Spondias purpurea) ..	.....	Anastrepha fraterculus
		Atta insularis
		Lagocheirus araneiformis
	Stilbum sp.	
Citrus (Citrus sp.)		Atta insularis
		Solenopsis geminata
		Pachanaeus litus

HOST PLANT	DISEASE	INSECT PEST
		Pachnaeus azurescens
		Apate carmelita
		Tretanychus bimaculatus
		Eriophyes sp.
		Aphids
		Mytilaspis citricola
		„ gloverii
		Chrysomphalus ficus
		Chionaspis citri
		Parlatoria pergandei
		Saessetia hemispherica
		„ oleae
		Lecanium sp.
		Coccus hesperidum
		Ceroplastes floridensis
		Pseudococcus citri
		Aleyrodes nubifera
		„ howardi
		Scarabids
		Leaf-miner
		Frankliniella insularis
		„ cephalica
		Aleurocanthus woglumi
	Colletotrichum gloeosporoides	
	Gloeosporium limmeticolum	
	Cladosporium citri	
	Sclerotium sp.	
	Rhizoctonia sp.	
	Blight	
	Melanose	

HOST PLANT	DISEASE	INSECT PEST
	Cephaleuros virescens Pennicillium digitatum Diplodia natalensis Alternaria citri Pythiacystis citrophthora Sphaeropsis tumefaciens Goat skin	
Cocō (Cocos nucifera)	.....	Aspidiotus destructor Chrysomphalus ficus Enlacaspis boisduvalli Aspidiotus cocotiphagus Cerataphis lataniae Strategus anachoreta „ titanus Hololepta quadridentata Rhynchophorus palmarum Shot-hole borer Termites
	Bacillus coli var. Pestalozzia palmarum Diplodia sp.	
Col (Brassica oleracea)	.....	Aphids Feltia annexa Pieris momnustei Plutella maculipenis
Coliflor y colinabo (Brassica sp.)	Bacterium campestris Alternaria brassicae Peronospora parasitica	

HOST PLANT	DISEASE	INSECT PEST
Chayote (Sechium edule)		Aphids
	Bacterium campestre	
	Plasmopara cubensis	
Chicharos (Pisum sativum)		Aphids
		Calandra oryzae
		Bruchus obtectus
		Spermophagus pectoralis
Chícharos de vaca (Vigna catjan)		Scarabids
		Feltia annexa
		Heliothis armiger
		Stenocranoides viridis
		Bruchus sp.
		Nematodes
	Oidium sp.	
Chirivia (Pastinacea sativa)		Papilio polyxenes
Chirimoya (Anona Cherimolia)	Gloeosporium sp.	Aleurocanthus woglumi
Espárragos (Asparagus officinale)	Cercospora asparagi	
Eucaliptos (Eucalyptus sp.)		Atta insularis
		Pachnaeus sp.
Fresa (Fragaria vesca)		Aphids
		White grubs on the roots
	Rhizoctonia sp.	
Frijoles (Phaseolus sp. y Dolichos sp.)		Aphids
		Thrips
		Stenocranoidis viridis
		Diabrotica sp.
		Heliothis armiger
		Weevils
	Colletotrichum lindemuthianum	

HOST PLANT	DISEASE	INSECT PEST
Frijol de terciopelo (Mucuna urens)		Hedylepta vulgalis Zinckenia perspectalis Feltia annexa Anticarsica gemmatilis
	Cercospora mucunae	
Fruta bomba (Carica papaya)		Dilophonota alope Toxotrypana curvicauda Aleyrodes variabilis Aleurocanthus woglumi
Galán de día (Cestrum diurnum)		Aleurocanthus woglumi
Gandul (Cajanus indicus)	Rhizoctonia	
Granado (Punica granatum)	Sphaerostilbe cinnabarina	„ „
Grevilea (Grevillea robusta)		„ „
Grosella (Phyllanthus distichus)		Asterolecanium pustulans
Guanábana (Anona muricata)		Melanchroia geometrioides Saissetia hemisphaerica Aphids
	Gloeosporium sp.	Aleurocanthus woglumi
Guásima (Guazuma ulmifolia)		Eriophyes guazumae
Guayaba (Psidium guayabe)		Anastrepha freterculus Haltica sp. Ceroplastes floridensis Aspidiotus destructor Perophora packardii Aleurodicus cardinii Aleyrodes floridensis Aleyrodes mori Paraleyrodes persea Aleurocanthus woglumi
	Cephaleuros virescens	
Higuereta (Ricinus communis)	Cercospora ricinella	

HOST PLANT	DISEASE	INSECT PEST
Higo (Ficus carica)		Tingitids in the leaves
		Echeta albipennis
		Bud borer
	Uredo fici	
	Cercospora sp.	
Jazmín de Italia (Solanum seaforthianum)		Aleyrodes trachoides
Jobo (Spondias lutea)		Anastrepha fraterculus
Justicia (Justicia adhatoda)		Orthezia insignis
Laurel (Ficus nitida)	Blight	
Lupinus albus	Diplodia sp.	
Maiz (Zea mays)		Laphygma frugiperda
		Heliothis armiger
		Feltia annexa
		Leucania sexta
		Heliophylla unipuncta
		Diatraea lineolata
		„ saccharalis
		Wireworms
		White grubs
		Pseudoccocus sp.
		Dicranotropis saccharicida
		Leaf miners
		Grillodes poeyi
		Scapteriscus didactylus
		Calandra oryzae
		Bruchus obtectus
		„ sp.
		Spermophagus pectoralis
		Heteroderes amplicollis

HOST PLANT	DISEASE	INSECT PEST
		Monocrepidius bifoveatus
		Anchastus opaculus
		Pyrophorus havaniensis
	Ustilago zeae	
	Puccinia sorghi	
	„ purpurea	
Majagua (Hibiscus tiliaceus)	.....	Chionaspis
		Eriophyes paritii
Mamey colorado (Lucuma mammosa)...	Leaf spot	Aleurocanthus woglumi
Mamey de Santo Domingo (Mammea americana)	.....	Lecanium sp.
Maní (Arachis hypogaea)	.....	Anticarisca gemmatilis
	Cercospora personata	
	Uromyces arachidis	
	Sclerotium	
Mango (Mangifera indica)	.....	Anastrepha fraterculus
		Tetranychus bimaculatus
		Aphids
		Lepidosaphes alba
		Asterolecanium pustulans
		Aspidiotus destructor
		Coccus mangiferae
		Chrysomphalus
		Galls
		Selenothrips rubrocinctus
	Gloeosporium mangiferae	Aleurocanthus woglumi
	Pestalozzia funerea	
	Lasiodiplodia sp.	
Marañon (Anacardium occidentalis)....	.....	
	Gloeosporium sp.	Aleurocanthus woglumi

HOST PLANT	DISEASE	INSECT PEST
Melocotón (Prunus persica)	.....	Asterolecanium pustulans
Millo (Panicum miliaceum)	Puccinia purpurea	Calandra oryzae
	Ustilago sorghi	
	Sphacelotheca cruenta	
Monstera deliciosa	Diplodia sp.	Pseudococcus sp.
Oreja de judío (Enterolobium cyclocarpum)	.....	Psallus sp.
Palma dátil (Phoenix dactylifnera)	Graphiola phoenicis	Comstockiella
Palmas de jardín (sp.)	.....	Chrysomphalus ficus
„ „ „ (Bactris auranthica)		Ceroplastes sp.
		Psocids
„ „ „ (de abanico)	.....	Aleurocanthus woglumi
Palma real (Roystonea regia)	Amarillez de las hojas (Capsidae)	
Papa (Solanum tuberosum)	Phytophthora infestans	Eupitrix parvula
	Actinomyces chromogenus	Wireworms (Elaterids)
	Macrosporium solani	
	Fusarium oxysporum	
	Bacillus phytophthorus	
	„ solanacearum	
	Rhizoctonia sp.	
Paraíso (Melia azederach)	.....	Apate carmelita
		Lagocheirus sp.
Pepinos (Cucumis sativus)	Plasmopara cubensis	Aphids
		Diaphania hyalinata
		„ nitidalis
Pino de Australia (Casuarina equisetifolia)	.....	Clastoptera obtusa
		Diorytria sp.
		Evetria sp.
Piña (Ananassa sativa)	Thielaviopsis paradoxa	Pseudococcus brevipes

HOST PLANT	DISEASE	INSECT PEST
Piñón de pito (Erythrina cubensis)		Agathodes monstralis
Plátano (Musa paradisiaca)	Fusarium cubense	Metamasius cericeus
	Gloeosporium musarum	Pseudococcus sp.
	Diplodia sp.	Eristalis sp.
		Aleurocanthus woglumi
Pomarrosa (Jambosa vulgaris)		Apate carmelita
Quimbombó (Hibiscus esculentum)	Cercospora hibisci	
Remolacha (Beta vulgaris)	Bacterium campestris	Plutella maculipennis
	Cercospora betae	
Rosa (Rosa sp.)	Cercospora sp.	Aphids
	Astinonema rosae	Tetranychus bimaculatus
	Sphaerotheca pannosa	Acheles cubensis
		Thrips
Salvia (Pluchea odorata)		Eriophyes plucheae
Seso vegetal (Blighia sapida)		Asterolecanium pustulans
Tabaco (Nicotiana tabacum)		Phlegethontius sexta
		Feltia annexa
		Prodenia commelina
	Rhizoctonia sp.	Prodenia endiopta
	Cercospora nicotiana	Chlorida virescens
	Mosaic	Micromima olivia
		Chinch bug
		Leaf folder
		Wireworms
		Epitrix parvula
		Phthorimaea operaculella.
		Dicyphus minimus
		Pachnaeus sp.
		May-beetles
		Oecanthus niveus

HOST PLANT	DISEASE	INSECT PEST
		Gryllodes Poeyi
		Scapteriscus didactylus
		Lasioderma serricorne
		Heteroderes amplicollis
		Monocrepidius sp.
		Anchastus opaculus
		Pyrophorus havaniensis
Tomates (Lycopersicum esculentum)	Septoria lycopersici	
	Cladosporium fulvum	
	Bacillus solanacearum	
Trigo (Tritcum sativum)	Helminthosporium gramineum	
Uva (Vitis labrusca)	Guignardia bidwelli	Atta insularis
	Uredo vitis	Aphids
	Plasmopara viticola	
Violeta (Viola sp.)	Cercospora violeae	
Yuca (Manihot utilissima)	Gloeosporium manihot	Dilophonata ello
	Cercospora Henningsii	„ alope
	Fusarium sp.	Lagocheirus obsoletus
	Diplodia sp.	Lonchaea chalybea
		Lepidosaphes alba
		Leptostylus biustus
		Pachnaeus azurescens
		Atta insularis
		Cryptocephalus commutatus
		Bruchus sp.
Yerba de Don Carlos (Sorghum halepense)		Tetranychus bimaculatus
	Cercospora sorghi	Monecphora bicincta
	Colletocrichum lineola	„ „

LIST OF HOST PLANTS WITH THEIR COMMON NAMES

llium cepa	cebolla
nacardium occidentale	marañón
nanassa sativa	piña
nona cherimolia	cherimoya
„ muricata	guanábana
„ palustris	bágá
„ squamosa	áñon
pium graveolens	apio
rachis hypogaea	maní
sparagus officinale	espárragos
ta vulgaris	remolacha
ghia sapida	seso vegetal
assica oleracea	col
ajanus indica	gándul
apsicum sp.	ají
arica papaya	fruta bomba
asuarina equisetifolia	pinos de Australia
edrela odorata	cedro
eiba pentandra	ceiba
estrum diurnum	galán del día
rysophyllum cainito	caimito
„ olivaeforme	caimitillo
nnamommum camphora	alcanfor
ocos nucifera	coco
offea arabica	café
ordia collococca	áteje
ucumis sativa	pepino
aucus carota	zanahoria
olichos sp.	frijoles
nterolobium cyclocarpum	oreja de judío
rythrina cubensis	piñón de pito
icus carica	higo
„ nitida	laurel
„ religiosa	álamo
ragaria vesca	fresa
ossypium barbadense	algodón
revillea robusta	grevilea
uazuma ulmifolia	guásima
ibiscus esculentum	quimbombó
„ tiliaceum	majagua
ordeum vulgare	cebada
omaea batatas	boniato
„ sidaefolia	aguinaldo blanco

Jambos jambos	pomarrosa
Lucuma mammosa	mamey colorado
„ nervosa	canistel
Lycopersicum esculentum	tomate
Mammea americana	mamey de Santo Domingo
Mangifera indica	mango
Manihot utillissima	yuca
Medicago sativa	alfalfa
Melia azedarach	paraiso
Mucuna urens	frijol de terciopelo
Musa paradisiaca	plátano
Nicotiana tabacum	tabaco
Panicum maximum	hierba de Guinea
„ numidianum	„ „ paraná
„ miliaceum	millo
Pastinacea sativa	chirivía
Phaseolus sp.	frijoles
Phyllanthus distichus	grosella
Pithecolobium saman	algarroba
Pisum sativum	chícharos
Pluchea odorata	salvia
Prunus persica	melocotón
Psidium guayaba	guayabo
Persea gratissima	aguacate
Ricinus communis	higuereta
Saccharum officinarum	caña de azúcar
Sesamum indicum	ajonjolí
Sechium edule	chayote
Solanum melongena	berenjena
„ seaforthianum	jazmín de Italia
„ tuberosum	papas
Spondias lutea	jobo
„ purpurea	ciruela amarilla
Terminalia catappa	almendro
Triticum sativum	trigo
Vigna catjan	chícharos de vaca
Viola sp.	violeta
Vitis labrusca	uva
Zea mays	maiz

SPECIAL WORK OF THE COMMISSION IN PROBLEMS OF CONTROL

THE BLACK FLY AND ITS CONTROL

The Black Fly was first determined to occur in Cuba when material was received at the Experiment Station from Guantanamo from a reported infestation on a few trees. This was in August 1914.

In April 1916 it was ascertained that this infestation covered almost the entire grove of Sr. Bertran 5 kilometers out from Guantanamo covering some 7000 citrus trees besides coffee, mango, guava and others, and it was determined at this time to undertake its eradication and control.

In July 1916 was begun the work of control under the Commission of Plant Sanitation. Sr. Patricio Cardin, member of the Commission and Entomologist of the Experiment Station together with Sr. Arango began the work. Pumps were purchased and treatment of Sr. Bertran's grove was begun, and later inspections were made in the surrounding territory to ascertain the limits of the pest.

Letter from Sr. Patricio Cardin to J. R. Johnston, dated July 24, 1916.

On Saturday we left on horseback and returned on Sunday night, covering some 22 leagues between going and returning, among the hills of this region, that resemble very much those of Baracoa, but owing to the heavy rains they were very muddy. The trip was toward the northeast of Guantanamo, in the same direction that we took to San Carlos, to see Mr. Ramsden. *Aleurocanthus woglumi* is found distributed all along the road as well as in all the patios where there was citrus in the town of Jamaica. From here the plague continues note that it was found on a plant that the wife of Angel Lopez, had we made note as a point of interest of the house of Eugenia Rivera in Casimba Abajo. The last place where we found it was in the village of Palmar, which has no palms but much mud. It is interesting to note that it was found on a plant that the wife of Angel Lopez,, had brought from Guantanamo 4 years ago and that probably this served as a source of infection in that locality. Also we found at the store of Sr. Manuel Marn the Black Fly.

We visited the farm Virginia, of Sr. Barrabeigt, which is a large farm about 8 leagues from Guantanamo, with extensive coffee plantings and many orange trees in the hills, but fortunately we did not find the Black Fly here.

I assume from this that the plague is very extended and that it is necessary to place a quarantine on all these places so that the insect may not continue spreading. It is much to be regretted that this was not reported years ago.

Extract from a letter of Sr. Cardin to J. R. Johnston, Jul. 28, 1916.

The plague is very dense in the large grove, it being necessary to employ up to 10 minutes in spraying one tree and even then it does not reach all the insects, as in many cases the leaves are curled up, thus protecting the insect. This is due to this very insect that by sucking out the juices cause the leaves to curl up.

Report of J. C. Hutson, Assistant Entomologist of the Estación Agronomica, cooperating with the Commission of Plant Sanitation in a campaign against the Mosca Prieta (Aleurocanthus woglumi) in the district of Guantanamo, Oriente, Cuba.

The writer was sent out from the Estacion Agronomica, Santiago de las Vegas, by the Commission of Plant Sanitation to take charge of the above work in the absence of the Entomologist owing to illness.

He left Havana on the night of August 20 and arrived in Guantanamo on Aug. 22. The work was taken up the following day.

The report of the work against the Mosca Prieta will be dealt with under two main headings: Control Work and Inspection Work.

CONTROL WORK

The control measures against the Mosca Prieta were taken up in July 1916 by the Commission of Plant Sanitation. The Entomologist of the Station, accompanied by one of the Inspectors went out to Guantanamo to begin the work.

The report of the Entomologist will give details of the work from its beginning until the end of the third week in August, while the writer in the present brief outline will attempt to cover the period between August 23 and September 9th inclusive.

During this period the control measures have been confined to the Finca Montesano, a property about 5 kilometers north of Guantanamo.

Condition of the Naranjal at Finca Montesano before the control was begun.

A portion of this Finca, the property of Sr. Bertran, is given up to citrus grove or naranjal of about 8000 medium to small trees, which at the beginning of July were infested with the Spiny White Fly or Mosca Prieta, and the report of the Entom- larger trees, was so badly infested that the trees presented a

blackened appearance due to the sooty mould fungus, and the leaves were in a semi-surled up and wilting condition as a result of the numbers of the nymphal stages of the insect on their undersides.

The winged adults of this insect were also present in such numbers that they rose in clouds from the trees and undergrowth when disturbed by the approach of the spraying machine.

Observations on conditions of the above grove after two complete sproyings with kerosene emulsion.

A visit made by the writer to the Finca Montesano on August 23rd showed that the second spraying of the whole naranjal with kerosene emulsion was just being completed, and the following observations were made:

After two complete sprayings the general conditions of the citrus grove have shown a marked improvement on conditions mentioned above.

The numbers of all stages of the Mosca Prieta have greatly reduced, and as a result the trees are resuming their normal healthy condition.

There are now remarkably few adults, whose presence can only be detected by a careful examination of the underside of the leaves, principally those of new growth.

The larval or nymphal stages have also suffered heavily as is shown by their shriveled condition and by the ease with which they can be rubbed off. There are, however, an appreciable number of these stages still alive.

With the aid of a lens it can be seen that a large percentage of eggs have dried up before hatching, but there are also many still left in a condition to hatch. Most of these last, however, have evidently been laid since the second spraying, and it is important that as many as possible be prevented from hatching.

The writer therefore recommended a third spraying with kerosene emulsion as soon as possible. Heavy rains delayed this work until August 25th, but served some good purpose in killing a number of adults of the Mosca Prieta.

Rains, machine and labor troubles have all contributed to retard the progress of the third spraying, but towards the end of this last week (Sept. 7th and 8th) the work was in a sufficiently advanced state to allow of further observations being made.

Observations made towards the end of the third spraying.

This sprayng has caught a number of adults just emerging,

or about to emerge, before they were able to fly or, in the latter case, even extricate themselves from their pupa cases.

In spite of this destruction of adults, however, their numbers do not appear to have been perceptibly reduced since the last spraying.

The immature stages, particularly the eggs, have suffered from the effects of the third spraying, a great number of these having shrivelled before they could hatch.

Further remarks.

The writer is of the opinion that with a higher grade of labor still better results would have been obtained. The men working the pumps have to be constantly watched for efficient work to be done, but constant supervision has not always been possible.

There have been many changes in the personal of the gang and this in itself has had a detrimental effect on the even quality of the work.

The writer considers, however, that in spite of these difficulties the Mosca Prieta is now under such control in the Finca Montesano that it can be left for the present. Further sprayings, however, at longer intervals, say two or three times a year, will be necessary if this pest is to be kept in check.

Inspection Work.

On Sept. 2 the writer accompanied by the Inspector visited the Finca of Sr. Morales which lies to the north-west of Guantanamo across the Rio Jaibo.

Sr. Morales has about 100 tall citrus trees, mostly orange, as well as other host plants of the Mosca Prieta such as mango, café, etc.

A careful examination of these trees showed that the Mosca Prieta was very slightly distributed throughout the grove. Traces of this insect were found on about a dozen citrus trees and on one small mango tree.

The orange trees were many of them badly infested with the citrus Chionaspis scale, the trunks and smaller limbs and twigs in some cases presenting a whitened appearance due to the numbers of male scales.

The writer considers that the infestation of these trees with the Mosca Prieta is not serious enough to make immediate spraying necessary.

Plans for the future (Tentative Only).

1. To make a complete inspection of the town of Jamaica

Plate N.° 13

Branch of an orange tree showing adult ''Black Flies''.

and its surroundings. This inspection to be followed immediately by spraying, where possible.

2. To inspect the valley lying to the Northwest of Guantanamo in order to determine, if possible, the limits of the Mosca Prieta in that direction.

3. To find out as far as possible the exact locations of the trees infested with the Mosca Prieta in the town of Guantanamo and its neighborhood, and to spray these where possible.

In some cases it will not be possible or practicable to spray infested trees and other means will have to be adopted later.

Report of J. C. Hutson on the Inspection of the District of Guantanamo, Oriente from Sept. 9th to Sept. 21st.

This inspection of the Guantanamo district was undertaken by the writer and his field assistant, Sr. Antonio Muñoz, with the idea of finding out as far as possible the distribution of the Mosca Prieta in all directions around the town of Guantanamo.

Previous to this inspection a trip had been made by Sr. Cardin, the Entomologist and Sr. Arango, the Inspector, in a northeasterly direction from Guantanamo through Jamaica as far as Palmar, at which point they found traces of the Mosca Prieta. In this trip, however, it was not found possible to cover the country on both sides of the Guantanamo-Jamaica-Palmar road. The writer, therefore considered it advisable to make a series of trips taking in the above tract of country with the main object of finding out the limits of the pest to the north and east of Guantanamo.

1st. trip. — The first trip included the Centrals Confluentes, Santa María, San Vicente, San Carlos and Santa Cecilia, and it was only at the last two of these viz San Carlos and Santa Cecilia that we found any Mosca Prieta.

At San Carlos there were a few citrus trees in the administrator's yard, all of which were attacked by the pest.

At Santa Cecilia there was a small grove of citrus from which the colonias are supplied with fruit. These trees showed a slight infestation of the Mosca Prieta, and the acting administrator, Mr. Mc Cleod, promised to spray.

The next few days were spent at Finca Montesano and in a trip to the west of Guantanamo which will be dealt with later.

2nd. trip. — The small town of Jamaica was made the headquarters for a two day's trip covering the country from northwest to south east of that town. The first day was occupied with a visit to the Centrals Esperanza, San Miguel, S. Emilio, Romelio, San

Antonio and Santa Isabel. At Esperanza and San Miguel which lie to the north west of Jamaica we found the Mosca Prieta on citrus.

The town of Guaso, where there are a number of colonias belonging to Esperanza, had been visited on a previous trip, but no traces of the pest could be found. Then the centrals lying to the east and southeast of Jamaica were visited.

At S. Emilio there was no Mosca Prieta, but at Romelie we found the pest in a few orange trees in the administrator's garden. Most of these had come from Holguin towards the end of 1915 and were now badly infested. So far the Mosca Prieta has not been found at Holguin, so that the pest must have been established at Romelie previous to the arrival of the Holguin shipment.

There is, however, the possibility that they were attacked before arrival within the infested zone, but owing to the careful way in which these shipments are packed this source of infection need hardly be taken into account.

The round trip was completed by taking in the remaining centrals in that locality viz San Antonio and Santa Isabel, but no Mosca Prieta was found at either of these places.

This trip marked Romelio as the eastern limit of the Mosca Prieta, so far as is known.

On the second day we were able to get up into the hills north east of Jamaica as far as Palmarita which is some 4 or 5 kilometers beyond Palmar and a steady climb all the way. We did not find the Mosca Prieta beyond Palmar where it had been previously found by the Entomologiste.

We were unable to get up into the large cafetals, but as far as could be learnt from intelligent men who know that district it would appear unlikely that the pest has reached that far.

This trip placed El Palmar as the northeastern limit of the Mosca Prieta.

3rd. trip. — Before going to Jamaica an expedition was made along a small valley in a general direction west of Guantanamo. Inmediatly after crossing the R. Jaibo we came to a small finca belonging to Mr. Emilio Quintana. This has mango, anon and caimito trees among others, and a careful examination showed that all the mango trees were attacked by the Mosca Prieta while the other trees were apparently free.

Some 3 or 4 kilometers further west we found a slight infestation of the Mosca Prieta on the finca of Sr. Rafael Díaz who has a few trees in his yard. Within another 3 or 4 kilometers we inspected two properties, one named Magueysillo, property of Fernando Campo, and the other belonging to Flores Betancourt.

Plate N.° 14

Branch of an orange showing eggs and larvae of the Black Fly.

Plate N.° 15

Orange tree showing the damage due to the Black Fly. The plant withers and dries up.

We examined a few mango trees on the first finca and two lime trees on the second, but in neither case did we find the pest. We then continued west for about 3 kilometers without finding any signs of the mosca prieta so we turned back and took the road back to Guantanamo on the north side of the valley. On the way we stopped at a finca belonging to Sr. Paulino Rivas where there is some citrus. An inspection of these trees showed them to be free of the Mosca Prieta. A little further on we had to shelter from a rain which lasted most of the afternoon.

On the way back we passed the finca belonging to Sr. Morales, where the Mosca Prieta had been found on a previous trip (mentioned in the first report). This trip showed that the Mosca Prieta has extended along this valley some 5 or 6 kilometers due west of Guantanamo.

Having covered all the territory within 25 to 30 kilometers radius of Guantanamo except along the valley to the northwest it was next planned to find out the limits of the Mosca Prieta in this direction as far as San Luis on both sides of the railroad.

Since the writer would be obliged to give up the inspection work within a few days it was thought best to take a few of the more important points along the valley so that his assistant would get all the experience possible in view of his having to continue the work alone.

Otherwise the inspection of the valley would probably have been carried out differently had the writer been able to see it through to the end.

4th. trip. — Therefore the first trip was made to San Luis which lies at the western entrance of the Guantanamo valley, as we wanted to know the worst before continuing the inspection of the valley.

An early start enabled the writer and his assistant to make a pretty thorough inspection of the town of San Luis in all directions and it was found that citrus trees are fairly generally distributed throughout the town, and there are also occasional mango and anon trees.

A large number of the trees were carefully examined in different parts of the town, but no traces of the Mosca Prieta could be found, so that as a result of this inspection the writer feels justified in saying that the Mosca Prieta has not as yet reached San Luis.

We then took the train to La Maya where coffee is grown extensively. A heavy rain just after our arrival in La Maya limited our inspection to the town and one of the smaller cafetales. We also examined the citrus and coffee belonging to the alcalde Sr. Gabriel Rosas Delcourt who was very interested in our work,

and kindly offered to report any discovery of the pest in his district, to spread the news of its prevalence around Guantánamo and to emphasize the danger of importing palms from the infested area. In the opinion of the writer Sr. Delcourt should be asked to serve as an honorary member of the Commission of Plant Sanitation for the La Maya district, in pursuance of the intention of the Commission to appoint men of influence to represent them in an honorary capacity in any district where the work of the Commission is being carried on.

5th. trip. — We returned to Guantanamo that night and next morning went out by train to Cuneira, which was chosen as being the next important point beyond Carrera Larga which at this time marked the northwestern limit of the Mosca Prieta found by Sr. Arango. Also Cuneira seemed the most likely place in that district where horses might be hired.

An inspection at Cuneira showed that there was a slight infestation of the Mosca Prieta on a few orange trees in the garden of Sr. Ezequiel Rojas.

We then got horses and rode in the direction of Ermita (Arroyo Piedras). About 2 kilometers west of Cuneira and opposite Santa Maria R. R. siding we found a few citrus trees in the garden of Justo Dimes slightly attacked by the Mosca Prieta. At Manantial we could find no trees which are attacked by the pest, and examination of citrus and other host plants of the Mosca Prieta at San Manuel and Santa Rita showed that they were apparently free of this insect. At Ermita, however, we found the pest on some small citrus trees quite close to the line. Then we inspected the garden belonging to Mr. Randolph, the owner of Ermita Central but could found no traces of the Mosca Prieta.

Heavy rain prevented any further inspection and we returned to Guantanamo that night. The writer was obliged to return to Santiago de las Vegas two days later, and Sr. Antonio Muñoz was left to continue inspection work alone. It may be mentioned that the edicts relating to the Mosca Prieta have been distributed throughout the territory covered by the inspectors, and wherever possible these edicts were posted in the presence of the inspectors.

Before leaving Guantanamo the writer gave full instructions to Sr. Muñoz about the further inspection of the Guantanamo-San Luis valley. The towns of San Luis and La Maya were inspected by the writer and his assistant but the territory intervening between San Luis and La Maya and Ermita has not been examined carefully. There is citrus all through this stretch of country, mostly along the railroad line, but only in small amounts. However, this citrus and other host plants of the Mosca Prieta must be inspected carefully to determine the exact distribution

Spraying the trees for the Black Fly in Guantanamo.

of the Mosca Prieta, as well as a register made of the names of owners of infested properties.

It is planned also to make a house to house inspection of the city of Guantanamo to determine the extent of the Mosca Prieta there and to register the properties attacked by this pest. In this way it is hoped that the subsequent control work will be facilitated.

CONTROL WORK

In the intervals between the various inspection trips the writer visited the Finca Montesano to note the progress of the control work. It was expected that the third complete spraying would be finished by the end of September, allowing for ordinary delays, but the heavy rains for the past three weeks have not made spraying operations possible, so that the control work has been postponed until more favorable conditions exist.

In concluding the report on the Guantanamo work it may be said that Finca Montesana was sprayed 5 or 6 times between July 1916 and January 1917, and at last was in good condition, although not entirely free from Mosca Prieta.

All of the city of Guantanamo had been inspected and in 254 residences over 2000 plants were found infested.

The extent of the infestations in the district of Guantanamo is shown on the accompanying sketch of that region.

Since early in February there is no report of further work in Guantanamo.

In November 1916, Mr. H. A. Van Hermann examined some trees in the house of Mr. Barker on 19 and 4th streets in Vedado, Havana, and collected various insects and sent them to the Entomologist Sr. Cardin. Among these insects were found some of the Mosca Prieta.

Investigation of the conditions in Vedado were immediatly begun. It was found that some mango plants had been introduced from Guantanamo during the last two years, and the infestation probably begun in that way. The entire block between 17 and 19, 2 and 4 was found infested so that treatment was immediately undertaken by the Commission of Plant Sanitation. At the same time inspectors were ordered to determine the limits of the infestation.

A few days work determined the fact that all of the Vedado was infested, and in addition the Quinta de Molinos. During the inspection of December, January, and February no Mosca Prieta

was found outside of these limits. Examination was made at Marianao, Buena Vista, Cerro, Palatino, Naranjito and Los Pinos. The only exception to this was one infestation at Hoyo Colorado which was attended to.

Treatment of the whole of the Vedado was carried out and will be finished about the first of May. Recent inspections have shown that now the insect is found not only in the Vedado, but also across the Rio Almendares, in Cerro, in Palatino, and in Jesus del Monte.

All these last infestations appear to be recent ones and for the present are attended to solely by destroying the infested leaves. Possibly in a few districts will have to be placed gangs of sprayers.

The Vedado will have to be sprayed a second time, as the first time some adults escaped and deposited new eggs. The second treatment should cover the entire Vedado inside of two months not to give sufficient time for the multiplication of the insects. To attend to all this work it is proposed to increase the number of inspectors and the number of workingmen.

The amount of work done week by week in the Vedado is shown in the accompanying table.

Date		Residences inspected or treated	Plants treated
Dec.....	11–20	13	230
	21–30	28	358
Jan	2–6	60	325
	8–13	94	1993
	15–20	87	720
	22–27	66	445
	29 a 3	58	406
Feb.....	5–10	174	1539
	12–17	302	2487
	19–23	196	3167
	26 a 3	113	2905
Mar	5–10	123	1370
		1314	15,845

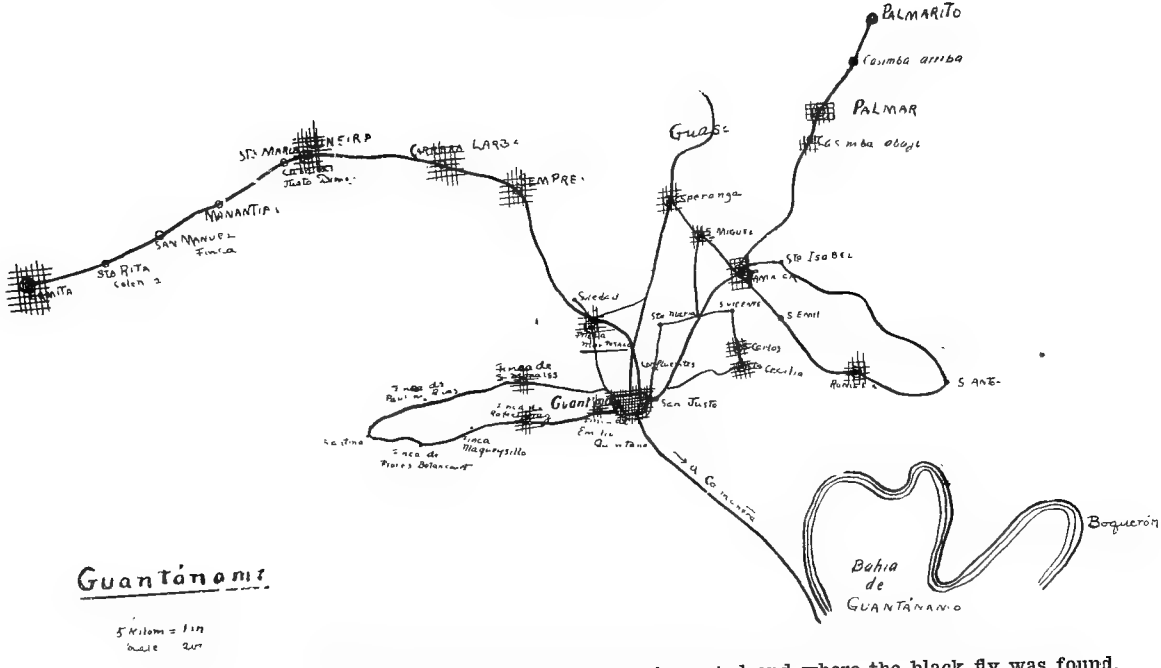
In concluding the report on the Vedado work it is seen that the Mosca Prieta is found in nearly all the barrios of Havana and in Hoyo Colorado some 20 miles out. The treatment of the trees has immeasurably improved their condition, and reduced the amount of Mosca Prieta but not as yet eradicated it.

Plate N.° 17

Spraying the trees for the Black Fly in Guantanamo.

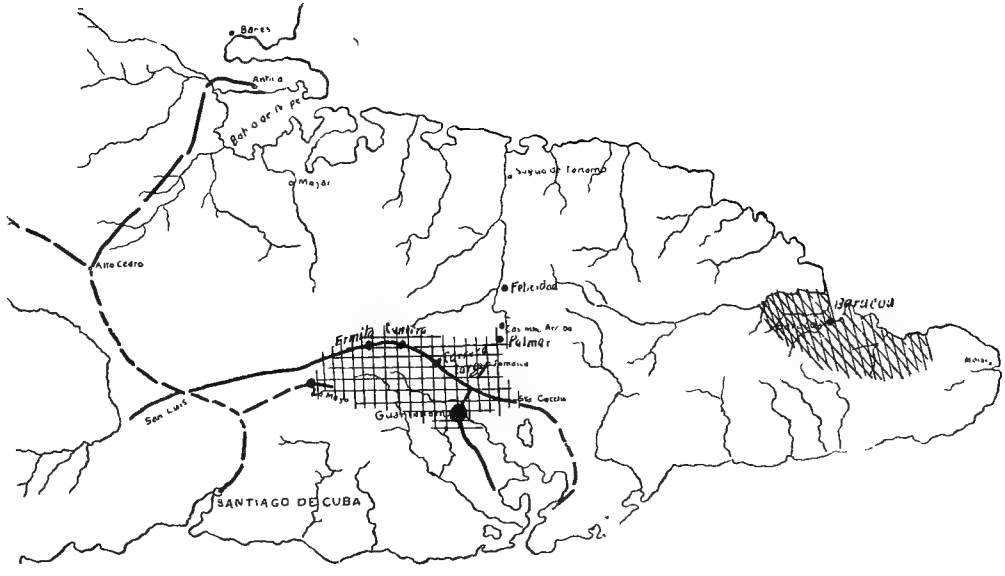
Plate N.° 18

Plate N.° 19



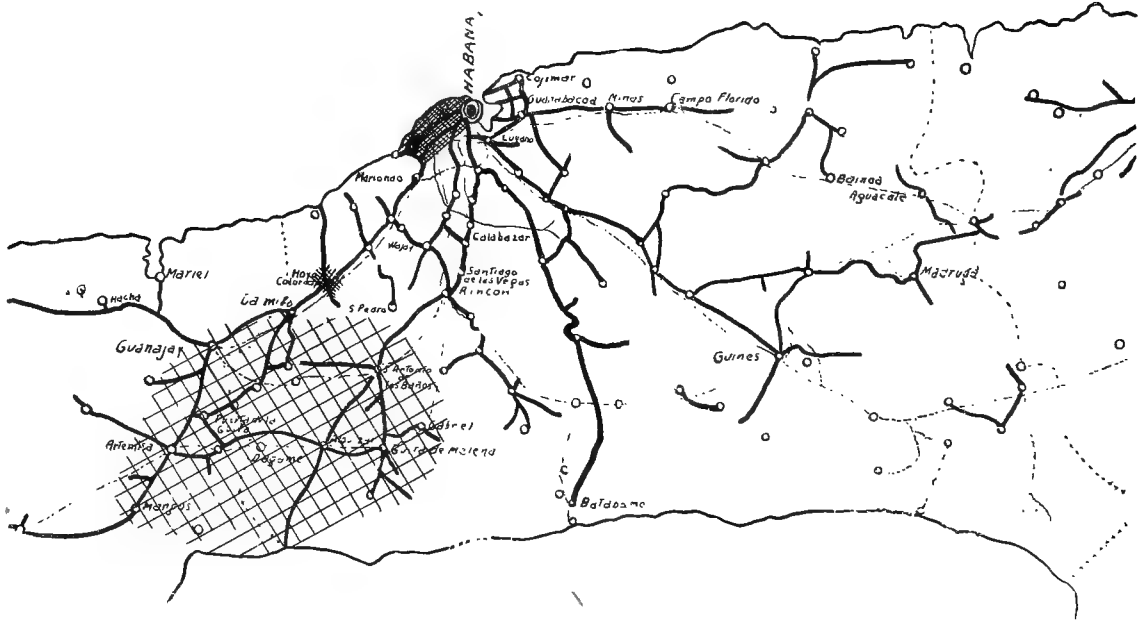
Sketch of the region of Guantanamo showing the places inspected and where the black fly was found.

Plate N.° 20



Province of Oriente. The zone marked with squares indicates the extensión of the Black Fly. The area marked with oblique lines indicates the territory inspected for the coconut disease.

Plate N.° 21



Province of Havana. Very small squares indicate the location of the Black Fly. Large squares indicate the zone inspected for the banana disease.

LIST OF PLANTS ATTACKED BY THE BLACK FLY

(1) En el Vedado:
guayabo *(Psidium guayaba)*
limonero *(Citrus limonum)*
lima *(Citrus limetta)*
cidra *(Citrus medica)*
toronja *(Citrus decumana)*
canistel *(Lucuma nervosa)*
granado *(Punica granatum)*
mamoncillo *(Melicocca bijuga)*
zapote *(Achras zapote)*
mamey *(Lucuma mammosa)*
naranjo *(Citrus aurantium)*
cafeto *(Coffea arabica)*
cereza *(Malpighia glabra)*
limoncillo *(Tiphrasia aurantiola)*
casmagua *(Wallenia laurifolia)*

(2) En Guantanamo, in addition to the foregoing:
croton *(Croton sp.)*
anon manteca *(Anona muricata)*
marañon *(Anacardium occidentale)*
fruta bomba *(Carica papaya)*
uvita o goma *(Cordia sp.)*
anona squamosa
guarana *(Cupania cubensis)*
galán de noche *(Cestrum nocturnum)*
galán de día *(Cestrum diurnum)*
güira *(Crescentia cujete)*
aguacate *(Persea gratissima)*
coral *(Antigonon leptopus)*
jazmin de candelero
„ „ montaña *(Tabernaemontana coronaria)*
palma de abanico
plátano macho *(Musa paradisiaca)*
farolito chino *(Hibiscus schizopetalus)*
acalypha linneolata
granadilla *(Passiflora edulis)*
chirimoya *(Anona cherimoya)*
jazmín de Persia
begonia sp.
laurel *(Laurus nobilis)*
guásima *(Guazuma tometosa)*
marpacífico *(Hibiscus rosasinensis)*

THE BUDROT OF THE COCONUT AND ITS CONTROL

This disease has caused enormous losses in the coconut industry in Cuba. Extensive studies have been made, and the Government offered a reward of $ 30,000 to any one that discovered the cause of this disease, and a method of controlling it.

Fifty seven people, both Cubans and foreigners, made applications for the prize claiming that they knew the cause and had efficient remedies. The various applications were at the close of the contest in Dec. 1913, referred for judgement to a commitee appointed by the Academy of Sciences in Havana. Up to date this Commitee has not reported.

Meanwhile the President of this Commission of Plant Sanitation while an employee of the U. S. Department of Agriculture worked in Cuba and other parts of the West Indies and carried out apparently successful experiments demonstrating that the Budrot disease of the Coconut was a highly infectious disease due to a form of a germ *Bacillus coli*. Studies made in various countries revealed the fact that the principles of sanitation yielded good results in the control of this disease. Prof. Horne, pathologist of the Estacion Agronomica made extensive studies and recommended sanitation as the only means practicable. The Commission appointed by the Government to investigate the disease in 1911 visited Baracoa and likewise reported on the feasibility of sanitation and recommended Government measures for control of the disease.

From the extensive studies made in this country and in the Island of Jamaica, of Trinidad and elswhere, there would seem to be no doubt that now the immediate cause of the disease is known and that there is a practical means of control.

This fact was reported by the Commission of Plant Sanitation to the Secretary of Agriculture, Commerce and Labor, and the decree against the coconut disease was the result.

The Commission of Plant Sanitation designated one Inspector to visit all the coconut groves in the Baracoa district, to register all the diseased forms and to counsel the owners of these places how to treat the diseased trees. Copies of the decree against the coconut budrot are distributed to the people and edicts are posted in numerous conspicuous places.

After a reasonable time the Inspector will revisit the various farms to note the progress of the work, and to note if everybody has complied with the regulations. In case the Inspector finds that the regulations have not been complied with, this fact will be communicated to the Commission of Plant Sanitation and

Members of the Commission inspecting the work on the Black Fly in Vedado.

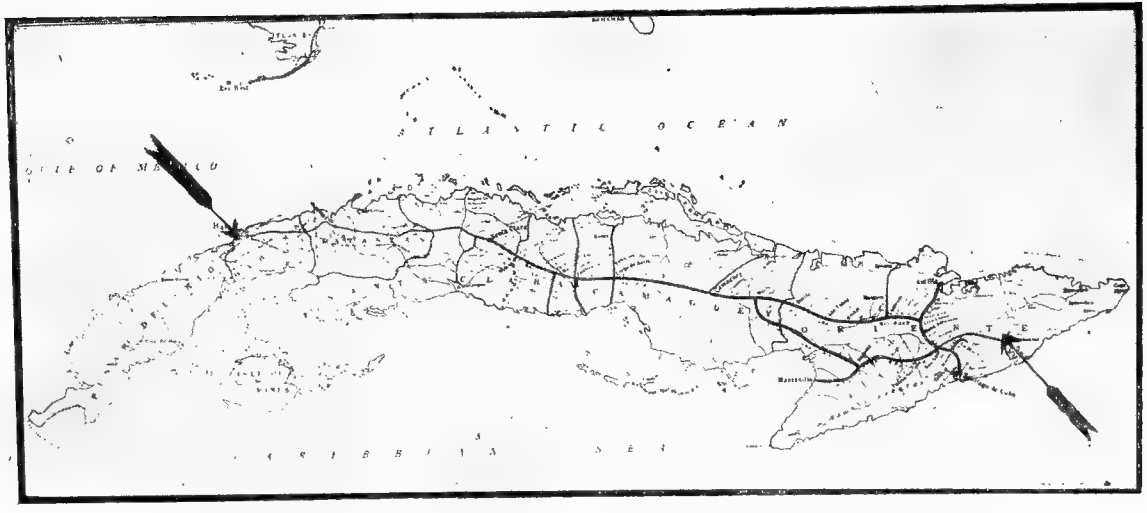
An example of one of the many gardens in Vedado which have been sprayed for the Black Fly.

Example of the gardens treated for the Black Fly in Vedado.

Plate N.° 25

This map of the city of Havana shows the presence of the Black Fly, each black dot representing many infections.

Plate N.° 26



Map of the Island of Cuba, showing the location of the two Black Fly centers.

by them to the Secretary where steps will immediately be taken to enforce the regulations.

The report of the Inspector on the Coconut work, Sr. Daniel Nicle, from August to January shows that 276 farms had been inspected, comprising some 4,600 acres. All this area lies within the Barrios of Sitio, Cabacu, Guiniao, Guandao, Velazquez and Duaba, in the district of Baracoa.

Baracoa, the center of the Coconut industry has been the locality for the most active work in the inspection. However, the work is not to be confined to this district but will include the whole Island.

The Inspector at Baracoa has been requested to formulate plans and obtain estimates of the expense of maintaining a government nursery for coconut seedlings, with the idea of providing selected seedlings to those planters who have suffered great losses from the coconut disease.

Many planters of Baracoa have become discouraged from planting coconuts, and have instead planted bananas and cacao, both good crops. However, even with those crops, coconuts should not be given up as it can be made a paying business in spite of this disease.

Some of the Baracoa people claim they have tried the methods recommended by the Commission but without success. Where this method has been a failure it has been because it was not properly carried out. The essentials of the methods of control of the coconut budrot as recommended by the Commission of Plant Sanitation are as follows:

(1) The diseased coconut trees must either be destroyed or severely flamed *in the beginning of the disease,* as well as in the later stages.
(2) All the diseased trees in any locality must be so treated.

People must not wait until a tree is dead before they decide to cut it down.

It must be remembered that to allow diseased trees to remain untreated is causing a loss not only to themselves but to their neighbor.

THE BANANA DISEASE AND ITS CONTROL

The disease causing such great losses in the manzano variety of bananas in Western Cuba is called the Panama disease and is the same as occurs in Porto Rico, Jamaica, Central America, Trinidad and Surinam.

In Cuba this disease attacks the manzano, the Johnson, or Gros Michel and the Ingles, but so far as is known does not attack the macho, hembra, burro, enano, and none of the morado type.

Fortunately this disease has not yet reached the district of Oriente where are grown the Johnson bananas for export, but as yet occurs only in central and western Cuba. However the large manzano plantations about Havana have suffered tremendous loss.

This disease is an infectious one and is due to a fungous growth in the soil passing into the roots and thence into the stalk. The fungus destroys the water-conducting vessels in the trunk and rootstalk and thus the plant suffers from a lack of water. The action of the fungus is not great in the new green stalks, but as soon as the stalk approaches maturity or sometimes when half grown, symptoms of the disease may be seen, if the leaves turn yellow and fall away.

This fungus that causes the trouble lives in the soil as well as in the plant and may be carried about in the soil on the shoes of laborers, or on hoes, or cutlasses used in chopping down diseased plants may become infected and carry the infection to other parts, and rootstalks or suckers that are transported for planting in other places might carry the disease with them.

Based upon these facts, regulations for the treatment and control of the disease have been promulgated in the decree against the banana disease. The recomended methods of treatment are those generally practiced in sanitation as follows:

1. No diseased plants should be removed from one field to another; neither rootstalks, nor suckers, nor leaves.
2. No soil should be removed from an infected field.
3. All diseased plants should be cut down. The rootstalks and roots remaining in the ground should be covered with quicklime.
   The trunk and leaves should be cut into pieces and made into a pile and burned.
4. All implements used in a diseased field, such as plows, hoes and cutlasses should be disinfected before using in a clean field.

Plate N.° 27

Young coconut tree attacked by the Budrot.

Plate N.° 28

Large coconut plantation destroyed by the budrot.

Banana plantation destroyed by the Panama disease.

An Inspector of the Commission of Plant Sanitation, Sr. Ernesto Simonetto, was sent to the center of the diseased district at Artemisa to report on all farms having this disease. He made a report of all the farms, advised the farmers as to the best methods of treatment, gave them copies of the decree and posted in numerous conspicuous places edicts regarding the disease.

Sr. Simonetto began his work in July 1916, but in Dec. appeared the Mosca Prieta in the Vedado, and owing to the scarcity of men he was ordered to drop the banana work and take up that of the Mosca Prieta control.

During the time that Sr. Simonetto was at work on the banana disease he visited about 150 farms, some of which had from 10,000 to 20,000 plants of bananas. He covered the entire district between the following points: San Antonio de los Baños, Guanimar, Guira de Melena, Dagame, Cachimba, Gabriel, Artemisa, Cañas, Guanajay, Mangas, and Alquizar.

It is intended as soon as possible to return a man to this work, who will see that the planters carry out the regulation of the Commission.

The subject of remedies for this disease has been extensively studied not only in Cuba, but also in Jamaica, Panama, Costa Rica, Trinidad and Surinam, but up to the present no remedy has been found.

As a matter of fact, owing to the nature of the disease, it is believed that the only probable way to avoid the disease is by the finding of some disease resistant variety or by following the recommendations of the Commission of Plant Sanitation.

Plate N.° 30

Cutting down diseased banana plants.

Piling up the pieces of diseased banana trunks for burning.

Burning the diseased banana leaves and trunks.

Spreading lime over the roots after cutting away the diseased banana plant.

Disinfecting the implements used in a field of diseased bananas.

SUMMARY

I. — The Commission of Plant Sanitation was formed by Presidential decree on the third of July 1916.

II. — The regulations in vigor in Cuba prohibiting importation of plants from foreign countries are as follows:

(a) Law of June of 1906, concerning the orange magott of Mexico.

(b) Decree No. 1133, prohibiting all importation of citrus plants.

(c) Decree of July 20, 1916 prohibiting the entrance of plants attacked by the Black Fly, especially from the Bahama Islands, Jamaica and India.

(d) Decree prohibiting the importation of banana plants without a certificate of their origin, and prohibiting the introduction into Oriente of the varieties manzano and Johnson.

Various other regulations are proposed.

III. — Regulations of foreign countries prohibiting the introduction of plants from Cuba are as follows:

(a) It is prohibited to import seeds of cotton into the United States.

(b) It is prohibited to import sugar cane into the United States.

(c) It is prohibited to import citrus plants into the United States.

(d) It is prohibited to import into the State of Florida seed coconuts and plantains.

(e) It is prohibited to import into the Islands of Bahama pineapple slips from Cuba.

IV. — In order to export to the United States any plants it is necessary that they be inspected by the proper officials and that certificates be provided.

V. — The regulations and interior rules in Cuba concerning the transportation of plants are as follows:

(a) It is prohibited to transport plants affected by the Mosca Prieta to any other place.

(b) It is prohibited to transfer any plants from the infected zones of Guantanamo and Vedado without a certificate.

(c) It is prohibited to remove banana plants in a diseased condition from one field to another.

(d) Prophylactic measures for the control of the coconut budrot are obligatory.

(e) Nurseries are forbidden to sell plants without certificates of the Commission.

VI. — The commission maintains a register of all the gardens and nurseries which sell plants and seeds in Cuba. Frequent inspections are made and certificates issued to those gardens free from injurious pests. There is also inspected all plant material arriving into Cuba by the Post Office.

VII. — The problems to which the Commission has devoted especial attention are as follows:

(a) In cooperation with the Experiment Station an inspection of the entire Island for the presence of the citrus canker.

(b) An energetic campaign has been waged againts the Mosca Prieta. All of the Vedado has been sprayed once including over 31,000 trees.

(c) A report was made concerning the marabu problem.

(d) A report was made concerning a plague in the sugar cane at Jagüeyal.

(e) A report was made concerning a plague in the Parana grass.

VIII. — The work of the Commission has been attended with good results especially by the propaganda carried out by means of edicts, articles, and circulars.

IX. — Almost all the work of a technical character carried out by the Commission has been done at the laboratories of the Estacion Agronomica.

X. — In this work is noticed the great necessity for care in the work of inspection of plants destined to foreign countries, and for plants introduced into this country.