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

J. L. Trujillo
Ave. del Recreo 203
Apatzingán, Mich. [México]

Apatzingán, Mich. Abril 23, 1963

Dr. Wilson Popenoe
Antigua Guatemala
Guatemala

Recordado Dr:

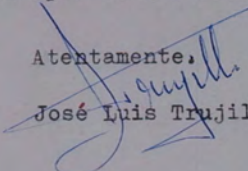
Agradezco mucho su carta que me dirigió desde Florida el 18 de Febrero. Por supuesto estoy muy reconocido por su gentileza para ayudarme.

He pensado en la posibilidad de conectarme por su conducto con alguna empresa subsidiaria de la United Fruit Company interesada en producir melón y sandía en esta región, anteponiéndole que tengo la experiencia y relaciones necesarias para lograr éxito.

Estimo que en esta región se podría producir muy buen mango de variedades finas, pues los de tipo manila que existen (de semilla) los hay de muy buena calidad. Por lo tanto agradeceré me dé su valiosa orientación para injertar mango en escala comercial y una lista de las variedades de tipo manila más apreciables. Aquí hay dos plantas de la variedad Haden que han ensayado bien.

Deseando que cada día existan más hombres como Ud., que dediquen su vida al bienestar de los demás, quedo como siempre su más reconocido alumno.

Atentamente.


José Luis Trujillo

J. L. Trujillo
Ave. del Recreo 203
Apatzingán, Mich.

Apatzingán Mich., mayo 30, 1963

Dr. Wilson Popenoe
Antigua Guatemala
Guatemala

Estimado Dr:

Deseando que se encuentre bien y continuando mi carta que le envié el 23 de abril, me he percatado aún mas de las ventajas que ofrece esta zona para el establecimiento de huertas frutales tropicales debido a que contamos con una altura de 320 mts. sobre el nivel del mar y superficies muy considerables de suelos profundos porosos y permeables.

Las lluvias son de junio a septiembre bien distribuidas haciendo un total de 2 mts. aproximadamente.

La zona se encuentra en si bien protegida de vientos fuertes, pues no es costa, y protegida por la Sierra Madre Occidental. Las temperaturas mas altas se registran entre la última quincena de mayo y la primera de junio, alcanzando hasta 42 C a la sombra. La época mas fría es la segunda quincena de diciembre hasta la última de febrero, siendo las temperaturas mínimas de 20 C.

Para iniciar el programa de fruticultura estimo que sería conveniente establecer una huerta de 20 Has. con las especies y variedades de frutales tropicales mas comerciales: mango, aguacate, guayaba, mamey, guanábana, toronja, tamarindo.

De cada especie se pudieran sembrar 2 Has. con tres variedades de las mas comerciales y destinar 6 Has. para vivero.

Tengo entendido que uno de los lugares donde se pueden conseguir las plantas es Agricultural Experiment Station en - - Homestead Florida; sin embargo desconozco cuales podrían ser las condiciones para disponer de ellas.

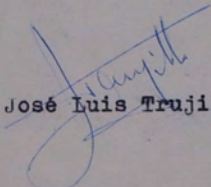
Mientras fuera atendiendo las huertas para su desarrollo, podría continuar trabajando en el asesoramiento técnico en plantaciones de algodón, melón y sandía como hasta ahora lo

he hecho.

En el curso de la semana entrante le enviaré a Ud. una copia de un estudio que hice sobre melón y sandía en esta zona.

Me permito insistir en lo que le manifesté en mi carta anterior referente a que si existe una firma filial a la - United Fruit Company interesados en sembrar melón o sandía en esta región para exportar , desde luego me pongo a sus órdenes.

Esperando sus noticias y deseándole bienestar, quedo de Ud. su amigo y servidor.


José Luis Trujillo

Estimado Dr.:

[See letter of 30 May 1963]

Le envío una copia del Trabajo
que presente a una compañía
establecida en la zona.

No he tenido tiempos de pasarlo
al Español de esta manera
opino que sería muy útil.

Su amigo y servidor

José Luis Trujillo

GENERAL OBSERVATIONS IN THE MELON
AND WATERMELON FIELDS DURING --
THE SEASON 1962- 1963 .

APATZINGAN, MICH.

R E P O R T
FROM JOSE LUIS TRUJILLO
TO WALLACE D. ALSTON.
COMPAÑIA INDUSTRIAL DE MICHOACAN, S. A.

INTRODUCTION
ENEMIES IN THE SOIL
ENEMIES IN THE FOLIAGE
RECOMENDATIONS.

I N T R O D U C T I O N

Every season many farmers invest much money in melon and watermelon plantations in this zone. However, are very few those that take in consideration all the factors that take place in order to insure good crops every year.

For this reason, is very important to know the most fitly why many plantations fail to produce - - conveniently in order to take the most adecuated - steps in the next season.

In this report is trying principally, to describe how are the plantations in this zone attacked for deseases, nematodes, mites and insects, with the purpose to improve the control systems using more afficent and economical ways.

ENEMIES IN THE SOIL

- Ants.-** Where base spots in the fields that are going to melon or watermelon indicates the location of ants colonies that clear the vegetation from the ground around their nests. After the seed bed is prepared their nests are reconstructed and the ants begin to transport seeds and little parts of the plants. The ants in this zone cause considerable damages. Is present in almost all the plantations in several grades of infection.
- Wire Worms.-** These are small yellowish or brown worms about 1 inch - long round and thin. They live in the soil and injure the root plants. The adult form of this worm is a - - beetle. Is present in only few fields.
- White Grubs.-** This larva of about 1.5 inches long. Thick with brown head and curved body, feeds on plants roots. The adult form is a beetle. Are not so considerable the damages of this insect in the region.
- Nematodes.-** The body dimension of this worm and translucent appearance delegate it to the microscopic category. It seems that nematode that attack the melon and watermelon plants in this zone, belongs to the genera *leloidogyne* that - - cause knot root. The plants affected show varying degrees of yellowing and dwarfing with a general unthrifty appearance. Only the system of the root is affected. Galls on the roots is the principal symptom. The organism affect in few places in this zone and tends to be more severe, and extensive damage on plants grown - in heavier soils that has several years planting melons.

ENEMIES IN THE FOLIAGE
PRINCIPAL DISEASES

MOSAIC.- Diseases caused by several virus trasmitted by insects, - principally aphids, and characterized by:

- a).- Light dark green in the leaves.
- b).- The margins of many leaves are serrated.
- c).- Some leaves distorted and curled.
- d).- Deformed flowers and its polen that fail to set - fruits.
- e).- Some fruits with anormal net.
- f).- Insipid and deformed fruist.
- g).- Many times is observed that mosaic decomes in less marked as the plat grow older and becomes dwarded.

This damage was generalized in this zone during the - cold season.

In this region is almost sure that the virus prevail in several kinds of hosts in the fields. The control of insect vectors by insecticides fail to control the de - sease, because few virus host plants and few vector insects are enough to spread the virus.

It seems that the virus has a grater activity when the temperature is moderatly low, for this reason the - plants that grow during a long cold period and are early infected, don't have chance to produce well.

If the plants with mosaic catch another desease, for instance anthracnose, as happen in some fields, then a collapse take place and the plant die rapidly.

Was observed that the watermelon is more resistant to the virus than cantaloupes.

Quick spread of the virus seems to take place, it - could be by the next reasons: mechanical trasmission, - - handling trasmission, intervention of other vectors in this zone, like white fly, leaf miners that have a great population.

ANTHRACNOSE.- (*Colletotrichum lagenarium*). The casual organism - - affects seriously watermelon and muskmelon, and prevails on deseased vines leaved in the fields. Is diseminated by surface water and insects stem petioles, leaves and fruits.

SYMPTOMS

Stem and Petioles.- Enlogated, narrow slightly sunken, - water soaked lesions.

Leaves.- At first light brown spots more or less circular. Later lesions turn dark brown to red, they may coalesce - consuming all the leaf, giving it scorched appear ance.

Fruits.- In watermelon: Many infected small fruits (1 to 3 cms) turn to black and die. The bigger infected fruits bear circular to oval sunken lesions.

DOWNY MILDEW.-- (*Pseudoperonospora cubensis*). This organism is - very destructive and infect only leaves. At first appear in the old leaves as small, yellow angular spot on the upper surface. On the undersides of - these spots a blackish mildew occurs.

As the older leaves die, the disease begin to - appear in the young foliage. As the leaves show - more spots, a yellowing occur, then coalesced areas die and turns light brown. Plants severely infected die or produce very little marketable fruit.

The moisture, rather than temperature is the limiting factor in its development.

POWDERY MILDEW.-- (*Erysiphe cichora cearum*). At first on the lower surfaces of the leaves appears circular whitish - spots. These spots increase in number and cover all the leaf with a white powdery. Very infected leaves turn brown and shrivel, the plants become chlorotic and die. Due to the lack of foliage the fruits are malformed, often sunburned.

The dry winds favor the spread while, during the night temperatures are warm enough and yet atmospheric humidity at the surface of the leaves is high enough for germination and infection.

ACAROS AND INSECTS

RED SPIDER.-- "Este animalito del diablo nos trae de cabeza" (This Devil's animal have us on head). Expressions like - this are often hearing from the farmers of the region, because this pest is for all a big problem - - that cost much money.

Red spider is very samall, the largest is a single point maked with a sharp pencil; the males are smaller than the females. They attack on the lower leaves surface and feed by piercing the epodermis of the - - leaf drawing the liquid contents from the cells. The leaf turn pale around the injured part.

When the infestation is severe this stippled areas coalesce, the leaf appear rust-red and die. The plant may become covered with fine silken webs which the mites made as they move from place to place.

The red spider attacks nearly all kinds of plants injuring the principals crops of the season and when the damage increase or the food becomes scarce, they move to others fields or crops. In this region principally live in the cotton plants and when the season cotton ending, they move to the wild zonez, lemon plantations, etc., and to the melon and watermelon plants.

Until now, there are not an authorized classification of the species of the red spider that exist in the region but is know that the two spotted are the most numerous.

THE PRINCIPAL REASONS WHY THE RED SPIDER IS A BIG PROBLEM
IN THIS REGION ARE:

- The red spider has a high population in most of the region, as much in different plantations as wild plants.
- The red spider is showing high resistance to the fosforated acaricidides even those of systemic action, and it could be that in undetermined time the products (fosforated, too) that are using now, fail.
- The acaricidides using until today, have only a short residual effect and a rapid red spider invasion occur again, increasing the cost.
- In order to have a good killing effect with the fosforated products is necessary some conditions like:
 - a).- Adequated time applications.
 - b).- Good activity conditons of the plant.
 - c).- To have a good control all the time with very low population principally in the leaves where the fosforated acaricidides using now can't work afficiently.
- In this high temperature region the multiplication is - very rapid: " At 75 F (24 C) the eggs hatch in 2 or 3 days and reach the adult stage in 5 days. The matting occurs a few minutes after the female becomes adult. One female lays from 100 to 194 eggs daily during average life of 3 or 4 weeks. One female can give rise in one month, - - - through succeeding generations to a progeny of 13 000 mites at 70 F (21 C) and about 13 millions mites at 80 F (26.6 C) constant temperatures". (Floyd F. Smith, Bereau of Entomology and Plant Quarantine, U. S. A. Agriculture Departament)
- The protection beneath webs on the lower surface have increased the difficulty of combating them.
- The wild or uncultivared well distributed zones that exist in the region where the red spider lives and multiply, - - menace constantly the corps all the year.

Leaf Miner.- As is know, the larva of this insect feed on the plant - tissue between the upper and lower leaf surface and cause the formation of irregular serpentine mines. When they are numerous enough may kill the leaves and thus disfigure the plant.

The orange colored gnatlike flies (adults) emerge from the leaves over a period of about 2 weeks.

White Flies.-The very small insects are numerous in the begining of the season and can be observed when plants are shaken, - the diminutives white flies fly to short distance. They suck the plant juice principally of the leaves. If they are numerous enough, and not controled, stop the plant - development. This insect probably trasmit as a vector,

Woolly bear or Salt Marsh Caterpillar.- In the cotton fields where this insect was not controlled at the end of the season, the larva and moths invade the near melon or watermelon fields. Moths (adults) lay their eggs on these plants. At this time most of the plantations are young. The invaders caterpillar are difficult to kill. They eat (chewing) the leaves principally. The young larvae show a typical feeding damage in the leaves (skeletonization). In this time is easily controlled. Generally only invaders caterpillars are dangerous.

Army Worm.- Dark brown moths approx. 1.5 inches wide (unfolded wings) with a white mark forming like number 8 in each wing. Lay approximately 1 000 insolated white eggs on the leaves. The eggs are as the half of a pin head and delicately striated. Hatching in 4 days and reach 1.5 inches long in his approximately life of 14 days. The worms have 2 pairs of false feet. They are green with a not so conspicuous white band in the flank.

This season these worms were very numerous in the region. Preferably they eat tender parts of the plant and epidermis on the fruits. This injury cost much to the farmers because the fruits become low in quality and price.

Fruit Worm.- In this season the successive generation of the moth (Heliothis) invade different crops causing the larvae (worms) injuries to:

Cotton fields now the larva as bollworm.

Corn fields now the larva as earworm.

The melon and watermelon fields were severely attacked.

The moths are light brown, 1.5 inch wide (unfolded wings). The female lay approximately 1 000 white and striated insolated eggs.

The young larva feeds on tender growth for a day or two, and then moves toward the bottoms of the plant and then attacks the fruit making one tunnel each larva.

In color and markings, the larva range from a pale green through rose and brown. The full grown is - - about 1.5 inches long, then enters the ground to pupate for a period of 4 to 7 weeks.

R E C O M E N D A T I O N S
C O N T R O L W I T H S P R A Y

ENEMIES	PRODUCT	Kls. or Lts. of		
		PRODUCT	PER	HA.
		1	2	3
Leaf Miner	Etyl Paration 50%	.250	.500	1
White Fly	Etyl Paration 50%	.250	.500	1
Red Spider	Chlorobenzilate 25%	.250	.500	1
Salt Marsh Caterpillar	Etyl Paration 50% (S)	.250	.500	1
Salt Marsh Caterpillar	Dipterex 80% (M)	.250	.500	1
Army Worm	Endrin 19.5%	.500	1	2
Fruit Worm	Endrin 19.5%	.500	1	2
	or Sevin 85%	.375	.750	1.5
Anthracnose	Zineb 65% plus	.500	$\frac{1}{4}$	$\frac{3}{4}$
Downy Mildew	Tribasic Cooper 53%	.500	1	2
Powdery Mildew	Karathane	.250	.500	1

(S) For small larvas.

(M) For medium larvas.

- 1.- Young plants covering $\frac{1}{4}$ of the surface bed.
- 2.- Young plants covering $\frac{1}{2}$ of the surface bed.
- 3.- Plants just covering the surface bed.

On good plants and high foliage plants use dust formulation from 25 to 40 Kls. per Ha. (see control with dust)

CONTROL WITH DUSTS.

Enemies	Insecticide	Technical Material	Kls. by Ha.
Leaf Miner			
White Fly	Etyl Paration	2%	18 to 35 Kls.
Salt Marsh (s)	Etyl Paration	2%	" "
Salt Marsh (m)	Dipterex	4%	" "
Red Spider	Chlorobenzilate	2%	" "
Army Worm (m)	Endrin	2%	" "
Fruit Worm (m)	Endrin	2%	" "
Anthracnose	Zineb	5%	" "
Downy Mildew	Tribasic Cooper	4%	" "
	(Cooper. Metallic)		
Powdery Mildew	Karathane	1%	" "

(s)----Small (m) ----Medium

- 1.- 18-Kls. By Ha. in plants covering no more than half of the surface
 25 " " " to scarcely foliage cover all the bed surface
 35 " " " good foliage covering all the surface
 40 " " " on abundant foliage

2.- When is reported 2 or more enemies, that need be combated at once, use adecuated formula for example:

Apply Endrin 2% with Chlorobenzilate 2% to control Fruit Worms - and Red Spider at the same time.

If is reported Army Worm, Red Spider, and is time to apply fun - gicides for control Downy Mildew and Powdery Mildew, use the formula:

Endrin 2%, Chlorobenzilate 2% Karathane 1% Zineb 5% metallic Cooper (from the Tribasic Cooper) 4%.

GUIDES FOR APPLICATIONS

- COMPLETE COVERAGE OF PLANT IS ESSENTIAL FOR EFFECTIVE CONTROL REGARDLESS OF METHOD APPLICATION.
- Avoid mid-day applications generally from 10 a.m. to 4 p.m. in this region for the next reasons:
 - a).- Generally are applicated organic products that are very volatile.
 - b).- At mid-day temperature rising air currents prevent desired coverage of the dust applications-
- Airplane applications most be flagged on proper widths.
- Spray airplane applications only are relatively effective ness (principally when fungicides are used) when the plants scarcely just cover the surface bedm after this time, there are not good covering and in small plants the airplane applications are expensive.
- Do not apply dust if the wind velocity exceeds 6 to 8 Kms. per hour aprox.
- Do not apply spray when the wind velocity exceeds 20 Kms. per hour aprox.
- The good ground spray applications of fungicides using medium or high volume equipments require high pressure (from 200 to 400 lbs. per square inch) in order to distribute the fungicide covering with little drops, most of the over and lower surface of the plants and protect them better against the microscopic organisms.
- To insure sorrect applications check before:
 - Waste per Ha. (Spray or dust)
 - Amounts of materials recommended by Ha.
 - Good plant covering.

This is specially essential with the hand spray equipments that are used here for all the time the plants are growing until just cover the bed surface, after this time is more recomendable the dust application.

SOME IMPORTANT RECOMENDATIONS

- A).- Salt Marsh Caterpillar invasors (big larvas intruding in the plantations from other fields) are difficult to stop. But can be halted by deep, dusty sided furrows. The loose dirt keeps them from scaping. In the bottom of the furrows, apply creosota; calogum cyanamide or a dust insecticide like Dipterex 4% + Etyl Paration 2% + Endrin 2%.
- B).- Army worm and Fruit worm are hard to control because are difficult to kill after the Army worm is big or the Fruit worm intered the fruit. Is hecessary to apply - when the larvas are small. When are finding 4 or 5 - small, larvas in 100 terminals or leaves, apply immediately, and then at 4 days intervals, until not are ob - served eggs.
- C).- Use recently dust formulation, when are used Zineb and Tribasic Cooper fungicides together.
- D).- To control Anthracnose and Downy Mildew begin to apply on young plants and continue at 6 days intervals.
- E).- Anthracnose and orincipally Downy Mildew progress rapidly with humidity, then program the fungicides application just before irrigation, if possible.
- F).- During cloudy or raining time should be shortened the intervals of the fungicide applications.

OTHER IMPORTANT RECOMMENDATIONS

MOSAIC PREVENTION.-

Don't grow cantaloupes or watermelon in the vicinity of sources of virus.

Those places severely injured for the mosaic don't seed between November 15 and January 30. In this time the temperature is moderately low and the virus activity inside the plants is high, in this conditions they can't grow normally and are seriously affected. Out this time the temperature is higher and the virus activity is low or latent.

SOIL ENEMIES PREVENTION.-

Don't grow in soils where for many years have been planted melon and watermelon because they:

A).- Are low in organic matter.

B).- The population of injurious organisms the soil are increasing; by instance anthracoses, fusarium, nematode, etc.

Don't subestimate the injuries that can be done by the nematodes, send to analyzed the soil when is suspicious a high nematode population.

SEED BED PREPARATION.-

The heath plants depends greatly of the soil conditions, where they grow; it is not enough a new soil with deep top soil, good texture and high fertility even in those are necessary to make a good seed bed preparation where the roots grow well and the irrigation permit only the adecuated humidity to the plants and better fertilizers use.

SEED TREATMENT.-

Be sure to use seed treatment with Tiuram against "dumping off"; insecticide against ants, grubs and wireworms. A fungicide like Manzate 3 grms. for each Kl. against anthracnose, necessary in this region. Take in consideration that the seed tratment only protect the plant short time, generally for insure the germination.

SOIL TREATMENT.-

Where there are danger of ants, grubs or wire worms, immediately apply to the soil Heptachlor or Aldrin.

FERTILIZATION.-

In 100 days approximately the muskmelon and watermelon plants produce an average about 20 tons. of total fruit; in good plantations can be produced 40 tons. For this reason the plants must grow constantly vigorous and well balanced in their flowering and fructification.

For each ton. produced of fruit, the plant absorb from the soil approximately:

Nitrogen	3	Kls.
p2o5	1	"
K2o	5	"
CaO	2.5	"
MgO	5	"

The conditions of the regional soils are very varied and is difficult to recommend a general formula and fertilizer quantity for Ha. Was observed that the high concentrated and soluble fertilizer give very good results because they are rapidly available for plants that must grow fast and produce many tons.

The fertilizer 16-32-16 is very laudable, using by Ha. from 200 to 250 in good soils and 250 to 350 in fairly good soils at the sow time.

The later Nitrogen applications are recommended.

When use Ammonium nitrate apply 100 to 150 Kls. by Ha. in two applications between the 20th to the 40th day.

When use ammonium sulfate apply 150 to 200 Kls. by Ha. between the 15 to 30 dat in two applications.

Others formulas are recommended are: 12-24-12; Diammonium fosfate plus Potassium Chloride, etc.

For fertilization think twice taking in consideration, principally fertility of the soil and seed bed conditions in order to have the best results.

CROP ROTATION.-

The diversification and crop rotation are measures -- that have great importance:

- a).- Help to keep the health plantations during more seasons.
- b).- Improve the soil conditions.
- c).- Low the weeds poblacion.
- d).- More rapid amortization and better insured profits.
- e).- Improve the management.

ONE EXAMPLE:

FARM SURFACE

Time to Seed	Half 1	Half 2
Jun - Jul	Cotton	Rice
Jan - Feb	Soy Bean or Sorghum	Cantaloupes
Jun - Jul	Rice	Cotton
Jan - Feb	Cantaloupes	Soy Bean or Sorghum

The rice plantation under run water give the next advantages:

- a).- Low the weeds poblacion.
- b).- Improve the soil mulching.

After rice, grow cantaloupe:

- a).- Low in weeds.
- b).- Better root growing.
- c).- The fertilizer surplus is better available, for the next poblacion.

Continue the Cotton:

- a).-- Low in weeds.
- b).-- With good soil mulch.
- c).-- Available fertilizer that was surplus in the cantaloupes plantation.

The next plantation could be sorghum or sou bean. With sorghum increase the mulch condition. With soy increase the organic matter, the mulch and nitrogen. (Between 27 C to 35 C these plants grow better).

Others advantages:

- a).-- The are work all the year in each farm.
- b).-- The management improve and the investments are more insured and produce more profits.

Clean Cultivation.-

Keep the fields the most clean possible free of weeds. These consume fertilizers and are host if insects and diseases. Also is important to protect - the fields maintaining clean around.

POLLINIZATION.-

The bees insure more intensive careful and effective pollinization. For this very important reason maintain at least one well poblated bechive for each Ha.

CULTIVATION.-

Cultivate only enough to control weeds. Cultivate lightly; muskmelons and watermelons are shallow -- rooted and deep cultivation may injure the roots. When cultivating, try to avoid moving the vines.

IRRIGATION.-

A good rule to follow for irrigating muskmelon and watermelon is this: Do not irrigate unless the plants need it; then soak the soil thoroughly.

Begin by soaking the soil thoroughly before -- planting. Plant as soon as the soil dries sufficiently.

Later, irrigate when plants first tec to wilt during the day or when they cease vigorous growth.

Try to irrigate without wetting the foliage; wet foliage is susceptible to leaf spot diseases. For best - results, irrigate with a soaker hose or by running water though the furrows between the hills.