

THE EVERGLADES
AND
OTHER ESSAYS RELATING TO



SOUTHERN FLORIDA

BY JOHN GIFFORD

THE EVERGLADES

AND

Other Essays Relating

TO

Southern Florida

BY

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DEDICATED TO THE MEMORY
of
NAPOLEON BONAPARTE BROWARD
the
"FATHER OF THE EVERGLADE DRAINAGE PROJECT"

CONTENTS.

	PAGE
CHAPTER I.	
The Everglades of Florida and the Landes of France. From <i>Conservation</i> , 1909	1
A Tribute to Broward. From the <i>Atlanta Georgian</i>	12
CHAPTER II.	
Southern Florida. <i>Forestry and Irrigation</i> , 1904.....	13
CHAPTER III.	
Trees as an Aid to Drainage. From the Spanish, in <i>La Hacienda</i>	21
CHAPTER IV.	
The Coco Palm. <i>Garden Magazine</i> , 1910.....	27
CHAPTER V.	
The Lime and the Sapodilla. <i>Garden Magazine</i> , 1910.....	33
CHAPTER VI.	
The Banana and the Papaw. <i>Garden Magazine</i> , 1910.....	38
CHAPTER VII.	
What Will Grow in the Everglades. <i>Everglade Magazine</i>	42
CHAPTER VIII.	
Valuable Trees for the Everglades. <i>Everglade Magazine</i>	48
CHAPTER IX.	
Some Common Florida Plants. <i>Everglade Magazine</i>	52
CHAPTER X.	
Vines for Everglade Planting. <i>Everglade Magazine</i>	56
CHAPTER XI.	
Mahogany in South Florida and the West Indies. <i>Woodcraft</i> , 1909..	60
CHAPTER XII.	
Bungalow Construction in South Florida. <i>Everglade Magazine</i>	83
CHAPTER XIII.	
The Everglades of Florida. <i>Southland Magazine</i>	95
CHAPTER XIV.	
The Problem of Growing Pineapples for Market. <i>Garden Magazine</i> ..	104
CHAPTER XV.	
The Mango, the Best of All the Tropical Fruits. <i>Garden Magazine</i> ...	109
CHAPTER XVI.	
The Guava and the Rose Apple, <i>Garden Magazine</i> , 1911.....	114

CONTENTS—Continued.

CHAPTER XVII.

PAGE

Rubber in South Florida, *Everglade Magazine* (Feb., 1911)..... 117

CHAPTER XVIII.

Coffee and Vanilla in South Florida, *Everglade Magazine*..... 124

CHAPTER XIX.

Fruit Quality in South Florida, *Everglade Magazine*..... 129

CHAPTER XX.

New Roots for Old Trees, *Everglade Magazine*..... 135

CHAPTER XXI.

How to Get a Lot of Work Out of a Small Windmill, *Everglade Magazine* 141

CHAPTER XXII.

What is Muck? *Everglade Magazine*..... 146

CHAPTER XXIII.

Everglade Sanitation, *Everglade Magazine*..... 153

CHAPTER XXIV.

A Home Orchard Plan with a List of the Principal Fruits of South Florida, Alphabetically Arranged. *Everglade Magazine*..... 160

CHAPTER XXV.

The Humble Koonti, *Garden Magazine*..... 170

CHAPTER XXVI.

The Australian Pine—a Promising Tree for South Florida, *Everglade Magazine* 177

CHAPTER XXVII.

The Gumbo Limbo, *Everglade Magazine*..... 183

CHAPTER XXVIII.

Camphor and Cajeput..... 186

CHAPTER XXIX.

Two Promising Bush Fruits for Florida..... 192

CHAPTER XXX.

Shade for Tropical Fruits, *Everglade Magazine*..... 196

CHAPTER XXXI.

A List of the Trees of South Florida, Native and Introduced..... 203

LIST OF ILLUSTRATIONS.

	PAGE
Views of Arcachon in France on the Bay of Biscay and Miami, Florida, on Biscayne Bay.....	Frontispiece
Natives of the Landes of France.....	2
A Scene in the Landes before Drainage.....	3
Tapping a Pine for Resin in the Landes of France.....	6
Indian Family in Canoes on the Miami River.....	8
A Cypress Island in the Everglades.....	9
On the Beach at Cape Florida.....	26
Coco-Palm Grove on the Keys.....	26
A Camphor Tree	31
Picking Sapodillas.....	32
A Lime Tree on Elliott's Key.....	32
A Papaw Tree in Full Fruit.....	37
State Canal in the Everglades.....	44
In the Hammock on Key Largo.....	59
In the Mangrove Swamp.....	76
A Cool Tile Covered Bungalow.....	82
A Shingled Bungalow.....	82
A Cuban Country House in the Tobacco District of Pinar del Rio...	84
A Cuban Bohio.....	85
Type of Inexpensive Bungalow Suited to the Climate of South Florida	86
A Patio Floor Plan.....	87
A Cistern Plan.....	88
Floor Plan of Flat Roofed Unit House.....	89
Side View of Flat Roofed Unit House.....	90
Plan of a Strong, Attractive Fence.....	91
A House for Poultry.....	92
Two Views of Unit House in Process of Construction.....	94
A Scene in the Pineland, a Rock Road and a Rock Fence.....	99
A Scene in Egypt where Flat Roofed Houses Prevail.....	100
A Field of Pineapples on the East Coast of Florida.....	103
Sundersha Mango Tree.....	108
A Rubber Tree (<i>Ficus aurea</i>), in Florida, on the South Side of the Miami River.....	113
Bearing Coffee Tree, United States Experimental Station, Miami....	123
Vanilla Shed, United States Experimental Station, Miami.....	126
Diagram of Earth Zones.....	131
Diagram of Zones on Mountain Side.....	132
Diagram Showing How the Part Above the Bud Union Has Outgrown the Stock	136
Inarching—Reinforcing a Tree with New Roots.....	137
A Corkscrew Root.....	139
Diagram of a Windmill and Tank.....	142
Diagram of a Loose Tile Irrigating and Drainage System.....	143

LIST OF ILLUSTRATIONS—Continued.

	PAGE
Transverse Section of a Cesspool.....	157
Wooden Frame for the Construction of a Concrete Cesspool.....	158
A Home Orchard Plan.....	162
A Fine Type of Avocado.....	164
A Fine Type of Banana Produced on Muck Soil at Cocoanut Grove..	165
An Avocado Grove.....	166
The Ti-es, a Little Known but Promising Fruit.....	168
The Koonti-log. Copied from U. S. Ethnological Report on the Semi- noles	171
Mature Koonti Plants.....	172
Seed and Seedlings of Koonti.....	172
Root Nodules of Koonti.....	174
Avenue of Australian Pines.....	176
A Gumbo Limbo Tree on the Road between Miami and Cocoanut Grove	182
The Camphor Tree	188
A Group of Young Cajeput Trees, Three Years Old and Twelve to Eighteen Feet High.....	190
The Carissa	193
The Surinam Cherry.....	194
Coffee Shaded by Pithecolobium Saman Trees in Porto Rico.....	202
West Indian Almond Trees Bent by the Wind.....	203
An Avenue of West Indian Almond Trees.....	204
A Mahogany Tree in the Bahamas.....	205
The Live Oak.....	206
Seminole Indians Coming to Miami with Venison and Skins.....	207
An Avenue of Royal Palms. Another Fine Tree for Mucky Soil.....	208
A Branch of the Candlenut Tree.....	209
A Mastic Tree in the Hammock.....	210
The Sugar Apple.....	212
The Wild Tamarind.....	214
A Cedrela Tree.....	215
A Rubber Killing a Coco Palm.....	217
A Bamboo Grove in Japan. A Fine Tree for Mucky Soil.....	219
A Piece of Reclaimed Land in Holland.....	222

PREFACE.

I have been writing on the subject of the Everglades and South Florida in general since 1904 in various magazines. Requests for this literature have come to me from time to time and in ever-increasing number until my reprints are exhausted. It is impossible to answer all the letters which come to me requesting information in reference to this region. Friends have suggested many times that I collect some of these articles into book form. This I have attempted to do in the following volume. I am well aware that as a book it has many shortcomings and, owing to the fact that it contains articles hastily written at odd times and for different purposes, there is considerable repetition and perhaps even contradiction. If, however, it succeeds in arousing interest in this great Everglade drainage project and offers helpful suggestions to newcomers, its mission will have been fulfilled, and its author and publisher will be satisfied. I wish to thank the various magazines for permission to copy these articles and the Everglade Land Sales Company for assuming the burden of publication.

JOHN GIFFORD.

Miami, Florida, 1911.

THE SECOND EDITION.

The publication of this work was an experiment. The sales have been sufficient, however, to prove that this Everglade Drainage Project in particular, and South Florida in general, are commanding the attention and interest of the English reading public throughout the world, and to warrant the expense of this enlarged and improved edition.

THE PUBLISHERS.

Miami, Florida, 1912.



ARCACHON—ON THE BAY OF BISCAY. A GREAT RESORT WHICH DEVELOPED AFTER THE RECLAMATION OF THE LANDES OF FRANCE, CORRESPONDING TO MIAMI, ON BISCAYNE BAY, WHICH WILL DEVELOP IN A SIMILAR WAY WHEN THE EVERGLADES ARE DRAINED.

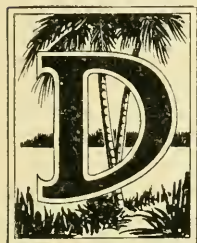


MIAMI, ON BISCAYNE BAY.

The Everglades — AND — Southern Florida

CHAPTER I.

THE EVERGLADES OF FLORIDA AND THE LANDES OF FRANCE.



URING a recent visit to the great work of reclamation now in progress in the Everglades of Florida, I was impressed with its resemblance in many respects to the great work the French have accomplished in the Landes of France, and with the fact that ex-Governor Broward, after many trials and tribulations, is succeeding, just as did the French engineers after similar troubles. This also applies to the work of Enrico Dalgas in the reclamation of the Heathland of Denmark.

The drainage of the Everglades is now well under way, and almost every unprejudiced person who visits this work becomes an enthusiastic convert. Just as the French engineers practically added a new province to France, Broward has been instrumental in promoting a work which will convert a vast, useless waste into what promises to be the most productive part of Florida, if not the most productive area of land of equal size in the whole United States of America. This drainage is being done at the insignificant cost of about \$1 per acre; and when done the land will be ready at once for the plow and for the production of tender crops, the like of which cannot be produced elsewhere in the United States, and at a time when the rest of the country is frost-bound. This is no small area; it is many miles in extent, and is capable of yielding, at small outlay, enormous crops of the most delicate tropical products, as well as Northern

THE EVERGLADES

vegetables, in midwinter. A visit to this region, even at this time (May, 1909), at the very beginning of the work, since it is a colossal task, will convince the most skeptical person that this is no idle dream or wild land scheme, but a feasible, practical piece of good business. After inspecting this work, one naturally wonders why it was not done long ago. It is not a complex engineering problem; it is merely a matter of digging, so that



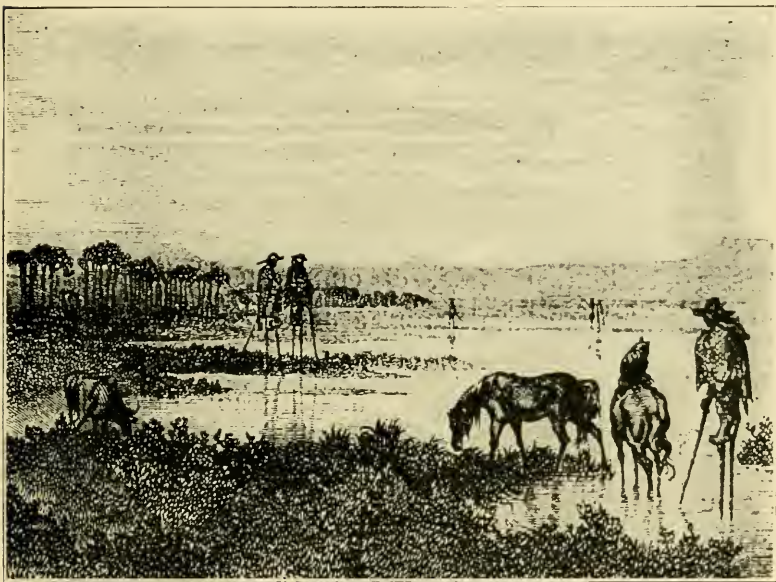
NATIVES OF THE LANDES OF FRANCE. A REGION RECLAIMED
BY DRAINAGE.

the water in this great Everglade basin can flow into the sea. Behind the giant maws of these dredges which, when they work day and night, are literally eating their way through rock, mud

AND SOUTHERN FLORIDA

and sand at the rate of a mile a month per dredge, there are left broad, navigable canals, which are comparable only to those of Holland, and which will afford miles of placid water courses, avenues of traffic for the products of the land, and a never-ending source of enjoyment to pleasure craft.

In the case of the Everglades, the exit of the water to the sea is prevented by a limestone rim. In the case of the Landes it was due to a bank of wind-blown sand, which clogged all outlets to the sea. The resemblance of the two conditions is much closer than is at first apparent, since this very rock rim was



A SCENE IN THE LANDES OF FRANCE BEFORE RECLAMATION. THE NATIVES WALK ABOUT ON STILTS. (PHOTO OF AN ILLUSTRATION IN AN OLD FRENCH GEOGRAPHY.)

once, no doubt, limestone sand blown in by the wind and later hardened into rock. I think geologists now generally recognize that this rocky rim is of eolian formation. The main difference between the two propositions is that, in the case of the Landes, it was silicious sand, which did not harden into rock, but re-

THE EVERGLADES

mained mobile, shifting back and forth with every caprice of the wind, while, in the case of the Everglades rim, it was limestone sand, which soon hardened into solid limestone rock. As in sand dunes, the wind laminations show in the rock like leaves in a book, recording forever the character of its formation. Some distance up the Coast, in the great pineapple district of Eden and Jensen, the obstructing dune consists of silicious sand. Southward the rim is not pure limestone in every instance but a calcareous sandstone, that is, granules of silicious sand cemented together with lime.

Before further describing the Everglades, let me quote from my notes made a few years ago, while visiting the Landes of France. Not only are the physical conditions similar, but there was the same opposition at the start. As in the case of the Everglades, the work in France was pushed by the personal initiative and persistency of one or two men, and the method of securing the funds for the purpose was very much the same. In the early part of the last century (before 1857), the condition of the flat, triangular plain known as the Landes, which is roughly bounded by the Bay of Biscay, the River Adour and the River Garonne, and the Medoc, was, in brief, as follows: There were miles of marshy, almost treeless wastes, covered mainly with a low growth of herbage. It was wet, unhealthy and sparsely inhabited. The few people who lived there depended upon their flocks. The accompanying picture shows a native of the Landes standing upon stilts, watching his sheep. He is dressed in a heavy sheepskin paletot. By standing on stilts, these shepherds can easily see their sheep in the bushes and grass, and can easily follow them through wet and marshy regions. Their spare time is spent in knitting stockings. The condition of the Landes is due to the immense sand dunes, which arrayed themselves along the shore of the Bay of Biscay. They moved inland, covered villages and occluded inlets. Bremon tier tells of a dune which advanced in a violent tempest at the rate of two feet in three hours. The damage done by these moving sands so increased that the government officials studied the work and devised and executed plans; and now, thanks to De Villers, Chambrelent and

AND SOUTHERN FLORIDA

Bremontier, the pioneer workers, the Dunes and Landes are covered with a beautiful growth of the maritime pine. The region is now a famous health resort, combining the beauties and pleasures of the seashore with those of a well-managed pine forest, which extends almost to the edge of the ocean.

There are evidences that originally the Dunes were fixed naturally by forests. These forests were destroyed by vandals, and all attempts to stop these menacing mountains of sand failed. In 1778 a talented engineer, Baron Charlevoix de Villers, was sent to Arcachon for the purpose of forming a military post. He saw at once the necessity of fixing the sand, and was, according to Grandjean, the first to establish the fact that the way to fix the Dunes is by means of plantations of pine. He met with troubles in his work, and was finally sent back to the Island of Santo Domingo.

In 1784, Bremontier began the work, and it is said that, by using the results of De Villers' labors, he finally succeeded in fixing the moving sand.

The fixation of the Dunes rendered possible the work of M. Chambrelent, which was the reclamation of the Landes by drainage and plantings. It is a unique example of personal initiative. M. Chambrelent, a young engineer in the Department of Bridges and Roads, in 1837, was sent to the Gironde to study the drainage of 800,000 hectares of land in the districts of Gascony and the Landes. His conclusions were not accepted, so he bought some land and put in effect the measures he advocated. In 1855, the results of his experiments were submitted to an international jury. The jury was so favorably impressed that it recommended the application of Chambrelent's plans for the entire region, and in 1857 a law was passed requiring the Communes to do this work. The Communes paid for it by selling a part of this land, which increased in value after the completion of the work. This region was 100 meters above sea level, flat and sandy. It was underlain with a hard-pan called "alios." In summer it was a bed of burning sand, in winter in a state of constant inundation, while between the two was a period of pestilence. The country was characterized by sterility and insalubrity.



TAPPING A PINE FOR RESIN IN THE LANDES OF FRANCE. NOTE THE CUPS TO
CATCH THE PITCH.

AND SOUTHERN FLORIDA

A complete system of drain ditches was dug and the seeds of pine were sown. In 1865 all works of drainage were complete. By the fixation of the Dunes and the drainage of the Landes 650,000 hectares of land were made productive. Formerly, if one wished to buy land he mounted a hill and called in a loud voice; the land over which his voice carried was worth 25 francs. "A man," says Grandjean, "was forced to take some of this sand for a debt. He became a millionaire later by selling it in small parcels." The first summers, the visitors lived in the resin-gatherers' cabins; now every luxury is afforded the 200,000 tourists who come there every year. In the Landes a man could buy a farm for a few francs, but it required over two acres to support one sheep. In less than a century the population sextupled, while that of a large part of the rest of the country either remained stationary or decreased. The fecundity of the French in places where there is plenty of room and opportunity is proverbial, as in Canada; it is even so in the Landes, which, on being reclaimed, was equivalent to a new province or colony.

All along the East Coast of Florida there are dunes of snow-white sand covered with scrub pines and palmettoes. This fine, white, silicious sand, although naturally sterile, is excellent for the growth of pineapples in regions where there is sufficient warmth. Mile after mile of this sand along the line of the railroad between the Everglades and the sea is used in the cultivation of pineapples, which are fed a balanced ration of fertilizer, just as cows are fed a balanced ration of feed for the production of high-grade milk.

The great Everglades basin, extending from Lake Okeechobee to Miami and westward to the Gulf of Mexico, contains 3,000,000 acres, more or less. The whole cultivated area of the State of Florida is estimated at only about a million acres. The Everglades are larger than Porto Rico or Jamaica and as big as Rhode Island and Delaware combined. This great area is mainly confined by dunes of sand and ridges of limestone rock. These ridges, like fingers, project into the Everglades and are usually covered with pine. Between these ridges are small glades on the edge of the main or "big glade." The accepted definition

THE EVERGLADES

of a glade is a narrow strip of grassy land between forests. Glade refers to a grassy area. The big glade is all or "ever" glade. In this way, no doubt, the term of Everglade originated. Here and there in the Everglades are islands covered with rich jungle or hammock hardwood growth. On these islands the Seminoles clear small areas, where they raise their crops.

We visited the Everglades from Fort Lauderdale. It was after a long period of heavy rains, and the mosquitoes were bad in the pine woods. We ascended the New River, a beautiful,



INDIAN FAMILY IN CANOES ON MIAMI RIVER.

winding stream, generally deep, but very deep in places, one spot having a depth of eighty-five feet. The banks were quite low and sandy and lined with moss-draped cypress, oak, maple, magnolia, coco-plum, pond-apple, etc. After a short ride we reached the beginning of the drainage work—one long canal ran north-westward, with the dredge Everglades, another due westward, with the dredge Okeechobee, at work. These canals will run about twenty miles out into the Glades and will be met by a canal running north and south from Lake Okeechobee to a point about

AND SOUTHERN FLORIDA

twenty miles west of Miami. The dredge Miami is now at work at the head of the Miami River; another dredge is at work on the West Coast, opening the old Disston Canal into Lake Okeechobee.

As these canals are finished, dams are made to hold back the water to facilitate dredging, showing rather a surprising amount of fall and how effective these canals will prove in discharging the floods of water from this big area. I understand



A CYPRESS ISLAND IN THE EVERGLADES.

that the Government will permit the level of Lake Okeechobee to be lowered only four feet, since a federal appropriation has been made to dredge the Kissimmee River, which empties into the northern part of the lake.

There were no mosquitoes in the Everglades during our visit, and crops already growing on the land, owned by eager settlers, show what can be done on land only partially drained.

THE EVERGLADES

Western capitalists mainly have bought this land; the money from the sales is doing the work, and the further it progresses the more the land will bring and the more eager people will be to get hold of it. The Board of Internal Improvement is wisely holding back much of the land from sale, knowing full well that as time goes on it will increase in value and thus yield ample funds for the continuation of this important work. In many cases the state has sold only the alternate sections.

There are agents at work selling this land in every State in the Union. Men of wealth and influence are behind this project. If any one doubts its feasibility, he should come to Florida and see with his own eyes. Much praise is due ex-Governor Broward for his work in this line, and in the years to come he will shine forth as the governor who really did something to add to the productivity and worth of his State. The man who makes two blades of grass grow where only one grew before is the proverbial public benefactor; but the man who, by his energy and foresight inaugurates a movement to render 3,000,000 acres of waste land highly productive deserves endless commendation in this day, when we talk so much about the conservation of nature's resources. Mr. Broward is a masterful promoter; the keynote of his campaign was drainage; he worked at it incessantly while in office, and he has been working at it ever since, and has made good.

We must not forget that this reclamation is in a land of perpetual summer in the only part of the mainland of the United States which is truly tropical, and where the productive capacity of the land is many times greater than in northern climes; where not only a greater quantity, but a much greater variety of crops can be produced than elsewhere in this country.

This may be far-fetched, but I can picture in my mind's eye long avenues of Eucalyptus, Australian pine and royal palms along these canals; great masses of Hibiscus, Allamanda, Oleander, Bouganvillea, Poinciana, and countless other resplendent ornamentals around thousands of neat homes surrounded by fields of peppers, tomatoes, eggplants, celery, onions, okra, arrow-root, tobacco, etc.; also, no doubt, orange and grapefruit groves,

AND SOUTHERN FLORIDA

as well as choice mangoes, avocados, and other tropical fruits. The canals filled with boats will lead to Miami and Biscayne Bay, the Arcachon and Biscay of Florida.

The land of the moccasin, alligator and Seminole will see a great transformation in a very short time—it does not take long in a tropical country, especially on land where there is no forest to clear.

It is more than a drainage scheme, since by means of dams and locks the water table may be kept at all times just where it is needed for irrigation purposes. The land is level, fertile, and free from alkali and other injurious minerals. The canals serve the triple purpose of drainage, irrigation and transportation.

The soil is usually a black muck, in places several feet in thickness; under this is usually a layer of marl; under the marl, sand, and under the sand, limestone rock. There is considerable mineral matter mixed with this muck, and, although it will shrink some, I doubt if the shrinkage will ever prove a serious drawback. By the application of lime, the cultivation of legumes, etc., this soil can be kept at a maximum state of fertility, so that five acres would be ample for the support of an ordinary family.

The water of the Everglades is usually heavily charged with lime, which is deposited on the surface of everything in a fine, flocculent state during the period of overflow. This deposit, added to the muck, no doubt, contributes much to the quality of the soil. There are deposited also the shells of many fresh-water mollusks. In short, with the fertile, easily worked soil, an abundance of water for irrigation, a tropical, healthful climate, canals for transportation purposes, all within easy access, by both water and land, to our great northern markets, there is a combination of favorable conditions which probably cannot be equaled elsewhere in the whole world.

And lo! the poor Seminole; what of him? At best, he is merely a renegade; and the time will soon come when he will have to put on pants and go to work on the land, join his relatives in Oklahoma, or die from the effects of too much bad whisky.

THE EVERGLADES

A TRIBUTE TO BROWARD FROM THE ATLANTA GEORGIAN.

"Napoleon B. Broward, the beloved Florida statesman, whose untimely death took place a few days ago, was the apostle of reclaiming Southern swamp lands—a pioneer in the work of saving the great inundated tracts to the productive resources of the South.

"It was the dream of his life to do this for his State—to change the hundreds of square miles of the Everglades from a dreary waste of bog and morass to gardens teeming with fruits and vegetables—to make two useful plants grow where none grew before.

"It was a dream worthy the best quality of constructive statesmanship. He not only dreamed this dream, but he set about to put it into reality. He took it and his plan for its realization before the people of his State.

"He met with cries that the builder always meets—'It can't be done. Drain the Everglades? Absurd!'

"But the people had faith in him and his policies and they won. He was elected governor and secured the necessary legislative enactments to put his plan of draining the Everglades into operation.

"It has been a success. Its effect is the same as if some great fertile island were gradually rising out of the ocean to add itself to Florida's riches. It is an ever-increasing source of income direct to the State and a source of additional thousands of inhabitants and additional millions of invested capital.

"In anticipation of its progress, land now under water and a few years ago worse than worthless is now selling for prices that are remarkable under the circumstances.

"Broward was a pioneer in a movement that is going to mean much for every Southern State. In the South there are 87,000 square miles of swamp lands. In Georgia alone there are 4,210 square miles or 2,694,400 acres. Making these lost acres serve the use of man and the good of civilization is a worthy task. Broward, the pioneer, has pointed the way. Let the leaders in every Southern State follow it."

CHAPTER II.

SOUTHERN FLORIDA.

NOTES ON THE FOREST CONDITIONS OF THE SOUTHERNMOST PART OF THIS REMARKABLE PENINSULA.



ACCORDING to the report of the Biological Survey of the United States Department of Agriculture, there are three regions in the United States which belong to the Tropical Zone. One is in Southern Texas close to the mouth of the Rio Grande, another is along the Colorado River in Arizona and California, and the other in Southern Florida.

The first two are hot and arid, the other is humid and pleasant throughout the major portion of the year. The southernmost part of Florida can rightfully claim, therefore, the distinction of being the only humid or truly tropical part of the mainland of the United States—the only tropical part of this country which can be reached by rail. Early geographers arbitrarily made the frigid zones and torrid zone the same number of degrees and then divided the balance of degrees left over between the two temperate zones. The lines called the tropics of Capricorn and Cancer, although of course perfectly straight on the map, are really very crooked and very difficult to definitely locate. Some claim that the frost line is the limit; if this be so no part of Florida is in the tropics, since frost has occurred, in spots at least, throughout the whole peninsula. The best guide is the character of the vegetation, and wherever the coco palm, avocado, mango, pineapple, and hundreds of other strictly or characteristically tropical plants flourish and fruit without protection, the region is truly tropical.

The territory referred to in this article is unique in another

THE EVERGLADES

respect. It is the only region of coral formation in the United States. These two peculiarities combine to render it a region of extreme interest to foresters and botanists. Here is field for research for many years to come, where many phases of plant ecology may be studied to better advantage than elsewhere on the continent. One can pass through all the climatic zones from the boreal to the tropical in going from the region of the proposed Appalachian Park to Biscayne Bay in a little more than twenty-four hours. Were the roads all good, it would be little more than a pleasant automobile trip.

The part of Florida to which this article refers lies between the Everglades and the Florida Strait, and includes the territory around Miami, and southward to Cape Sable, including many coral keys, mangrove islands, and wooded islands in the Everglades.

The vegetation of this district from a forestry standpoint may be divided into three distinct types—the hammock, the pineland, and the mangrove swamp. It is, of course, impossible in so short a space to give more than a superficial description of these types.

The hammock is undoubtedly the climax forest. It represents the type that the rest would in time become were it not for fire, flood and other detrimental and retarding influences.

The hammock is a tropical jungle, consisting of species of trees characteristic of the Antillean Flora. Most of these species produce a vigorous coppice, and the ground is covered with a rich black mold resulting from the leaves and detritus of these hardwoods. It is in the hammock where one finds mastic, crabwood, satin-leaf, gumbo-limbo, princewood, whitewood, manchineel, and many other rare and in many instances valuable woods.

This hammock may be found in patches in the pineland, on islands in the Everglades, and on the keys north of Bahia Honda. Strange to say, the southernmost keys are like the pineland of the mainland in character. Sand Key, seven miles to the southwest of Key West, is the southernmost point in the United States. Although all the keys north of Bahia Honda were once

AND SOUTHERN FLORIDA

covered with a dense tropical growth, much of it has been cut for pineapple clearings. In many places, especially on Key Largo, it is still in virgin condition. Wherever these keys are above tidewater, the growth is hammock; when subject to overflow, it is mangrove swamp. Some keys are all hammock; others are all mangrove, and others have hammock centers fringed with mangrove.

For half a century the timber on these keys has been cut, allowed to dry, and is then burnt. In the ashes a fine crop is produced, and fertilizers have never been used. The fact that pineapple patches are very combustible has caused these natives to burn cautiously. In referring to the vegetation of these keys, I cannot refrain from quoting the following from an article by the botanist Curtiss in "Garden and Forest," volume I, page 279:

"A person who is acquainted only with the vegetation of more northern states, or with that of Northern Florida in traversing these keys, will find scarcely a tree or herb identical with, or even resembling those with which he has been acquainted. He may hear familiar names in use by the inhabitants, such as cherry and cedar, but on examination he will find the species thus designated to be entirely different from those which he has known by such names before. The curiosity is piqued at every step by some unfamiliar and interesting form of vegetation, and if the tourist be accompanied by one of the inhabitants he will learn much of the popular lore regarding names and uses, for these people are remarkably intelligent in regard to the vegetable and animal life of the region they inhabit. It will be found that almost all the adult inhabitants come from the Bahamas, that nearly all the trees and other plants are common to those islands, and, in short, that these islands have much more in common with the Lesser Antilles than with the Florida mainland.

"A tour of the Florida Keys reveals nature and society under such peculiar conditions that any one who has never visited this insular region may rest assured that there remains in store for him at least one source of novel and enjoyable experience, though he may have traversed the mainland of the United States from Maine to California. As regards conformation and

THE EVERGLADES

soil, the inhabitants and their pursuits, the surrounding waters and the marine life they support, these coral islands differ essentially from all other portions of our vast country; but in no particular do they present so striking a dissimilarity as in the vegetation which covers them."

In spite of the mosquitoes these keys are charming places, especially Elliott's, which is bounded on one side by the waters of Biscayne Bay and on the other by the straits of Florida. They are protected from storms by a chain of coral reefs. Near at hand are the famous Sea Gardens.

The pineland, although less rich and luxuriant in growth, is also peculiarly interesting. The rocky ridges or reefs, with sandy swales in between, are covered with pine and palmetto. The pine, strange to say, seems to shun the sandy swales. The sand of these swales is underlain usually with a reddish calcareous clay, resulting from the disintegration of the coral rock. This rock may be found in all stages of disintegration. In the swales the palmetto is most luxuriant, and no doubt the absence of the pines in these places is due to this fact. The regeneration of these pines, in spite of fire and rock, is generally good. The pines grow right on the rock, the roots penetrate its crevices, and the tree is anchored to such extent that when it upturns the rock sometimes upturns with it.

On the keys the soil is crumbled coral, and coral sand. On the mainland it is a limestone as soft in places as chalk and as hard in others as flint. In places it seems stratified or in plates and lifts out in good flat building stones, which harden on exposure; in others it is jagged, honeycombed, and filled with pot-holes and pockets; in others it is coquina-like in character, and in others has an oölitic structure.

The pine is Cuban pine (*Pinus Elliottii*). It does not yield resin satisfactorily, and is therefore not tapped. The wood is often so heavy that it sinks in water, and on the whole is one of the meanest woods on earth to work with. The heart or light wood is durable, but it warps to such extent and is so hard when dry that it is cut, hauled to the mill, sawed into boards, and used for constructive purposes just as soon as possible.

AND SOUTHERN FLORIDA

It is almost impossible to drive a nail into the dry wood without splitting it, and in order to saw it one must flood the tools with kerosene to prevent gumming. Mechanics shun it, although many people use it because of its cheapness. The sapwood soon rots and leaves a heavy, durable heart, which is in great demand for posts, ties, poles and fuel. Much of it is used in burning the coral rock into lime, and much of it is burnt up in the clearing simply to get rid of it. The "log-rolling" stage is still on in this district. In many cases it is blasted down with dynamite and then burnt; in others it is "deadened" and then burnt standing. It would probably pay to distill this wood, since it could be secured cheaply and would yield large quantities of tar.

Fire sweeps over these pine regions frequently. The pine needles, grass and palmettoes burn like tinder. The dry pine bark and rotten sapwood hold fire like punk. Fire gets down in the crevices of the rock, so that it is next to impossible to extinguish it. The effect of fire on this rock is peculiar. It becomes a potent geological agent. It converts the rock into lime, which slakes when wet by rain or dew. In burning piles of brush, rocks are often thrown into the heap to check the flames or prevent the wind from blowing sparks. These rocks are burnt with the wood and crumble into soil.

This rock crumbles into soil in the presence of decomposing organic matter. By the use of velvet beans, dynamite, and hard grubbing by Bahaman darkies, the roughest, most hopeless looking rock-bed may be converted into productive soil.

There ought to be considerable nitrogen present in this soil, since the ground is often covered with thirty or more species of creeping legumes. There must be potash somewhere, since the palmetto ash is extremely rich. Few things will grow, however, in this rock without the help of fertilizer. Plant-food materials may be there, but they are not available. The rock is usually wet, even in the driest times. In fact, under the limestone ridge there are channels of water running from the Everglades and bubbling out in the form of springs along the shores of Biscayne Bay.

THE EVERGLADES

All this pineland would in time become hammock, no doubt, were it not for forest fires. One can find all stages between the true hammock type and the pineland. Where pineland has been protected from fire, it becomes hammock-like in character.

The type of forest called mangrove consists in places of pure red mangrove, the great land-former, but gradually merges into forest similar to hammock. The vegetation of the mangrove swamp consists of those species which can stand a salt-water bath occasionally. They are located on mud lands which are being gradually wrested from the sea. The red mangrove is chief among those plants which can thrive in salt water. With it, however, are often associated the coco palm, the seeds of which float in, become covered with wet seaweed, and then sprout and grow together with buttonwood, black mangrove, sea grape, and others. There are hundreds of thousands of acres of land in which mangrove predominates. Fringing these mud lands are often sand beaches. In the course of time, when this land becomes high and dry by the continued deposit of vegetable detritus, other trees, such as grow in the hammock, gain a foothold and spread.

Back of the rock ridge, which stretches along the coast from the region of Miami southward, is that vast territory called the Everglades. The extension of tree growth on the Everglades has been restrained by an excess of fresh water. With drainage the hammock islands will quickly extend. A very large proportion of the tropical hammock trees of South Florida are berry producers. Such seeds are quickly disseminated by birds and other animals. In the Everglades there are hammock islands, on some of which the Seminole Indians live. This Everglade region, it is claimed, contains 3,760,000 acres. Since ten acres or less is sufficient for the support of a family in this climate, there is room for 376,000 families. The whole cultivated area of Florida is estimated at 1,000,000 acres. It is interesting to compare the size of this wild territory with other parts of the world. For instance, the Everglades cover 5,875 square miles; Porto Rico, 3,550 square miles; Rhode Island, 1,250 square miles; Delaware, 2,050 square miles; Jamaica, 4,207 square miles.

AND SOUTHERN FLORIDA

When this area is once properly reclaimed there will be little of it which can not be cultivated. The complete drainage of these Everglades is not only being seriously considered, but is actually in progress. The following on the "Drainage of the Everglades" is from a recent issue of *Success*, by J. E. Ingraham, one of the vice-presidents of the Florida East Coast Railroad:

"There are great agricultural possibilities in the Florida Everglades. Though they are yet merely an expansive waste of swamp and lake and jungle, I venture to predict that they will be the location of hundreds of fertile farms within ten years, and will by degrees develop into one of the most productive tracts of land in the world. The barrier to the utilization of the Everglades has been, of course, the water which covers the greater part of them to a depth of from one to six feet; but it has been found entirely practicable to drain off the water. Work to this end has already been begun and is being pushed rapidly. When it is completed a tract of land one hundred and sixty miles long and sixty wide will have been opened to cultivation. The size of this region is not as important as the remarkable productivity of the soil. The latter is not only absolutely virgin, but has been fertilized by animal and vegetable life through many centuries. I am confident that its crops will lift Florida to a place among the leading agricultural states.

"The project of draining the Everglades attracted the attention of Henry B. Plant in the early nineties, but he was by no means sure that the scheme was feasible, so I, acting under his direction, undertook an expedition through the region. Despite its proximity to centers of population, it was then for the first time thoroughly explored by white men. Ours was virtually a voyage of discovery. We paddled our light boats on lakes and camped on islands that, I have good reason to believe, had never before been visited by any human beings but Seminole Indians, and by these but rarely. We underwent so many hardships that some of our party were compelled to turn back, but our efforts were not in vain, for we ascertained the important fact that the Everglades, along the whole 160 miles of the eastern side, are

THE EVERGLADES

rimmed by a rock ledge. We furthermore learned that all of the lakes are several feet above sea level, and we decided that there was nothing whatever to prevent the water of the lakes from flowing into the ocean and leaving the land drained if vents could be made in this long ledge of rock. The chief question before us pertained to the practicability of cutting through the ledge in various places, and dredging out outlets into the Atlantic, which is not more than two or three miles away at numerous points.

"Experiment proved that this work would present no great difficulties. It was merely a matter of a great deal of digging. Henry M. Flagler took up the project, and it is being carried out by his lieutenants. We are not only making artificial outlets through the rock, but are also, by ditching and dredging, turning large bodies of water into rivers and creeks which flow to the ocean. The work has progressed far enough to enable me to predict confidently the opening in Florida, within a very few years, of a great tract of land of almost unprecedented fertility."

When one considers what the Bermudas yield, with only twenty square miles of rocky land, the possibilities of this great Southern tropical peninsula seem almost limitless. The whole region is one of great interest, and although one of the first to be explored and partly settled it has remained dormant until lately. Settlement is difficult, but gradually obstacles are being overcome, and when competition in transportation facilities develops, the boom will be on in earnest.

This region of perpetual summer is also the natural gateway to the West Indies, and the great peninsula of Florida, like a huge finger, directs the way to fertile regions beyond, awaiting American capital and enterprise.

CHAPTER III.

TREES AS AN AID TO DRAINAGE.



ALL trees, in fact all kinds of vegetation, transpire. Although a large part of the body of all plants is water (96 per cent in plants like the banana), a still larger quantity is absorbed by the roots and is again discharged by the leaves into the air. This passage of water into the air from the leaf surface of the plant is called transpiration. Water absorbed by the roots

contains the nutrient substances of the soil. There is thus a current of water from soil to air through vegetation which is known, botanically, as the transpiration current. This keeps the plant turgid. When evaporation from the leaves is in excess of the supply from the roots, or in other words, when there is no transpiration current, due to an insufficiency of water, the tender parts of the plant wilt. The cells of the tender rootlets of plants not only absorb this watery solution but have a selective power in choosing from the many mineral substances contained in the moisture of the soil, the kinds and quantities needed for the use of the plant. If even one necessary element is absent the plant dies of starvation. These substances are left in the plant for the manufacture of wood and fruit, while the water which has served as the vehicle of transmission evaporates from the leaf surface of the tree. The actual source of the power of this great transpiration force is still unknown. It is a mighty pump that will lift enormous quantities of water from the roots through the wood to the topmost branches of a tree two hundred and fifty feet in height. In fact, every tree is a natural pump with many valves. The power that does the pumping is simply another one of the great problems in plant life which remain

THE EVERGLADES

to be solved. The leafage is a broad surface spread out to the sun and air. In addition there are numerous stomata (air-pores) which increase the porousness and promote evaporation of moisture from the surface. These air-pores or stomata open and close to suit the needs of the plant. The leaves and green twigs are then the special organs of transpiration.

The water evaporated in the five months from June to November from an oak standing perfectly free and apart and having about 700,000 leaves has been estimated at 111,225 kilograms. This is equivalent to about a quarter of a million pounds of water.

A clover plant has been found to give off in one day twice its weight of water. A crop of hay on one acre producing two tons has been found to use during its growing season more than six hundred tons or wagon loads of water.

Storer in a chapter in his work on agriculture on "Trees as Pumping Engines" quotes that a single oak in Germany in about five months transpired 264,000 pounds of water, or about eight and one-third times the amount that fell in rain on the surface it occupied. He mentions another oak tree that transpired 4,400 pounds of water in a single summer's day.

Some trees transpire more than others, and, of course, in a climate of continuous summer, transpiration throughout the year is enormous. Rapidity of growth is determined by the amount of moisture available. The amount transpired depends upon the supply of water, the rate of growth and the condition of the atmosphere. Given then a wet soil, a fast growing tree, such as a cedrela or eucalyptus or any one of a hundred or more fast growing tropical trees, with a dry, windy atmosphere, and you will have a pump working quietly and constantly that would rival a windmill.

In a parliamentary paper relating to Natal is the following statement: "Clumps of eucalyptus planted in undrained swamp lands at elevations up to 4,000 feet have been known to completely dry up the space within reach of their roots."

I have heard it said that in India eucalyptus trees were planted along an irrigation ditch. These trees robbed the ditch

AND SOUTHERN FLORIDA

of so much water that they were cut down. The region around San Paulo delle Tre Fontane, it is claimed, was drained and rid of pestilential fevers by the planting of eucalyptus. Along the Mediterranean shore I have found the belief prevalent that eucalyptus plantations keep off fever. Müller speaks of the cajeput tree (*Melaleuca leucodendron*) as the "anti-malarial tree." Many attributed this effect to emanations of oil from the leaves. It is a "poor lie that is devoid of all truth" and it is a poor popular belief that is not based on some shadow of fact or reason.

I think the modern development of medical science proving the causes and manner of transmission of tropical fevers explains it all.

In order to contract malaria or yellow fever one must be bitten by an infected mosquito. The notion that these fevers are carried by miasmatic emanations from swamp lands no longer holds.

To keep off fevers either one of two things is necessary—remove all mosquitoes that are infected or remove or segregate all people that can infect the mosquito.

The mosquito does not travel far. He must have water to breed in. Undrained land furnishes the breeding place. In the Roman Campagna the water was held in pockets and the land was difficult to drain by ditches. Trees were planted. They drained the land, the mosquito was left without a breeding place and without him, or rather her, since the female does the mischief, the fever was not transmitted.

The eucalyptus has been singled out as the great genus for this purpose, but there are other trees of quite as much value, which I shall mention later.

Eucalyptus rostrata, the red gum, is a favorite because it grows on moist ground with a clay subsoil. It will grow on land subject to fresh water inundations for a considerable time. In Mauritius it resisted hurricanes better than other species. It yields a heavy wood, which is highly esteemed in Australia.

Eucalyptus resinifera, the red mahogany gum, has proved best for the tropics. It is not, however, such a rapid grower. It yields a good timber, but has an unfortunate common name. It

THE EVERGLADES

should not be called mahogany, because it does not belong in the same class with this time-tried prince of timbers. It should not be called gum because the term gum to many minds carries with it little to recommend it.

In Cuba I found a eucalypt growing with magical rapidity. It was the fastest growing eucalypt I have ever seen in the tropics. An expert of the Department of Agriculture, Washington, D. C., diagnosed it to be *Eucalyptus crebra*, the narrow leaved iron-bark tree of New South Wales and Queensland. I am not sure that he is right, but if he is this species is the one to plant in Western Cuba. In our excitement over the eucalyptus, some of the many species of which are good for certain special districts, such as Southern California and Mexico, we have overlooked other Australian and American trees which are quite their equals, if not in many instances by far their superiors.

We have many species of the order *Myrtaceae*, to which the eucalyptus belongs, so similar to eucalyptus that the novice could not tell the difference. For instance, the rose apple or pome-rosa and many other species of the genus *Eugenia* and allied genera, which have large seeds, grow very rapidly, and yield fruit as well as wood.

Any quick-growing tree such as the cedrela or cigar-box cedar will pump just as much, if not more, water than the eucalyptus. The Australian pine is a fine tree for swamp lands. It is storm fast, grows very quickly, in fact faster than any eucalyptus in Florida, and yields a fine, hard wood.

Melaleuca leucodendron, the cajeput tree of India, which yields the cajeput oil of commerce, is, according to Baron V. Mueller, a great tree for swamp lands. He thus speaks of it: "It can with great advantage be utilized for such areas for subduing malarial vapors in salt swamps where no eucalyptus will live." I have it growing successfully on the bay shore here in Florida. We have all noticed how the roots of trees will run to an old well and then form in great hair masses down its sides to the water below; we have all noticed how the roots of quick growing trees such as the poplars and willows will go long distances to a tile drain and fill it completely with hundreds of

AND SOUTHERN FLORIDA

rootlets; and we have all noticed how the roots of some trees will run out and under a pavement so persistently that they crack and ruin it. The rootlets are merely doing their part—hunting for moisture, so that the tree can hold up its head, and hunting for mineral food which is dilutely dissolved in the water which it drinks. When the earth fails to yield sufficient moisture and in consequence sufficient plant-food held in solution the tree begins to die at the top first—a condition called stagheadedness, which is the beginning of the end. In the selection of soils, look up and not down. The height of the timber is usually a good measure of the soil's depth and fertility. On an old homestead in this region there was a well cut from the solid rock. By the side of this well a wild rubber grew. The well was long ago abandoned and is now almost filled by its hose-like roots.

In conclusion let me say that the greatest function of the forest, aside from yielding materials useful to man, is soil betterment. It holds the soil in place against the erosive action of wind and water, but what is more important, the roots penetrate to the deeper layers of the soil, absorb the mineral substances and then deposit them again on the surface in the form of detritus, which soon becomes humus. Thus the surface soil is being constantly fed, thus the mineral ingredients of the soil are conserved and thus the wornout fields and ruinate lands of the tropics may be rejuvenated and rendered virgin. This deposit on the surface gradually raises the level and thus helps also in the process of drainage.



ON THE BEACH AT CAPE FLORIDA. (PHOTO BY HOMER SAINT-GAUDENS.)



COCO-PALM GROVE OR "COCAL" ON ONE OF THE KEYS.
(PHOTO BY FLORIDA PHOTOGRAPHIC CONCERN.)

CHAPTER IV.

THE COCO PALM.



IT IS so much better to call this tree the "coco palm" than the "cocoanut palm tree." There seems also no reason for spelling coconut with a in it. The source of this word is probably not known, but when no other source is plausible, ancient Greek or Latin is sought, and a possible origin is guessed at, for instance the Greek *kokkus*, a berry. As another instance the natives of the Bahamas are called "Conchs," apparently because they are fond of the shellfish called conch, from the Latin *concha*, a shell. It more than likely comes from a very old English word similarly spelled, meaning a "beach thief," or "beachcomber."

The use of an *a* in the word simply helps to confound it with cacao, coca, and a few other plant names with similar spelling. The Spanish call it *coco*, and the German *kokos-palme*. The generic name is *Cocos*, the specific name *nucifera*, and when Linnaeus called it nuciferous, or nut-bearing, he perpetuated in its name its most striking quality. The use of the word "perpetuated" is good, since *Cocos nucifera* is one of the few plant names which have not been changed a dozen or more times by ardent botanists.

From the standpoint of utility, the coco palm leads the procession in the tree world. As to beauty, that depends altogether on the character of your art education. I have heard both the royal palm and coco palm likened to huge feather dusters set on end over the landscape. This much is certain—a coral strand without coco palms would look like Father Time without his whiskers.

THE EVERGLADES

In spite of the fact that the fruits of the royal palm are only used for pigfeed, this tree is more stately and aristocratic than the coco palm. It is perfectly straight, smooth, and columnar and well fitted for avenues leading up to Southern mansions. The coco palm, on the other hand, is plebeian. It bends accommodatingly at the start, and has pronounced ridges where the massive leaves have fallen away, which give the monkey-like pickaninny a good toehold.

It is a fitting shade to the hut of a fisherman, for with a long-handled sponge hook he can pull down at any time a green nut which yields a cool, sweet, fresh, invigorating drink from nature's own distillery. Strange to say, this liquid is under pressure and, although there is not the decided "pop" which is always looked for in the case of a soft drink, there is a good active "squirt" indicating that the water is fresh and the nut sound. Inside, under the shell, which in this stage is just beginning to harden, there is a layer of soft nutritious jelly.

The white meat of the ripe nut is used for candy, feed for animals, and, when ground very fine, makes a cream which is delicious on fruits, etc. I have seen chickens, goats, dogs, pigs, and pickaninnies all feeding in the same yard at the same time on the white meat of the coconut.

The coco palm is a queer tree—it seems to love the winds and salt of the seashore; yet some scientist has tried to prove that its home is inland on a high plateau in South America.

It has been pictured in times-past as a perfect adaptation to the seashore. What the date is to the desert, the coco palm is to the strand. The hard shell of the nut is filled with a rich oily meat which floats high. The germ is protected and well supplied with nutriment for the days of its youth. On the outside of the shell there is a pad of fiber which protects it when it falls to the hard coral strand. The nut will not break when it falls; it bounds and rolls like a ball down the incline into the sea, and floats and floats and floats till washed on some muddy shore which the coral polyps, the waves, and the mangrove trees have been many a year in making. Then it is gradually covered with sand and seaweed by wind and wave. Soon the tree springs from

AND SOUTHERN FLORIDA

one of the three eyes in the end of the nut. The leaves are at first simple, and in youth the tree needs shade, which it gets naturally from the bushes on the shore. Soon it throws out great compound leaves of woody texture, some of which are fully fifteen feet in length. Think of leaves fifteen feet long! In a few years, seldom under five, it bears a bunch of nuts, followed by other bunches in all stages of growth.

Then the mangrove island is fit for human habitation, fit for the home of some smoky colored, semi-nude sea-islander, who from this palm can garner all the necessities and a few of the luxuries of life. With the fish in the sea by the shore, and the turtles that lie and lay on the beach, starvation is not possible. Man's ultimate wants are shelter, food, and drink. The coco palm supplies them all, with more besides.

The Negro who lives in the shade of this useful tree has also fortunately developed a thick skull-shell, covered with a mat of tow. And well so, since the fall of a coconut from a sixty-foot palm is nigh like a ball from the cannon's mouth. A single fruit of the double coconut of the Seychelle Islands weighs from forty to fifty pounds. Our common coconut when green will weigh at least five pounds. Over in Brazil men wear bucklers of wood to protect themselves from the fall of the balls of Brazil-nuts. These actually plant themselves when they hit the soft, moist earth of the jungle.

Still there are scientists at work who have proved, to their own satisfaction at least, that the coconut does not float far, that it soon loses its vitality when soaked in salt water, that it rarely sprouts when washed upon the beach, and that it has been distributed completely round the globe mainly by the hand of man.

The waves wash the tree half over, break over it with great fury and bang great booms against it in times of storm, but it lives on and bears on in spite of abuse. Dig it up carefully and pet it with fertilizer, and it will more than likely turn yellow and die. Cut off its tough fibrous roots to the stub, and cut off its leaves, then stick it in the ground as you would plant a fence-post, and it will very likely live.

THE EVERGLADES

In Porto Rico the water of the green coconut is relished by everybody. It is almost a national beverage, and a wholesome germ-free beverage it is—absolutely free from chemical adulteration and ptomaine poisoning. All through the day and late at night in Porto Rican cities may be heard the welcome call of the *coco-de-aqua* vender.

In some parts of the East the fruit stalks are cut while green and tender, and the stub is attached to a light bamboo trough. Several flower-stalks may be thus treated and several little troughs may be led to one spot where there is a receptacle in the form of a big gourd or calabash awaiting the liquid which oozes out and trickles down to form a cider or toddy.

Could one imagine a state more seraphic to the minds of many men than a hut closely surrounded by coco plams with bamboo conduits leading this cidery juice slowly, but continuously, into a receptacle on the kitchen table?

From the outside of the nut comes the husk or coir which is used for cordage and woven into tough matting for church aisles, office floors, etc.

The oil which is expressed from the copra, or dried meat of the nut, enters into butter, soap, etc.

The hard shells are carved and used for utensils of various kinds.

The trunk wood is poor and hard on tools. It is used, nevertheless, because it is cheap and answers the purpose, although, of course, a fine full-bearing coco palm is never cut for its wood. It is called "porcupine wood" because it has hard bundles of tissue in it which, when cut on the slant, appear like spines in the wood. The heart is spongy, but the outer layer, although rough, is tough and durable.

A coco palm usually bears a terrific weight of fruit, and bears it continuously, but if it fails the native hacks it or drives iron into it or cuts deep notches into the trunk, which at the same time facilitate climbing, and lo! it bears—bears because its vegetative activity has been restrained, and, like every other creature on earth, it strives all the more to perpetuate its kind.

Among the leaves around the stem there is a natural cloth, to

AND SOUTHERN FLORIDA

be sure not woven with warp and woof, but of such a nature that primitive man could have easily taken the hint. I don't know whether this cloth is ever used for wearing apparel or not, certainly not in the majority of even remote regions where gunny sacks are plentiful.

There are those who grow passionately fond of the coco palm, especially when grouped by the shimmering particolored sea of the tropics. There is nothing sorrowful about them; in the breeze they never emit a whining tune as do the pines, but a lusty clattering and banging. I heard an old sailor once say that he wanted to be buried in the shade of a coco palm by the shore.

But like all good things on earth it has its tormentors. In parts of the West Indies it has fallen a prey to a fungous blight. Strong efforts are being used to check its spread, and close watch should be kept to prevent it from entering Florida from Cuba, since in south Florida there are many coco palms, and many acres of land where they can be successfully planted.



PICKING SAPODILLAS. (PHOTO BY PROF. JOHN CRAIG.)



A LIME TREE ON ELLIOTT'S KEY GROWING IN THE CORAL ROCK.
(PHOTO BY PROF. JOHN CRAIG.)

CHAPTER V.

THE LIME AND SAPODILLA, COMMONLY CALLED "SOURS AND DILLIES."



ISIT a conch farmer on the Florida Keys and the conversation will soon drift to the condition of his "sours and dillies."

The "sours" or limes were planted long ago mainly for their acid juice which was cherished by seafaring folk to combat scurvy, while "dillies," the short for sapodillas, were grown because they have always been held in high esteem by the natives, both black and white, of the Florida Keys and the Bahama Islands.

The buccaneerish taint in my blood got the upper hand when I bought a farm on the Keys, well stocked with limes, sapodillas, and coco palms, and a sloop which I named The Dilly. Since then my interest in sours and dillies has grown, in spite of devastating storms, tricky commission men, and long droughts.

These two fruits grow together on the Keys among lime rocks of coral origin, where soil is often so scarce that on some acres, which one could easily select without wandering far, a man would have to scrape with a spoon for a whole day to get a barrow load. The rocks stick up as though the bones of mother earth were dry and bare, without skin or flesh of any kind.

In the crevices of the rock there is some soil, and from the porous rock itself the plant must derive nourishment. At any rate, the lime tree produces sour limes, and the sapodilla tree sweet sapodillas, in great abundance.

If one plows this soil he must use dynamite, and all weeding is done with a machete or a sailor's sheathknife.

THE EVERGLADES

In a moist season the little lime, hardly more than a seedling, is planted in a rock crevice or pot-hole. If the ocean keeps its place and the weeds are kept in check, the lime tree will thrive and in three years will blossom and fruit—a fruit with a delicious refreshing aroma which puts the lemon to shame. The lemon is a coarse, thick-skinned, rough, raggy and acrid product compared with the lime. School children in Boston eat limes pickled in salt-water, at recess. The lime is a naturally refined and delicate acid fruit.

The lime is a spiny, semi-wild crop, although a spineless variety from Trinidad is being tried. It stands no frost and will not flourish if too carefully tended. No fertilizer except a little half-rotted seaweed, and no cultivation except a couple of weedings a year, are needed. Heavy crops of fruit are produced almost every summer, often with a light winter crop, and the limes from the Keys are especially cherished because, unlike mainland limes, they will carry long distances without deterioration.

The lime is thin-skinned, full of juice in proportion to rag, of a delicate inimitable aroma, and once a lime-convert the epicure forever after spurns the lemon.

There is little trouble in getting them picked in spite of the mosquitoes and their needle-like thorns.

The lime is in active demand because there is an unquenchable desire—the awful thirst which besets the American people in the summer time. Great pyramids of limes may be seen at almost every soda fountain where limeades are in vogue or at the club where the gin-rickey holds sway. A whole lime for a glass with the thin aromatic rind thrown in is the rule. For that reason big limes are not wanted, and then, limes are usually bought by the barrel and sold by the dozen.

My crop last year on about four acres of land amounted to two hundred and some barrels. A flour barrel is the standard and holds about one hundred and twenty-five dozen limes. They netted me on the average \$3.50 a barrel. They probably re-tailed at twenty cents a dozen, costing the consumer about

AND SOUTHERN FLORIDA

twenty-five dollars a barrel—a fair instance of the abysmal gulf between the consumer and producer.

Limejuice has other uses than assuaging thirst. In the form of citric acid it is extensively used in manufacturing establishments.

A little lime juice put in the water in which meat is boiled renders it more tender and palatable.

Added to desserts, other fruits, jams, etc., it brings out their peculiar flavors and removes flatness.

It offsets hardness in water.

With salt it will clean brass and remove stains from the hands.

It improves and whitens boiled rice and sago. It is a soothing application to irritations caused by insect bites. It is better than vinegar as a salad dressing. It makes a cleansing tooth-wash diluted with water. It is good for the liver, useful in fevers, and they say a little limejuice in the water you drink is sure death to the typhoid bacillus!

And so I manage my lime plantation—a kind of *laissez-faire* system—but it pays a good interest. A new-comer would hardly notice it in passing. A colored man called Parson Jones, otherwise known as the Sultan of Cæsar's Creek, has an eye on it. Every month or so I meet him in town, but his good wife, who picks limes also, has not been away from home for three years. Three or four times a year when we want to bathe in the briny parti-colored waters of the Keys or seek plunder on beachcombing expeditions along the shores, I drop in to look over my plantation and pick some green coconuts for the refreshing liquid which they contain. My only concern is in summer, awaiting returns from shipments. Sometimes the sales are disappointing, especially in the region of New York if a ship has arrived with a cargo of "sours," each wrapped in brown paper, from the island of Santo Domingo.

My sapodillas were planted because they yield a very sweet fruit and stand firm in the teeth of the gale. The trees are so dense and sturdy that they form a wind-shield and storm-break. Good dillies have a local sale of a penny each. Some are

THE EVERGLADES

smooth, light brown, with a pink blush on one side, but many resemble a rusty-coat apple. The colored gentry will invest in this luxury even when grits are low in the larder. And the raccoons are so fond of them that ripe dillies on the trees are seldom found.

But there is a future to the dilly beyond all this. The gum or milky juice of the tree is the basis of chewing-gum, and although the world at large may not be cognizant of this impending calamity, and although even the conservation commission has not considered it, we are on the verge of a chewing-gum famine. The price of this gum, called chicle, has risen, the quantity given in a cake of gum has been reduced to the severest minimum, and adulteration has reached its maximum. Still the demand is beyond the supply.

The man who plants limes, with sapodillas for a wind-break, is actually, but perhaps unwittingly and indirectly, furnishing important ingredients for two articles not destined to uplift mankind—the gin-rickey and chewing-gum.

In addition to yielding a sweet fruit and a valuable gum, the wood of the sapodilla tree is probably as near everlasting as wood can be, in fact it outlasts many metals. Lintels of zapote, or sapodilla wood, in the ruins of Mexico are still hard and sound, having endured many centuries, probably 3,000 years.

In a few years, no doubt, there will be many chicle plantations, under the control of companies inducing the unwary to part with their coin on the promise of great future returns, as in the case of rubber.

Even now chicle figures in American stock reports, and American chicle is bought and sold in Wall Street by the side of stock of other great corporations.



A PAPAW TREE FULL OF FRUIT.

CHAPTER VI.

THE BANANA AND THE PAPAW.



NEVER cease to marvel at the banana and the papaw. Statisticians who have predicted a famine from the increase of population without a corresponding increase in the production of breadstuffs have neglected one potent factor—the banana.

The papaw or papaya is another succulent, quick-growing, prolific tropical fruit-producer, belonging in the same class of marvels with the banana, but is not related to it.

The banana has been the cause of the formation of steamship lines to the tropics; it has caused the building of railroads within the tropics; it has figured conspicuously in Spanish-American politics, and even the dreaded Black Hand is known to many as "the Society of the Banana." We are now importing \$12,000,000 worth of bananas annually.

The banana is marvelous because of its prolific nature, yet it forms no seeds, and the great bunch of foodstuff when not used by man or other animals simply rots, and the stalk which produced it dies to give space to another to repeat the performance.

With me the banana is a favorite crop. I dig a deep hole in moist soil or muck. Into this hole I empty my waste basket containing old letters, newspapers, returned manuscripts, etc.; also the kitchen barrel containing tin cans and other stuff that the chickens will not eat; then I throw in sweepings, rakings, old fertilizer bags, old iron, useless wood, bottles, and trash of any and every kind. On top of this I put a good forkful of stable manure and then some sand or muck. Then the banana root, often no bigger than your two fists, dry and lifeless-looking, after having been kicked about in the sun for a few days,

AND SOUTHERN FLORIDA

waiting for planting time, is stuck into the ground and covered with a few inches of dirt.

In three months, if the weather is good, you may sit in the grateful shade of this big green-leaved plant. I almost called it a tree, because its stalk is as big as a man's leg and its foliage may be several feet above your head, but according to the definitions a tree must have a central *woody* axis, and to the banana there is no woody texture; it is all as soft as a cabbage and is usually completely consumed in a short time when left to chickens.

Within a year a bunch of fruit is produced which a man can hardly carry—a bunch so big that it often bends the plant to the ground unless propped by forked sticks. As soon as the bunch and stalk are cut, up shoots another and another. A dozen or more suckers are at the same time produced so that more and more may be planted. What an active chemical laboratory this plant is to form so much leaf and stalk and fruit from soil and atmosphere in less than a year!

It is a sight seldom forgotten to see picturesque Indians in Central America working in banana plantations where the plants have met to form a forest-like canopy. In Mexico there are young coffee trees in the shade of these banana plants. I have seen the semi-nude Karif women of British Honduras meet the ship far from shore with their dugouts loaded to the gunwales with bananas.

But the most marvelous kind of banana culture may be seen in the Bahamas, on the Island of Eleuthera. Here there are deep holes called "banana holes" some of which are fifty or sixty or more feet in depth. At the bottom of these holes is moist rich earth. They are just like deep dry wells. A banana root is planted in a basket of soil, which is lowered with a rope to the bottom. The root sprouts and the stem shoots up like magic till it reaches the top of the hole. Then the foliage spreads out in the sunshine like flowers in a vase. There it grows and forms its bunch protected from the wind in the cool moist recesses of the hole. The bunch is formed at the surface of the ground, so that the enterprising native has but to pull it over

THE EVERGLADES

with boat or sponge hook, sever it from the stalk with his machete, and walk proudly home with a week's provender for himself and family on his head—a fitting illustration of man's mastery over nature.

Little wonder that the native of the tropics is a lover of leisure; little wonder that he rests content in his palm-thatched hut amid his beloved bananas.

A good papaw will bear a hundred or more melon-like fruits, a fruit to the axil of each leaf, ripe at the bottom and in all stages of development up to the bloom. The staminate and pistillate flowers are usually on separate plants, and the fruit varies a great deal in quality.

The fruit contains a large quantity of black, peppery seeds which may be removed *en masse*, as in the case of the cantaloup. A good papaw, cold and treated with sugar and lime-juice, is relished by many people on a par with a muskmelon. The seeds are usually scattered in the midst of rubbish during the rainy season. As soon as the plants begin to bloom, all but one or two staminate plants are destroyed. In the course of a few months one may begin to pick papaws every day or so.

Of course some people have to learn to like them, but one lady that I know, of good habits, will steal this fruit when buying and begging fail. She has for the papaw the same irresistible longing that the negro has for the watermelon.

Next in wonder to the prolific nature of this fruit is the marvelous fact that it contains a natural food-digester, a ferment now famous the world over as a medicine. Under various patent names it enters into the lists of many drug firms. By means of it men have already accumulated fortunes—not the producer, but the manufacturer and peddler who invent appealing names and have them patented.

I have before me a sample bottle containing one hundred pills for twenty-five cents. It is marked "Physician's sample. Our own preparation of the digestive juice of *Carica papaya* with willow charcoal." It is also marked a sure cure for dyspepsia or indigestion. I have often wondered where all this juice comes from. I have traveled in many parts of the tropics,

AND SOUTHERN FLORIDA

but have never seen or heard of anybody collecting it, and the plant will not grow north of the frost line.

How fortunate the dweller in the tropics! If his meat is tough he can wrap it in papaw leaves over night and it will be tender in the morning. If his meal has disagreed with him, he can step into his back yard and pick and eat a papaw for dessert.

Both bananas and papaws, however, are picked when full, but still green. This must be done to save them from the rats and birds. The tropical planter has bananas to roast and bananas to fry, sweet bananas and acid bananas, big bananas and little bananas, yellow bananas and red bananas—in fact, varieties galore.

If his bananas are slow to ripen, he can hurry the process by putting the bunch in a barrel and filling the barrel with warm air and smoke. This is easily done by turning the barrel upside down, hanging the bunch to a nail in the bottom which is now the top, and building a small fire in the hole in the earth under it.

In a native school in India I have been told the pupils are fed almost exclusively on bananas. Bananas must be had at all times in proper condition. So they have a trench in the earth arranged in such a way that they can fill it with bananas, warm air, and smoke at any time and thus hasten the process of ripening.

The banana has been in a way the emancipator of the tropics. In many instances it has led the native out of thralldom. In many places from which bananas are not shipped he must work in the fields at a small recompense. At banana ports he can usually receive a cash payment for every full bunch. With bananas to eat and bananas to sell, the copper-colored native can rest in his home-made hammock, thump his home-made guitar, and smoke his home-made cigar with only one worry, and that is that he might at any time be forced to serve in the army of either the *de facto* or *de jure* government, for the cause of liberty. Even so he knows that the folks at home can live on the bananas and papaws and other fruits and vegetables growing in a semi-wild state around his bungalow.

CHAPTER VII.

WHAT WILL GROW IN THE EVERGLADES.



O MANY plants will grow in the Everglades when drainage is complete that a book and not one or two articles would have to be written to cover the subject and do it justice. The growing of things is, of course, the purpose of all reclamation, and upon this alone depends the future value of the land. *This Everglade land when drained, owing to its favorable location, will produce a greater variety of crops than any other land in the United States of America.* We know of many things which have been successfully grown on the edge of the Everglades already, but think of the hundreds of useful plants now growing in other parts of the world which have yet to be introduced and tested!

Let me say at the start that this Everglade drainage question is no question at all; it is a question only in the minds of doubting Thomases, who are prejudiced, who are ignorant or who are born knockers and who belittle every project in which they have no hand and out of which they can make no rake-off. We need not go to Europe for examples of successful works of a similar nature. The Dutch in fact would smile at such a project. They are making farm lands out of such places as Biscayne Bay. They reclaim places below the level of the sea. They pump the water out. Look over the great irrigation projects of our West, or better still the banked lands of the Mississippi Valley where huge and costly levees hold our mightiest river in check. The overflow of Okeechobee is insignificant compared with the floodwaters of the great river which drains a third of this whole country.

The first product for our consideration on Everglade soils

AND SOUTHERN FLORIDA

should be forage. Few countries can be highly and wholly successful in an agricultural way without being able to raise sufficient food for farm animals of all kinds. Aside from the expense of feeding these animals on hay and grain brought from a distance, they are necessary for the maintenance of soil fertility and the conversion of roughage into manure, which is an expensive and to some extent an imported article. Enough vegetables are wasted to feed many pigs. The fertilizer bill is the main item of expense.

In the West alfalfa means corn, alfalfa and corn mean hogs and cattle and horses; these in turn mean fertility, money, prosperity and happiness.

There seems to me to be only one great work in this world; all other aims are subsidiary to it; it is the production of happy and prosperous homes. Every man who honestly works to that end is a benefactor to mankind. The men who reclaim waste land, the men who introduce valuable plants from foreign lands, the men who by selection improve varieties and increase productiveness, the men who devise means for combating plant diseases, in fact the men who in any way increase the productivity of the soil in proportion to the labor expended thereon are doing a great work for all time. They may be long forgotten, but the effects of their labors will roll down the ages for all time to come. All other movements are insignificant compared with the one great movement of producing the largest amount of food and shelter for our people with the minimum amount of labor outlay.

In the matter of forage for animal feed, velvet beans, cow-peas, beggarweed and grasses and other legumes are already common. The Indians have successfully grown corn for many years on islands in the Everglades, and the green corn dance has always been to them an important event. In places in the Everglades where vegetables have been recently grown there are oats waist high with good heavy heads, having sprung from seed in the manure used for fertilizer or from oats, accidentally scattered by the horses while eating their mess. There is no stronger hay than oats cured in the milk, and in the land where

THE EVERGLADES

I was bred farmers all said that animals fed on fodder of this kind needed no grain. And why should oats not thrive? The winter climate of Florida is not unlike the summer climate of Northern regions where oats are abundantly produced.

The soil has never been inoculated with the bacteroid of red clover, yet in places red clover may be seen in full flower, having sprung from the seed from baled hay. This same baled hay brings in many weeds from the North, and the Canada thistle and other noxious weeds may be already seen in the vegetable patches on the Glades.



STATE CANAL IN THE EVERGLADES, FOR DRAINAGE, IRRIGATION AND TRANSPORTATION.

Remove the water from the Glades, plant forage crops, keep animals, convert all roughage and waste products into manure and the agricultural future of this whole region will be assured for all time to come. Farming seldom succeeds without manure, work and sense. The maintenance of soil fertility and the con-

AND SOUTHERN FLORIDA

trol of plant diseases are the two main agricultural problems throughout the world.

It does not make any difference where you live, says Gleanings in *Bee Culture*, alfalfa can be made to grow all the way from Maine to Florida. Here are the directions boiled down from the *Ohio Farmer*, written by Willis O. Wing, the great authority on the subject of alfalfa:

"Please do not make a mystery of alfalfa-growing any longer. It is such a simple matter that one can write all the rules needed in small space. Here they are: Drain the water out; let the air into the soil; fill the land with lime if nature did not do it; get humus into it—stable manure or some vegetable matter to rot and promote the life of bacteria there. Put in plenty of phosphorus. Sow good seed, with a little inoculated soil. Lime brings alfalfa. Alfalfa brings corn. Corn brings money, homes, pianos and education for farm boys."

As to the production of vegetables nothing need be said, since it is hard to name a common garden variety which will not thrive on the glades.

As to the production of rice, sugarcane and tobacco the prospects are not so bright for the *small* farmer. They will no doubt all grow well in the Everglades region. In the case of rice considerable capital is necessary in order to compete with Texas and Louisiana, where machinery has materially lessened the cost of production. There is a large rice eating population throughout the world, and although the price may be low the demand is unlimited.

The development of sugar estates requires much capital, but the system of sugar production may change. Experiments along this line are now in progress in Cuba. The plan is to shred the cane, drying it and baling it with the sugar in it. In this form it is shipped to northern refineries. Thus handled they are able to get more sugar out of it and the bagasse which is left is fit for the manufacture of a coarse grade of paper. If this new system proves successful one farmer or at most half a dozen farmers could afford the necessary machinery and raise

THE EVERGLADES

cane profitably even if there is not a big sugar factory in the vicinity.

Tobacco will no doubt grow in the Everglades, but I have never seen it tried to any extent. It is quite possible that it might be successful and yield a leaf of superior quality or something out of the ordinary like the Perique of Louisiana.

Cotton may also prove a valuable crop. The climate surely suits it and I have seen it growing elsewhere on soils of a similar nature.

Bananas may be successfully grown. The Cavendish variety seems best suited for the purpose. There need never be starvation in a region where bananas will grow. It is certainly one of the most wonderful food producers of the world. It has been grown successfully and of delicious flavor on the edge of the glades for years. It continually produces food from the same root and after the bunch is cut the chickens will completely consume the succulent stem and leaves.

The Everglades will grow many of the vegetables and forage crops of the North in midwinter, and in addition a long list of tropical trees, fruits and vegetables which cannot be grown elsewhere in our country, some of which are well known, but many kinds have yet to be tested. In another article I will mention some of the most promising of these, since in addition to food many of these tropical plants yield medicines, gums, perfumes, dyes, tanning materials, cabinet woods, etc., of more or less value to mankind.

All that part of Florida south of Ft. Lauderdale is tropical and has a tropical flora. It is the only part of the United States where the mango, avocado, sapodilla, anonas, etc., thrive and although many of these tropical fruits ripen in the summer time, they may be preserved no doubt into midwinter by cold storage.

The territory toward Cape Sable (Lower Glades) is still a wild and unreclaimed region. Its development has just begun, although its possibilities may be unlimited. The whole country needs people and capital, coupled with active enterprise. The tide is moving Southward and it is human nature to follow the crowd. Some will not stay and some will not succeed. Home-

AND SOUTHERN FLORIDA

sickness has killed more soldiers than bullets. Some people cannot cut loose from old associations and are not fitted for the life of pioneers. Others love it and are stimulated and improved by it. Only a certain percentage can succeed at agriculture, anyway, anywhere, since although it is the most important, it is at the same time the most intricate of all professions. One must also have foresight and business ability to fight against soulless transportation companies and tricky middlemen. If one cannot prosper in agriculture in Southern Florida, there is little hope elsewhere in this line.

The newcomer cannot freeze to death, and unless hampered by illness and dire misfortune he cannot starve, because wild in the woods is *comptie* or *coontie*, a plant which yields a starch equal in quality to sago. This still serves people in remote districts and was at one time the mainstay of the settler. The waters teem with fish, and poultry thrives.

Although in the beginning there may be isolation and discomfort, the man who works can make a living and a home such as cannot be made elsewhere in the United States in the same length of time and with the same amount of capital.

One thing is certain, if one is in search of a tropical climate and a place to grow tropical crops, he will settle in Southern Florida or go out of the United States, and if he goes out of the United States he will have to face conditions and people with which he is not familiar, and to which he can never become wholly reconciled and there will always lurk in him a desire to return to his country and his kind.

CHAPTER VIII.

VALUABLE TREES FOR THE EVERGLADES.



IN THE following article I shall mention a few trees specially worthy of cultivation and certain to succeed on Everglade soil when drainage has sufficiently progressed to lower the water table three or four feet below the surface level. Some of these trees will stand submergence for a short time. Even grapefruit or pomelo will stand submergence in two or three feet of water for a period of a couple of weeks without apparent injury.

The following opinions are based entirely on my own experiences and observations. These are based on ten years of experience in the tropics, especially in Southern Florida, and fifteen years of experience as a forester.

Bamboo (*Bambos vulgaris*) is very abundant along mucky water courses in the West Indies, where it forms stately groves or thickets. Although there is not a fortune in growing bamboo it is highly ornamental and the poles are very useful on the farm. It is sure to become a great favorite for Everglade planting. The Government is now experimenting, and in a short time we may be able to select varieties especially fitted for fish poles, furniture, etc. Bamboo throws a dense shade and is fine as a shelter and forage for poultry.

Of the palm family the royal palm (*Roystonea regia*) and the coco palm (*Cocos nucifera*) are of first importance. The royal palm is native to Southern Florida. It loves a moist, mucky soil. It is a majestic tree for avenue or roadside planting. Its berries for pigfeed are equal to corn.

Although the coco palm is a lover of the seashore, it will

AND SOUTHERN FLORIDA

grow on moist soil several miles inland. Just how far it is difficult to say, but I have seen it growing in the West Indies ten miles from the coast. This tree and its many products are too well known to need description. It is sufficient to say that it is considered by many authorities to be, on the whole, the most useful member of the plant world. A home in the tropics, at least near the seashore, seems incomplete without it. Many nuts were planted years ago on our sandbeaches, and although many did sprout and grow, thousands were lost because the young, tender leaves of the germinating nut were devoured by rabbits.

Australia pine or beefwood (*Casuarina equisetifolia*) is second to none as a quick hardwood producer in mucky soil or in saline land along the coast. In my opinion *it is superior to any eucalypt that I know of for the production of hardwood lumber.*

Very few of the eucalypts produce first-class sawlogs in a short length of time. The eucalypt is not a sawlog proposition. I am upheld in this statement by Bulletin No. 61, Agricultural Experiment station, Tucson, Arizona: "It is not very likely that eucalyptus culture will ever prove a success as a *sawlog proposition* in any part of Arizona." I think I can safely say the same for this part of Florida. It is a pole, sleeper and fuel proposition and a California proposition. There is no reason why we should ever concern ourselves about fuel anyway. There is no danger of freezing to death in this part of Florida. The limbage alone will be sufficient; there will always be a lot of waste lumber, and then the coal supply of the Eastern United States is by no means exhausted. Plant for fine timber or other valuable products. The fuel question will take care of itself in the tropics.

We have several native trees belonging to the same family as the eucalyptus, and they are apparently quite as good. The rose-apple or pomerosa belongs to this family and is a magical fuel wood producer on the edge of streams in Cuba. It looks just like a eucalypt and yields an abundance of edible fruits. This tree would succeed on Everglade muck. I am growing

THE EVERGLADES

another tree similar to the eucalyptus on muck soil. It is the cajeput of India. It is a beautiful tree, of very quick growth and yields the cajeput oil of commerce. This oil is used in India for rheumatism and I believe is the basis of some massage creams and hair oils.

My choice of all the softwood trees, which produce fine timber, are easily propagated from cuttings, free from disease, and grow with great rapidity, is three or four species of the genus *Cedrela*—the commonest of which is *Cedrela odorata* or Cuban cigar-box wood. The wood of this tree is worth more than mahogany; in fact, much of the so-called mahogany in the market belongs to this genus and is not true mahogany.

In the spring of the year stick a cutting, twelve inches long, of *Cedrela odorata*, Cuban cedar, *Cedrela toona*, the red cedar of Australia, or *Cedrela Brasiliensis*, the acajou of Brazil, in moist muck land and in six weeks it will have shoots on it six feet high. I have specimens growing at the rate of more than one foot a month. The trees resemble walnut trees and lead as softwood timber producers for tropical regions.

Were I engaged tomorrow to plant a tract of land in trees for lumber on the Everglades I would plant Australian pine for hardwood and Cuban cedar for softwood.

For quick growing, valuable shade trees I would like to recommend the Spanish laurel (*Ficus nitida*) and the Sacred Bo tree of India (*Ficus religiosa*). The wood of these trees is no good but they afford a fine shade, are very decorative and grow very quickly.

I think all the trees mentioned above will hold up in bad winds. On mucky soil one must select trees that do not blow over easily. That is a fault of the eucalyptus in this region. It probably would not happen if the tree could get deep rootage.

Another good shade tree for mucky soil is *Thespesia populnea*, called in Cuba the Florida mahoe (*majagua de Florida*), although not a native of Florida. It bears a beautiful flower and is easily reproduced from cuttings. A brother to this tree, called "maga" in Porto Rico, is one of the most beautiful trees

AND SOUTHERN FLORIDA

I have ever seen. I have not been able to get seeds or cuttings for Florida, but I hope to some day.

Speaking of fuel wood above, I think we have the best fuel wood producer in the world. It is the Florida buttonwood (*Conocarpus erecta*). This tree grows on the seashore. The wood gives out a great deal of heat and produces very little smoke. *It will now bring twice the price of any other fuel wood in Key West or Nassau.*

The sapodilla is a great favorite of mine. It grows especially in the hammock, but will, I think, grow well anywhere in the glades when drainage is complete. It is stormfast and tough, it produces a wood that is everlasting, a fruit that is good and salable locally, and a gum called chicle, which is in great demand in the manufacture of chewing gum. In fact, we are on the verge of a chewing gum famine, owing to the scarcity of this gum.

The mastic is a fine native hardwood.

Princewood is also a good wood. Its bark is a splendid tonic, containing quinine or a similar drug. It is worth while to plant a tree or two of this just to have a fine, unadulterated tonic near at hand.

In addition we have mahogany and Jamaica dogwood, well known native woods of excellent quality and in demand locally. Mahogany is ordinarily regarded as the "king of all hardwoods." I have sent samples of our mahogany, here called madeira, to England and France and experts there pronounced it of first quality for the manufacture of solid furniture. This grows wild on islands just south of the Everglades.

We have other woods of great value too numerous to mention in one article. In addition to the plants I have already mentioned, there are, of course, many tropical fruit trees and many ornamental shrubs and vines.

CHAPTER IX.

SOME COMMON FLORIDA PLANTS.



HAVE often been asked to recommend plants which will make good hedges for South Florida. For this purpose I know nothing better than Carissa or Natal Plum. There are supposed to be two species of Carissa in Florida—*grandiflora* and *arduina*, but I can see no difference. This bush is always a rich dark green. It has vicious thorns; it bears a sweet scented white flower and red plum-like fruit. It is easily reproduced by layering and may be grown from seed. It is best always to propagate from a heavy bearing plant, since it seems that all strains are not the same in this respect. When cooked the fruit makes a sauce hardly distinguishable from cranberry. The sauce is improved by the addition of a few chopped raisins. This plant bears throughout the year, and the sauce is welcome at almost every meal. I believe this fruit can be successfully dried or evaporated, as are dates, figs, raisins, prunes, etc. The home of this bush is South Africa, where it is effectively used for hedges. It seems to be perfectly adapted to Florida conditions.

Another good hedge plant is the lime. This yields the well-known "sour" of commerce which will in time no doubt replace the lemon. For good limes there is a growing demand and after one has become accustomed to using them he ever after spurns the lemon. No home in the tropics is complete without a few lime trees.

The same may be said of the guava, sometimes referred to as the "apple of Florida." The guava grows with little care,

AND SOUTHERN FLORIDA

fruits heavily and is perhaps the greatest of all jelly fruits. The ripe fruit has a smell which is at first detested by the newcomer, quite in contrast to the aromatic lime, but one usually learns to relish it, after a time, out of hand. Guava jelly brings many dollars to Florida and I know several small jelly factory owners who ship their products to every State in the Union and to England as well.

The Surinam cherry is a handsome bush. It yields an abundance of rich red cherries which are relished on a par with northern cherries by many people. It is of course in no way related to the true cherry of the North, and it has a slight resinous flavor, but it is a good substitute.

Around every home there should be many pigeon pea bushes. This is the cajan bush of India and Africa, now common throughout the tropics of the world. The peas are worth fifteen cents a quart. They make the famous pigeon pea or Congo pea soup. The negroes cook them green. They shade the ground, improve the soil, keep down weeds and deposit a rich leaf-mold over the surface of the ground. I plant them in my grove. Chickens, quail and doves are fond of the peas and they flourish in the shade, scratching for bugs and the peas which fall.

The Castor bean grows well in Florida and ought to be an extensive industry. There is good demand for the oil, and the pumice from the seeds is a fine fertilizer.

All of the above have been introduced into this State but are now perfectly at home here. Among our native plants we have many yet to try and to improve under careful cultivation.

Some time ago my attention was attracted to a little pea-like plant growing by the roadside. It reminded me of the white clover of the North and like the famous camomile grows the faster the more it is trod upon. I am testing it and think it will make a fine lawn plant. In looking up its name I find it belongs to the Indigo genus, *Indigofera mineata*, and this reminds me of the fact that indigo was once extensively grown in Florida before the days of aniline dyes and synthetic chemists.

In patches out in the Everglades there are many pond-ap-

THE EVERGLADES

ples. The pond-apple is the Florida representative of the great Anona family which includes many delicious fruits. Some people eat the pond-apple and I think I have seen it on sale in Mexican markets. The wood of the pond-apple is almost as light as cork, and may be used in place of cork for net floats, etc.

The pond-apple may prove a good stock on which to bud the famous Cherimolia, Rollinia, Uvaria and other choice, but little known, fruits of this order.

Nothing is commoner on islands in the Everglades than the Coco-plum. This is a beautiful small tree yielding a fruit which makes a fine preserve. There is great variation in the quality of the fruit. In many cases it is mostly one big seed but I have seen some that were large and meaty and well worthy of cultivation and improvement. It is not very distantly related to the peach, apricot, etc., being of the same family, and might be useful as a hardy stock for budding something of greater merit.

We have a wild West Indian cherry fruiting in our hammocks which might be useful also as a stock for budding purposes.

I have used above the word "hammock," the term applied in South Florida to a dense hardwood jungle. This is not the same word as "hummock," or the same as "hammock," a swinging bed, but is probably a word of local Indian origin, spelled in early times "hamak."

I will conclude this chapter with a few words in reference to the humble coontie or comptie, a little plant which grows wild everywhere in the pine woods, avoiding the wet places. The root of this plant kept the early settlers supplied with starch for bread, as well as the Indians before them. It was the main industry of this country in the early days. The starch from the root is still in demand. It is a sago. From it easily digested and nutritious biscuits can be made. In the wild state the plant contains prussic acid and is poisonous and for that reason is never molested except by man and the comptie fly, a beautiful insect which is immune to its deadly juice. Fire does not injure it, in fact helps to scatter the seeds, since the heat opens the cone-like head which holds them.

AND SOUTHERN FLORIDA

Cassava also grows like a weed in Florida. From its root a starch is made. If further treated this starch becomes the tapioca of commerce.

With its sunshine and its moisture, with its host of useful native and introduced plants, with its black mucky soils and light sandy soils, with its vast beds of phosphate holding great stores of the most precious of all plant foods, phosphorus, with its long coast line and canals and harbors to come, it seems to me that all this great State lacks is people with capital and energy to furnish fun and feed for millions,

CHAPTER X.

VINES FOR EVERGLADE PLANTING.



IN THE development of a home in a tropical country there is no group of plants which give as much gratification as do the vines. They grow quickly, they afford shade in a short time, they occupy but small space, in fact space which would otherwise not be utilized, and in addition many vines yield products which are quite equal in value to other crops of forest and field.

They are in a peculiar way attractive, and to many people far more attractive than bushes and trees.

They gracefully cover unsightly places and clamber into nooks and corners, covering with a rich green fences and out-buildings and at times are a delight beyond expression when in the acme of their bloom. A poultry wire fence covered with vine is usually a more effective screen than a solid board fence and although the effect of complete seclusion is secured the air can filter through.

In the old world, where space is scarce, even fruit trees, such as figs, peaches, apples, lemons, etc., are grown on trellises. In this case the fruit is larger, brighter in color and of better flavor because of the abundance of light and free circulation of air which this form of culture provides. I have just received a postcard from a friend summering on the Austrian side of the Lake of Garda, showing lemons growing on trellises. The writer says: "I am sending this to you because I doubt if anywhere except here on the Lake of Garda lemons are trained against walls between pillars in this way. There is a lattice overhead and I suppose they can cover them in winter if necessary."

AND SOUTHERN FLORIDA

Suppose one owns only a small lot and builds in such a way that he has a central court or patio and suppose over this patio he builds a lattice and on this lattice he trains grapefruit or lime or orange, he would have an attraction that would afford himself and his family comfort, but above all it would be a sight which would hold a Northern visitor spellbound.

I know a man who owns a little one-story wooden house, covered with paper for a roof. This was hot in summer and he could not afford tiles or shingles. He built over it one foot or more from the roof a light lattice frame. He planted a quick-growing vine and now his house is actually roofed with a mantle of green. It acts like the double roofs so common in the Southwest. Between his house and the sun there is not only this roof of green but a current of air. It furnishes a nesting place for the birds and cuts out the bare, cheap look of a paper roof.

It would be impossible in so short a space to treat of all the vines which grow in South Florida, because they are legion, but some, in addition to being beautiful in leafage and flower, bear fruits of more or less value.

Probably few visitors to Florida realize that the vanilla vine is native, that it grows wild in our hammocks. It is slightly different from the vanilla of Mexico and South America and is almost leafless. It hangs pendant from branches like long slender green snakes. It was for a long time considered by botanists of the same species as the Mexican. In Small's Botany of the Southeastern United States it is called *Vanilla planifolia*. "In forests, peninsular Florida and tropical America, also widely cultivated." It is an orchid and might some day be profitably grown for the aromatic pods it yields.

The yam is a quick growing vine. Yams form one of the staple foods of many tropical peoples, especially in the East. The yam vine forms a root similar to a sweet potato but many times as large. I have seen a party of ten at dinner served with one-half a yam. There are many kinds of yams. They grow like mad in rich mucky soil and in addition to the shade afforded yield a food almost equal to a white potato.

THE EVERGLADES

That strange fruit called the ceriman is really a vine. In its native state it grows high into the trees. It has big leaves with natural holes in them and produces a flower something like a big calla lily and a fruit the shape of an ear of corn. Its scientific name is *Monstera deliciosa*.

The passion vine is too well known to need description. It yields a fruit called the granadilla in tropical America.

The black pepper of commerce is a vine. Also rattan is a climbing palm and who knows but that both of these may grow in South Florida?

Some time ago over in the Bahamas I saw a man planting vines in the hammock for rubber. Several vines yield rubber of commercial importance. We have one native rubber vine, *Rhabdadenia biflora* (same as *Echites paludosa*), and the one which has been planted in the West Indies for rubber is *Cryptostegia grandiflora*.

Pereskia aculeata, the lemon vine—the Barbadoes' gooseberry—has already grown to be a favorite in South Florida. It belongs to the cactus family and produces an edible fruit.

Think of the gourds which yield such useful utensils. The chayote, a vegetable vine from Mexico, has fruited in Florida, but has never become popular.

Then there is the grape, some variety of which will no doubt do well here. One good scuppernong will cover an arbor a quarter of an acre in extent in the course of time. The Key grape is already common and wild grapes are abundant.

There are many morning glory vines in Florida. They are usually treated as weeds. One of our morning glory vines yields jalap, a famous medicine. Many are highly ornamental and furnish in addition honey for bees when other bee food is scarce.

The velvet bean and other vines of the family grow very rapidly and yield an abundance of beans and fodder.

We have one little vine—very delicate—holding tight to stone walls, soon covering the stone completely with a growth of dark green. It is *Ficus repens*. I heard a man once say that he wanted a stone house just to be able to have this vine

AND SOUTHERN FLORIDA

on it. Strange to say it is a *Ficus*, the same genus to which the fig, the common rubber trees and the great banyans of India belong.

And then there is a host of highly ornamental vines that one must learn to know before appreciation is possible—such as the night-blooming cereus, bignonias, christmas vine, jasmines, solanums, chalice flower, clematis, woodbine, Virginia creeper, roses, allamanda, antigonon, bougainvillea, tacomas, etc., etc., all of which enliven the landscape and render the barest weather-beaten, tumble-down shack a thing of beauty and a joy forever.



IN THE MIDST OF THE HAMMOCK ON KEY LARGO. IT IS IN THIS REGION THAT THE LARGEST MAHOGANY OF THE KEYS IS LOCATED. KEY LARGO IS THE LARGEST AND HIGHEST OF THE KEYS. THE PHOTO SHOWS THE LINE OF THE NEW RAILROAD TO KEY WEST. (PHOTO BY FLORIDA PHOTOGRAPHIC CONCERN, FORT PIERCE, FLA.)

CHAPTER XI.

MAHOGANY IN SOUTH FLORIDA AND THE WEST INDIES.



BEFORE describing mahogany wood let me quote some statistics as to the quantity imported into this country and the value of the import. I don't know how reliable these statistics are. They are furnished by the Government and are probably approximately correct.

In 1908 41,678,000 feet of mahogany were imported into this country. Its value is given as \$2,566,954, an average of \$61.56 a thousand feet. This represents the price actually paid for it laid down in our ports, two-thirds to Atlantic and one-third to Gulf ports. Central America, Mexico and the West Indies furnished 65.5 per cent, South America 2.2 per cent, Africa 13.8 per cent, Asia 0.40 per cent, and 18.1 per cent came through Europe, mostly from England.

Mexico, Nicaragua, British and Spanish Honduras, Cuba and Santo Domingo furnish the bulk of the mahogany used in this country, and some which reaches us through Europe may have come originally from one of these places.

The value of mahogany from tropical America was \$51.75, of that from Africa \$51.13, of that from South America \$52.79, all about the same, while that which came through Europe was worth twice as much, \$105.78 per thousand, and that from Asia \$88.63 per thousand. The great difference in the price is probably due to the fact that the wood was of special, selected quality.

Mahogany and other cabinet woods are often shipped to England and then reshipped. Only a hundred miles across the

AND SOUTHERN FLORIDA

Straits of Florida is the island of Andros in the Bahamas, a British possession. The same kind of mahogany is produced there that grows on our Florida Keys and near Cape Sable. This Andros mahogany has been shipped to England from time to time and I have no doubt that some of it crosses the ocean again to New York.

It easily may be seen from the above figures that up to the time the retailer gets hold of it, mahogany is not an expensive wood. It makes a great difference in this world whether one is buying or selling, and the difference between the price the consumer pays and the price the producer gets is very wide, especially on products of the soil. In many cases I have no doubt that there is fully \$50 worth of hard human labor in almost every thousand feet of mahogany landed in American ports. There is small profit in it at this price.

Mahogany is usually scattered in a tropical forest and is often transported with the greatest difficulty over rough roads or no roads with the crudest kind of vehicles and other apparatus to the nearest shipping point. Some small logs are often carried by pack mules over slippery and precipitous trails, while the transportation of a log for a mile or more on the heads of three or four negroes is not uncommon.

One reads statements of the fabulous prices paid for mahogany. No doubt at times special logs will bring a high figure, but for years I have endeavored to trace every such statement to its source and I have found them all unreliable, exaggerated, or out and out figments of the imagination. Four or five months ago a popular American magazine published the statement, under the heading of "Notes," that two mahogany logs had sold in Liverpool for \$1,500. I wrote to the magazine and it claimed it took the note from a newspaper. I wrote to the newspaper and it said it found the statement in a book on timber published in 1870.

Logs sometimes bring high prices, but I think it is safe to assume that it happens rarely. A large part of the tree is usually left in the woods anyway and if the wood had such value it would pay to make a special trip to the spot just to get the stump.

THE EVERGLADES

It will be seen from the statistics quoted above that 34.5 per cent of our mahogany comes from South America, Africa, Asia and through Europe. Just what trees yield this wood I am, of course, unable to say. I am also, I think, quite safe in saying that nobody knows. There is a whole lot of wood which sells for mahogany, which looks like mahogany, and which brings just as much money as mahogany and may be just as good, but it is not all mahogany from a botanical standpoint. Nobody can tell the species of tree that yields a tropical timber by merely looking at the log. Without leaf, flower or fruit, or even bark, the naming of the tree which yielded the timber is simply the purest kind of guesswork.

English tramp ships are running to all parts of the world. They pick up here and there small lots of anything marketable. A mahogany log, using the term "mahogany" in a commercial and not a botanical sense, on the wharf of an English port may come from one of many places and may be the product of a tree which looks no more like the mahogany tree than a peach resembles an apple. Mahogany in a commercial sense applies to any wood that will sell under that head; in a botanical sense it applies only to *Swietenia mahagoni*. I have heard of expert mahogany dealers in England, and I presume we have the same in the United States, who can, as it were, look right through a mahogany log, tell to a surety the kind of grain it will yield and the country which grew it. There is not the man living who from the appearance of the log or the finished wood can tell whether it came from Honduras, Mexico, the Bahamas, Cuba, Santo Domingo, Asia or Africa. It is very much the same with coffees. Java, Mocha and Rio are very often picked from the same tree. Some time ago I sent a sample of Florida mahogany in the form of a block two inches square to a mahogany dealer. He wrote back that the sample "evidently came from a tree five inches in diameter. Please send sample from a tree two feet in diameter." I don't believe the man is living who can tell from a block of wood two inches square without sapwood or bark whether it came from a tree five inches or five feet in diameter or whether it came from the top of a large tree or from a

AND SOUTHERN FLORIDA

limb. The sample above referred to came from the heart of a large branch which had been reserved for boat timber. Close to a tropical seashore the limbs are usually much bent by the prevailing winds, but the wood is of very good quality and especially fine for boat construction.

The wood of the mahogany tree, in fact of every tree that I know of, varies very much, depending upon the conditions under which the tree grew. It must be borne in mind that the mahogany tree, although it cannot stand frost, will grow under other very adverse conditions. It will grow on hot coral rock on the Keys of Florida. Sometimes it is so close to the sea that its foliage is sprinkled with ocean spray. It will grow in parts of the West Indies where there is hardly a drop of rain for over six months at a time, and it will grow on steep mountain sides high up in crevices of the rock. In such places where the growth is slow, the wood is heavy and rich in color and grain. In warm, tropical valleys where there is an abundant and constant supply of moisture and where the tree is actually intoxicated with the very richness of the soil, its growth is rapid and the wood is light and of less value. In Florida it usually grows in hardwood thickets called "hammocks."

Some say that much of the mahogany on the market is really *Cedrela* or Spanish cedar. This may be so, since Spanish cedar from a tree which grows very slowly is hardly distinguishable from the wood of a mahogany tree which has grown quickly. Spanish cedar and mahogany trees are closely related, although they do not look alike. The mahogany looks something like a live oak, while the *Cedrela* or Spanish cedar looks like a *pecan*. From my own observations in the American tropics (Mexico, Honduras, Cuba and the Bahamas—there is no mahogany in Porto Rico) mahogany logs are cut for shipment at Atlantic and Gulf ports from the mahogany tree *Swietenia mahagoni*.

Color is perhaps the first quality in wood which attracts attention. We have in the tropics white, red, yellow and black woods—the same as in races. Many tropical woods are dark in color, in fact I think dark colors predominate, especially reds and browns. Mahogany is usually a rich reddish brown not

THE EVERGLADES

unlike the color of the skin of a good healthy red Indian. According to an official color scale, 25 parts red, 64 black and 11 orange produce the shade called "acajou;" 85 of black to 15 of orange "mahogany," and 83 of black, 4 of red and 13 of orange form "mahogany brown."

There are floors in parts of the tropics made of plank cut from the log by hand and from such woods that the colors alternate red, white and black. I believe that a good, rich, reddish brown is a normal color at least for the tropics. In the races pure white is just as abnormal as jet black. At any rate a reddish brown color is a good characteristic. There are more bay horses than any other color, and in Spanish America they say, "A tired red horse is a dead horse," meaning, of course, that a red horse is so tough that he never gets tired. In my own experience red poultry and red pigs do better in the tropics than those of other colors. The tips of very tender foliage are usually red. This is especially so in the tropics, but is not uncommon in the North, as with roses, Virginia creeper, etc. There is a red liquid in the outer cells of the plant which probably serves the purpose of screening out the actinic rays of the sun.

Unless one has strong race prejudice, and one usually gets over that if he lives in the tropics long, a rich, healthy, brownish red complexion is the handsomest of all. Of course mahogany wood varies in color, but reddish brown is the standard. It must not be dull but full of luster. In some cases when finished it has a satiny look which adds much to its beauty. Its color should be a rich red, darkening with age. In some woods this luster reaches a stage called "fire." Cape walnut, called also cannibal stinkwood, for instance, according to Stone, "exhibits much 'fire' or phosphorescent luster." Mahogany is cold to the touch. Birdseye mahogany is not uncommon and is produced by scars due to sap-suckers. In the Bahama Islands the mahogany is often badly ringed by sap-sucker holes.

We look upon mahogany as a cabinet wood. In the countries where it grows it is used for every purpose that a wood can be put to, not excepting fuel. It makes excellent shingles

AND SOUTHERN FLORIDA

and was once used for this purpose in Jamaica. I believe that defective trees, limbage, etc., might still be profitably used for this purpose. A house shingled with mahogany would be handsome without paint or stain. It would surely last as long as any wood and might not cost much more than first-class cypress. Shingle billets could be easily carried from the forest on the heads of negroes. Although often used for floors it becomes very slippery.

It is a combination of useful qualities with beauty which has made mahogany famous. Its popularity is founded upon true worth. It is heavy, very hard, close-grained, very durable and takes a fine polish. It seldom warps, cracks or shrinks under trying conditions if properly seasoned. Many tropical woods crack badly when taken north, but mahogany stands all climates and lasts well under water if kept constantly wet. It is seldom attacked by wood-eating insects, but is invaded by wood-boring crustaceans if left too long on the seashore. It is mostly all heartwood. It usually has only a thin yellow zone of sapwood. Its only fault is the fact that it is hard to work. The annual rings which ordinarily make the grain of wood are often very indistinct in mahogany. In many cases they are not "annual" at all. Several rings or additions of wood may occur in a year. Many times what appear at first sight to be rings in tropical woods are merely bands of color.

Mahogany must dry a little in order to float well. Sometimes the trees are girdled on the stump, some time before cutting, and sometimes they are left to dry in the shade of the forest. In case one wants a fine grade of wood for boat building, "mud seasoning" is good. Thus buried in mud a slow osmotic seasoning takes place which produces a wood of very superior grade. The wood has no special taste or smell. It colors water red.

It was the first tropical cabinet wood used in Europe and for two centuries has had unabated popularity. It has figured more or less in literature but never more conspicuously than in the following short and charming ballad by Thackeray:

THE EVERGLADES

"Christmas is here ;
Winds whistle shrill,
Icy and chill,
Little we care :
Little we fear
Weather without,
Sheltered about
The mahogany tree.

Once on the boughs
Birds of rare plume
Sang in its bloom ;
Night birds are we :
Here we carouse,
Singing like them,
Perched round the stem
Of the jolly old tree."

The mahogany tree is strictly tropical. It can endure only a small amount of frost. Tropical Florida, south of Lake Okeechobee, is its Northern limit. It grows in the Bermudas, which are farther North, but owing to the position of these islands in the ocean, separated from the mainland by the warm water of the Gulf Stream, their climate is tropical.

It is of course a waste of time and money to try to grow mahogany in Northern regions. I mention this because I have received requests for seeds or young plants from Northern people. Although frost-tender, it is otherwise a hardy tree. It grows in all kinds of soils high in the mountains and so close to the seashore that it is sometimes killed by floods of salt water during severe storms. During a hurricane in Florida in the fall of 1906, mahogany trees a foot in diameter on the Keys were killed by the salt water which poured over all the lower portions of these islands.

In speaking of its hardiness, Rea, a surveyor of the British War Department, says: "The tree is of comparatively rapid growth, reaching maturity in about 200 years, the trunk exceed-

AND SOUTHERN FLORIDA

ing 40 to 50 feet in length and 6 to 12 feet in diameter. It is very handsome, with enormous branches of solid timber; and rather strangely, when it springs from low levels and rich soil the wood is most inferior, being poor in color, soft and spongy, and consequently almost valueless.

"That, however, which has been grown without nourishment on high levels, save what it derives from the atmosphere, is hard, figured, densely close in texture, as well as rich and deep in color, all qualifications which enhance its worth. It is also a curious fact that the tree does not seem to have any partiality, as it will flourish in low, marshy ground, or in a deep alluvial soil, or even on rocks to all appearance barren of earth; in fact wherever the seeds chance to drop. Its development is more rapid in the shade than in the open."

The above corresponds with my own observations, although I have never seen mahogany trees 12 feet in diameter. There are trees now standing on Key Largo, Florida, from 4 to 5 feet in diameter and I have seen trees in Cuba 9 feet in diameter. Many of these tropical trees are heavily buttressed and only carry such size a short distance up the stem. Such trees are often cut ten feet from the ground. Mr. Rea lived for four years in St. Lucia and his observations are probably correct.

Mahogany seldom grows alone in pure stand except perhaps in small clumps here and there scattered among a great variety of other trees. It seems quite able to hold its own and abandoned clearings usually show many young mahogany trees. The fact that it endures some shade permits it to grow where many other trees would never start.

In the forest it grows, of course, taller than in the open, but it nevertheless likes to spread as does the beech. Some mahogany trees which have been left for shade in pastures in the West Indies, especially in Jamaica, are truly magnificent in their spread, having a stately and sturdy look defying even the fierceness of tropical gales. Strange to say there is no mahogany in Porto Rico. I have heard of one or two trees on the island, but in the unsettled Luquillo Forest, now a federal reservation, I could not find a single tree. It grows in the island of Culebra,

THE EVERGLADES

only a short distance to the eastward, and in abundance in Santo Domingo, only a short distance to the westward.

It is hard to believe that it could have been completely exterminated on the island. I believe such must have been the case, however, since place names often give one a clue to the character of the primeval woods. For instance, there is a place called "Mangler Caoba Laguna Soroco y Grande." Mangler refers to mangrove, caoba to mahogany, and I presume mahogany once grew on the edge of the mangrove swamp or on islands in the swamp just as it does on the south coast of Cuba, Florida Keys and in the Bahamas. Although Cuba and Santo Domingo have been settled for about the same length of time, they have never had the population of Porto Rico. The scarcity of Spanish cedar on the island tends to strengthen the belief that both of these trees have been practically exterminated.

The mahogany is a prolific seed bearer and will grow in almost all locations with sufficient warmth and moisture. It is these qualities which enable it to hold its own in the majority of places where it grows. Browne in his "Trees of America," published in 1857, describes the tree fairly well as follows: "*The Swietenia mahagoni* is one of the most beautiful among inter-tropical trees. Its trunk is often 40 feet in height and 6 feet in diameter, and it divides into so many massy arms, and throws the shade of its glossy foliage over so great an extent of surface that few more magnificent objects are to be met with in the vegetable world. Its summit is wide and spreading, sub-evergreen, and adorned with abruptly pinnate, shining leaves. The flowers, which are produced in handsome spikes not unlike those of the lilac, are whitish, sometimes reddish or saffron color and are succeeded by fruit or capsules of an oval form about the size of a turkey's egg. The fruit ripens in early summer, bursts into five parts, and discloses its winged seeds, which are soon after dispersed by the winds; some falling into the crevices of rocks, strike root, then creeping out on the surface, seek other chinks or crevices, re-enter, and swell to such a size and strength that at length the rocks are forced asunder, to admit the deeper penetration of the roots and in this manner, in process of time,

AND SOUTHERN FLORIDA

increase to large trees." The flower is not conspicuous but the large brown hard capsule incites curiosity. It splits in five segments from the under side and the seeds, which are winged like maple seeds, flutter to the ground. On the Florida Keys these ripen in midwinter.

How the tree can get a foothold on some of these coral islands is wonderful. The rock is hard and hot at times and the soil is so scant in some places that I believe it would be difficult to scrape together a wagon load on an acre. Mahogany may be easily grown from seed and the young plants may be easily transplanted. Last winter was a great seed year (1908-09). Trees ten feet in height were full of seed. In places on the Florida Keys one could collect seeds enough in a few hours to plant hundreds of acres. It is a common saying that trees fruit heavily a year or so after a severe hurricane.

The State of Florida is now engaged in draining the Everglades. If this project is successful, and I can see no reason why it should not be, a large amount of land will be reclaimed and although much of this land will be too valuable for tree planting, there will, no doubt, be many acres better fitted for forest trees than for field crops. This land would probably produce mahogany to perfection. Some trees should be planted for shade at any rate. The mahogany trees frequently grow on islands in the mangrove swamps.

Florida mahogany has been shipped to New York. The trade did not like it, in fact they found all kinds of fault with it. The logs were too small, which was due to the fact that the big logs were too heavy to handle. They claim it had black specks in it, but Honduras mahogany often has gray specks in it. In truth Florida Key mahogany is just like the Andros Island product. If we were to ship it to Liverpool and then reship it to New York it would sell no doubt to better advantage. Andros Island is only about fifty miles away and very similar in almost every respect to the Florida Keys.

In speaking of Andros mahogany Rea says: "It grows to a large size but is generally cut to small dimensions owing to the want of proper roads and other means of conveyance. It is

THE EVERGLADES

principally used for bedsteads, etc., and the crooked trees and branches for ship timber. It is a fine, hard, close-grained, moderately heavy wood, of a fine rich color, equal to that of Spanish mahogany, although probably too hard to be well adapted for the purposes to which the latter is usually applied." The above description applies exactly to the Florida variety.

It is commonly thought that hard, heavy woods grow slowly. This is not always the case. The northern black locust is a hard, heavy wood, but it grows very quickly. The same is so of some species of eucalyptus. On the other hand some soft light cedars grow very slowly. Mahogany is usually considered a slow grower.

If one counts the rings of a tropical tree and allows a ring to a year, as is common in the North, he is very apt to get fooled. He should first of all make sure that they are rings and not merely bands of color and then make sure that the tree in that special locality makes only one ring a year. Whenever a tree drops its leaves growth stops and a ring is formed. When a tree is rooted in a rich moist soil in a warm climate, it has no struggle except against its neighbors. It seems to do very much as it pleases.

In a paper read before the British Association for the Advancement of Science on "Foliar Periodicity in Ceylon" by Herbert Wright there is the following statement: "In studying the behavior of our deciduous trees, the most usual conclusion is that no law and order prevails and any tree drops its leaves how and when it chooses. There are, however, certain features which point to a climatic response, and others which indicate that the personal or internal forces are the chief agencies at work."

It seems strange to speak of the "personal" forces of trees, nevertheless the study of trees in the tropics, which is biological headquarters, leads one to the conclusion that they have, to say the least, many idiosyncrasies. Some trees will drop their leaves before and after the rainy season, some during the wet weather, some will throw out new leaves at certain seasons of the year regardless of the weather, and so on with similar peculiarities in

AND SOUTHERN FLORIDA

reference to flowering and fruiting. I have never seen a mahogany tree drop its leaves all at once unless when injured by flood or fire. Its foliage always looks the same. Sometimes it may be a little greener and there may be more young shoots at one time than at another, but its growth, judging from the appearance of its leaves, is practically continuous.

"When M. de Charnay visited Palenque in 1859 he had the eastern side of the palace cleared of its dense vegetation in order to get a good photograph; and when he revisited the spot in 1881 he found a sturdy growth of young mahogany, the age of which he knew did not exceed twenty-two years. Instead of making a ring once a year, as in our sluggish and temperate zone, these trees had made rings at the rate of about one in a month; their trunks were already more than two feet in diameter; judging from this rate of growth the biggest giant in the place need not have been more than two hundred years old, if as much." (The Discovery of America, Fiske, Vol. I, page 156.) The rings indicated that those trees were over two hundred and fifty years old, while in reality they were not over twenty-two and possibly younger.

In Vera Cruz wires are run from one tree to another on which the vanilla vine is grown. The vanilla vine grows wild in the hammocks of South Florida. It has never been developed commercially, but it resembles very closely the vanilla of Mexico. The mahogany tree is a favorite for this purpose. Cook, in his report on "Shade in Coffee Culture," thus speaks of mahogany: "It has been used for shade in cacao plantations in the Island of Guadeloupe, and according to Guerin, is preferable to *Erythrina Indica*, since it resists parasites, and the wood is valuable after thirty or forty years."

In Trinidad the planting of mahogany under forest conditions has been advocated by Superintendent Hart of the Botanical Gardens, who finds that under favorable conditions the annual average increase of thickness in the trunk is about one inch, and even in trees sixty years old or over is about nine-tenths of an inch. American mahogany has been successfully planted

THE EVERGLADES

in India. Even in Africa the mahogany forests are under the control of foresters.

A. H. Unwin, Forester, Benin City, West Africa, estimates that there are about 400 trees and 1,200 logs per square mile. This is less than one tree to the acre. In this region the mahogany is big, with large buttress-like roots, so that the tree is cut from platforms 10 to 15 feet from the ground. The ground is so soft and trees scattered to such extent that the logs after being squared are pulled by man power on rough rollers to the nearest stream. The timber is then rafted to the coast.

An important part of the forester's work in the Benin region is the planting and raising of seedlings to be planted to replace the trees cut. According to the old rule twenty seedlings are allowed for each tree felled.

A group of young trees is made near and around the stump of the old tree and seedlings are also put in along the hauling roads. In this way a future growth is assured. In three years one of the plants has attained a height of 20 feet and the average is even 15 feet. There is also a diameter limit but the figures are not given by Unwin.

The firms working these lands pay a royalty and export duty which is sufficient to pay the cost of the Forestry Service.

I once had the pleasure of traveling on the steamship Sokoto now running from Halifax to Mexico. She was formerly in the West African trade, oil nuts, mahogany, etc., and her officers told how the naked natives propelled these logs through the breakers to where they could be reached by the ship's launch. All this labor after dragging the logs from the forest to the shore by man power alone, then the long journey to England and perhaps to America, is evidence of the labor required to supply the market with this valuable wood from regions where men do the work of oxen and machines.

I have a sample of African mahogany secured in a wood-working establishment in Ottawa, Canada. It seems so light and soft and dull in color that I can hardly imagine how it could pass for mahogany.

AND SOUTHERN FLORIDA

In case any enterprising person desires to grow mahogany I would suggest that any of the following trees be planted with it at the same time, since the returns would be quicker. The planting of the following on suitable soil in a favorable location would no doubt in time yield handsome returns. Since mahogany endures some shade the mixture would be an advantage.

Cedrela toona—The "toon tree" of India and the "red cedar" of Australia. Wood light, soft, red, very rapid growth, a very valuable wood used for furniture, carvings, boxes, canoes, shingles, etc.

Cedrela odorata—"Cedro hembra," "Cuban cigar-box cedar" or "Spanish cedar." Wood similar to the above. Highly odorous and supposed to keep insects out of cigars.

Cedrela Brasiliensis—"Acajou." Wood soft, fragrant, red, easily worked. Trees of this species planted in Dr. Franceschi's garden in Santa Barbara, Cal., have grown with great rapidity.

Gaurca trichilioides, called "Gauraguo" in Porto Rico. This species closely resembles the above mentioned trees but the wood is not fragrant.

When the countries of the American tropics get over the revolution habit, when trunk lines of railroads get established and freight rates decrease, and when wood gets scarcer and of more value, there will be stronger incentive toward the proper utilization and regeneration of these tropical forests. There will be more careful exploitation with the future in view and not merely the utilization of a product which nature has given us. We are in the habit of looking too much to the Government to do things. In consequence they are never done. If on the average one man in every ten owns and properly cares for ten acres of timber land, there will never be any danger of a timber famine. It is up to the Government, however, to arrange conditions of protection, taxation and even transportation in such a way that private parties may feel safe in such an enterprise. The main function of government is to afford protection to property and life and to hold in check the greed of great corporations so that individual incentive, initiative and industrial activity may

THE EVERGLADES

have full encouragement and progress without interruption or onerous restrictions.

But when one tries such a commendable enterprise in the land of the mahogany tree he usually comes into sudden contact with high taxation, with sole concessions granted to other parties, thievery, incendiarism, shipping fees, brokerage, graft, high freight rates, dishonest commission agents, local uprisings and a host of other difficulties which the producer has to struggle against before his product reaches the consumer. There is the producer who with the help of nature makes the product at a small profit and there is the consumer who uses it, is glad to get it and pays high for it, but between the two is always a group who by hook or crook usually carry off the lion's share of the spoil.

Mahogany is quite common in Florida south of Biscayne Bay and the Everglades. Much of this territory extending southward to Cape Sable is little known. There is an area as big as the State of Delaware in a condition of pristine wildness. It is usually marked the Big Mangrove swamp on the maps and is not unlike the big Zapata swamp on the south coast of Cuba.

When I use the term "swamp" I mean it in the Southern sense, namely, a low, wet, but wooded area. Here and there in these swamps are slightly elevated portions or islands. On these islands there is usually a rich hammock growth. In these hammocks mahogany is common, in fact in one place it predominates to such extent that the place is called "Madeira Hammock" or "Island."

Forest land in tropical Florida may be divided into pineland, hammock and mangrove swamp. There are hammock islands in the Everglades, there are patches of hammock here and there in the pine woods, and some of the Florida Keys are covered or were originally covered with a heavy hammock growth. The hammock in this part of Florida consists almost entirely of trees of the Antillean flora, trees which grow here and are native here, but many of them do not reach their optimal growth in this section. This part of Florida corresponds very closely with the Bahama Islands.

AND SOUTHERN FLORIDA

The presence of hammock growth here and there may be explained in two or three ways. The hammock may be the climax forest. Suppose we have a bare parcel of land; suppose the various forces of nature scatter seeds over this area; suppose there are no retarding influences of any kind such as flood or fire or insect invasion, this land would according to some authorities become in time and remain a hammock growth.

If fire swept over the territory, it would soon be covered with nothing but pines and a few other trees able to withstand some fire. If floods of fresh water covered it frequently, it would remain a saw-grass country with perhaps clumps of cypress, saw palmetto and a few other trees here and there. If floods of salt water covered it, it would become a mangrove swamp. It is true that hammock growth is gradually working into the pine land and into the mangrove swamp, but I lean to the opinion that the soil where the hammock grows is richer—richer at the start mainly because of the nature of the rock which disintegrates to make the soil.

In many parts of the tropics there is a so-called limestone which, when it disintegrates, yields a poor soil. This is in truth not a limestone but a sandstone, the sand being cemented together with a little lime. Wherever a pure limestone disintegrates it yields a rich, reddish soil on which hammock grows. When a calcareous sandstone disintegrates it yields a poor soil on which the Caribbean pine predominates. A limestone soil is usually good. Grain and fodder from such soil is rich in bonemaking ingredients and in turn the people of such soils are usually big-boned and rugged.

When I said above that the land in South Florida between the Florida East Coast Railroad and Cape Sable is unexplored, I meant that it had never been surveyed and properly mapped. The islands are indefinitely marked and the water courses are merely indicated by dotted lines. Men have been all through it over and over again. Some new travelers go into the region now and then, and when they look around and see no human beings or signs of human beings they conclude that they are discoverers



IN THE MANGROVE SWAMP. THIS TREE GROWS IN SALT WATER AND IS A GREAT CONSOLIDATOR OF MUDDY SHORES AND A PROTECTION IN TIMES OF STORM. (PHOTO BY HOMER SAINT-GAUDENS.)

AND SOUTHERN FLORIDA

walking on land where the foot of white man has never trod before. But plume hunters, prospectors, scientists, etc., have been there.

It will be a long time before mahogany is exhausted in this region owing to the unsettled nature of the country and its inaccessibility. The drainage of the Everglades may some day lower the level of the water throughout this whole region. Even if it lowers it only a few inches it will increase to a great extent the area where mahogany can grow.

Over in the Bahama Islands, what we call the hammock is usually referred to as "bush" or "scrub." This land is the "provision land" where the bulk of the crops is grown. Here the terms bush and scrub are applied, very much as in Africa and Australia, to forests of considerable size, especially when there is a thick undergrowth.

The Bahamas belong to Great Britain and there is mahogany on almost every island, but the largest quantity is on the largest and least settled island of Andros. These people have made good use of this mahogany at home in furniture and boat construction. Labor is cheap there, but if the negroes continue to emigrate to Florida as fast as during the past winter it will soon be scarce.

Mahogany is seldom shipped north from Florida or the Bahamas because it is worth at home as much as it would bring in Northern markets. There is no mahogany in Porto Rico, and there is very little in Jamaica, so that Cuba and Santo Domingo are the two islands which have the most of it and which ship the bulk of all the West Indian mahogany in the market.

I have been over a large part of Cuba several times and I believe Cuba has very little timber of any kind to spare. There are great areas devoid of timber. One hears of vast tracts of virgin timber, but they usually dwindle in size and density the closer one comes to them. The Spanish and American ideas as to quantities of timber are often at variance. I know of no place where forestry is more needed. Cuba exports mahogany and imports yellow pine. She practically trades mahogany for yellow pine.

THE EVERGLADES

Cuba is not all a tropical land of luxuriant vegetation. There are miles after miles of pine-covered sand land in Pinar del Rio. The time is practically at hand when Cuba can use every stick of timber she cuts right at home. With a population of over 2,000,000 and a strong emigration from Spain there is necessity for conserving all available timber. The houses of the well-to-do are now mostly made of brick, stone and tile, while the natives depend almost entirely on poles and palm thatch for building material.

Santo Domingo is therefore left as the main source of West Indian mahogany for the future. In this beautiful island is concentrated all that is good and bad in the West Indies. It has the highest mountains, the deepest valleys and the richest soil and vegetation of the Antilles. It was the first place to be settled in this continent, the last to be developed. It is here that mahogany is most abundant and of fine quality. The land is rich in minerals, with a fine climate, or in fact many climates, with a thin population, with some poor pine land, but much of it is rich soil and as virgin in appearance as when Columbus landed. It consists of the famous Haitian Republic and the Republic of Dominica. Conditions in this island are by no means as bad as painted, and even Haiti, the Black Republic, has not been as complete and dismal a failure as is often represented.

Some very valuable timber concessions have been granted by the Haitian Government within the past few years. The following quoted from the New York *Sun* corresponds exactly with what I have heard from travelers who have visited the interior of the Black Republic:

"That the country is sadly misgoverned by her politicians there seems, however, no reason to doubt. On the other hand Haiti pays the interest on her bonds, encourages education by liberal grants, protects foreigners, and of late has welcomed the exploitation of her natural resources by American, English and German capital. The hospitality of the country people, their sterling honesty and natural kindness, are vouched for by all travelers who have disregarded the ogrelike reputation of the

AND SOUTHERN FLORIDA

people and penetrated the interior. In the cities the stranger can always look to his consulate for protection. In short, Haiti is not as black as it has been painted, but we would not venture to predict that the feuds of her politicians will not ultimately compel intervention for the general good and the interests of other nations."

I have never visited the interior of either Haiti or the Republic of Dominica, but judging from what I have seen merely from the coast towns and in sailing along its shores, it is one of the most beautiful and varied spots of earth. Both Haiti, now a republic in control of negroes, once a French colony, French being still the common language, and the Republic of Dominica, once a Spanish possession, now independent with the United States Government in charge of its custom houses and with Spanish the common language, have had the most checkered history possible to imagine.

I think the time is near at hand when there will be established a West Indian trunk line of railroad. The people of Florida are beginning to realize this when they see trainload after trainload of Cuban pineapples pass their doors. The Florida East Coast Railroad will soon be completed to Key West. If the car ferry from Key West to Havana is successful, sugar and other products will come direct from the plantations along the Cuban lines to our Northern markets without breaking cargoes. A trunk line of railroad now runs to the eastern end of the island. Another short car ferry would reach Haiti. By using lines already constructed Haiti and the Dominican Republic could be tapped at slight expense. By making another car ferry to Mayaguez, Porto Rico, and using the railroad already in operation to San Juan, this West Indian trunk line would be complete. When this happens, and I can see no reason why it should not happen, many fine forests of rich tropical woods will become available and will be shipped direct by rail into this country. Owing to the lack of roads, etc., it is impossible to get much of this timber to the coast. Even in the Dominican Republic, where timber is still comparatively plentiful, it costs \$30

THE EVERGLADES

per thousand or thereabouts to deliver mahogany at the ship's side.

The largest portion of the Dominican and the Haitian republics is covered with forest. According to an official report there are over 6,000,000 acres of hardwoods in Santo Domingo, among which mahogany ranks first, and mahogany from this island ranks first in quality.

Santo Domingo has broad, high plateaus with cool climate where it is claimed wheat, oats, rye, apples, pears and strawberries thrive. Loma Tina, 9,420 feet above sea level, is the highest peak in the West Indies. There are large quantities of Spanish cedar, also pine and "sabina," sabina being the Spanish name for our Florida pencil cedar. The silva of Santo Domingo is undoubtedly richer than that of any other West Indian island. These forests yield gums, resins, medicines, etc., and I have been told that cinchona, the tree from which quinine is made, grows in the mountains. Our vice consul from Puerto Plata writes as follows in reference to the hardwoods of Santo Domingo:

"Those chiefly exported are cedar, mahogany, *lignum vitae*, lancewood, fustic, greenheart and mora. The largest diameters procurable are, in cedar, 60 inches; mahogany, 35 inches, and in *lignum vitae*, 10 inches. On the northern side of the island quantities of large timber can be procured about 10 miles from the railroad. It is expensive to draw out the wood. There are no roads, and paths have to be cleared through the forests. The people usually drag the logs with bulls, but the more intelligent use two large wheels on an axle, on which they hang the timber. Roads could be made in the woods for wagons, but as this would be expensive it would all depend on the extent of the enterprise.

"In some sections there are rivers on which the logs may be floated, but one has to wait for a freshet, which often delays three years. The facilities and price of getting out the wood depends entirely on the location. Where one owns the trees, the medium cost of felling, squaring, hauling from forest, railroad freight, and delivering alongside ship is about \$30. Ameri-

can money, per 1,000 feet (mahogany or cedar). Trees can be bought standing at from 25 cents to \$1 per tree, depending on the size, condition and location. It is preferable to purchase the right to fell over an extent of land, first going over same to estimate the amount of timber that can be gotten out, or one can buy it at the rate of \$5 per 1,000 feet.

"A foreigner who attends to his own business is perfectly safe, both in life and property. The only inconvenience that would be experienced is that his laborers will leave him when a disturbance is going on in the district where he may be working, to avoid being impressed either in the government or revolutionists' ranks. After this danger is past they will return to their work. For this kind of work, laborers can be procured at \$1, American, per day. The price of labor is higher in this class, for it is considered harder than the ordinary run and as requiring more skill."

Some time ago I sent a sample of Florida mahogany to Herbert Stone, a wood expert and an officer of the Association of Economic Biologists. Aside from his scientific knowledge of the subject Mr. Stone has operated a business in Birmingham, England, in which many varieties of wood were handled. The following is his reply in reference to the sample sent. The sample was cut from a tree on Elliott's Key, Florida. The tree grew close to the sea, in fact was killed by a severe storm in October, 1906:

"The piece of mahogany is most interesting and valuable. It is precisely the same as the specimen I have, named Caoba, except as regards depth of color."

The specimen he refers to marked Caoba is described in Stone's "Timbers of Commerce." This specimen came from Mexico and is a type specimen received from the Royal Gardens, Kew, being one of the series of Mexican woods exhibited at the Paris Exposition of 1900 by the Mexican Government. The specimen was marked, "Caoba: Nombre Cientifico, *Swietenia mahagoni*." The alternative common name given is "Bois d'Acajou à Meubles," seeming to indicate according to the French view that this wood is especially fitted for furniture construction.



A COOL TILE-COVERED BUNGALOW IN SOUTHERN FLORIDA—COMBINATION WOOD AND STONE WITH LOTS OF WINDOW SPACE.



A SHINGLED BUNGALOW, SOUTHERN FLORIDA.

CHAPTER XII.

BUNGALOW CONSTRUCTION IN SOUTH FLORIDA.



SINCE coming to Florida, almost ten years ago I have been designing and building bungalows. During this period there has hardly been a time when I have not been altering an old one or planning or building a new. All the while I have been striving to produce something perfectly adapted to the environment. Long before I could finish one I would discover changes that would cheapen the cost of construction or add beauty or comfort to the structure. I disregarded all precedent, had difficulties with mechanics who would persistently do things the old way until finally I found myself doing most of the work with the help of a couple of negroes, who were willing workers but who could neither see straight nor saw straight.

In this part of Florida we sometimes begin at the beginning by cutting the trees and hauling the logs to the mill. The soil is lime rock, some of it loose, but much of it solid. This is good building material and by blasting, a lot of it may be secured on a small space for house walls, fence walls and roads in the process of clearing the land. The holes when filled with trash and rakings are fine for bananas and papaws. By building a kiln of wood and the proper kind of rock a fairly good quality of lime may be secured at a very low figure. With wood, stone, lime, sand and water all off the very lot you are building on, the house becomes in truth a product of the land.

The next step is to buy a galvanized iron pipe and a cheap pitcher pump. A twenty-foot length of pipe and sometimes much less is ample. A coupling is put on the end of the pipe. One edge of this coupling is filed or pounded sharp and opened over the beak of an anvil for a cutting surface. By churning this

THE EVERGLADES

pipe up and down through the soft, white rock with the help of a little water two men in a few hours can have a pump in good working order—pump, pipe and labor not costing more than a ten-dollar bill.

A pile of planed lumber, costing about \$22 per thousand, a case of dynamite, with caps and fuse, and with plenty of lime and water, all is in readiness for business. I find it pays to mix some



A FAVORITE TYPE OF HOUSE IN THE TOBACCO DISTRICT OF WEST CUBA, WHERE CLIMATIC CONDITIONS, VEGETATION, ETC., ARE SIMILAR TO SOUTH FLORIDA.

cement in the mortar and cement is now so cheap that the increase in cost is slight. The center of a thick lime-mortar wall does not harden for a long time. A little cement therefore helps to stiffen it. By building low of rock and timber and by giving the main lines of the structure the right proportions and sharp outlines to produce contrast, the house appears to grow out of the land and when surrounded by vines and shrubbery becomes in fact part and parcel of it.

AND SOUTHERN FLORIDA

The natural conditions to be considered are long, dry periods, continuous sunshine for months, very heavy rains and strong winds at times, which drive water in a fine spray through the smallest chink.

This calls for tight, cool, solid, low structures. I should add also that the well water is hard and cisterns are necessary, so that the roof must be of a material that will not taint or discolor or render impure the water.

Although a forester by profession, I do not believe that the



A CUBAN "BOHIO"—A HOUSE BUILT MAINLY OF PALM THATCH.

earth rotates upon a wooden axis, and I realize also that wood has been used in the past for many purposes merely because of its abundance and cheapness. It is, however, in the end an expensive constructive material if we consider the cost of paint and repairs, the danger from fire and the tribute we pay to fire and insurance companies.

The appearance of it is, however, good and although rock in this section is as cheap at the start, even considering the low price of lumber, many prefer the effects gained by a combination of both.

THE EVERGLADES

I have used cement blocks, concrete, paper roofing, corrugated iron, shingles, tile, etc. I have even used old barrel staves, cut in half, for shingles. When one lives near the shore there is a possibility of collecting a lot of valuable drift lumber. I have captured ash, mahogany and Spanish cedar logs adrift in the bay. The tile in my hearth came from the floor of the engine room of a wrecked steamer. The wrecks often yield brass hinges, etc., which are difficult to get in any other way. The enterprising beachcomber can usually find many useful articles along the



TYPE OF BUNGALOW SUITED TO THE CLIMATE OF SOUTH FLORIDA.

shore and the waste of lumber on the beaches is enormous, since it is soon riddled with holes and rendered useless by borers of various kinds.

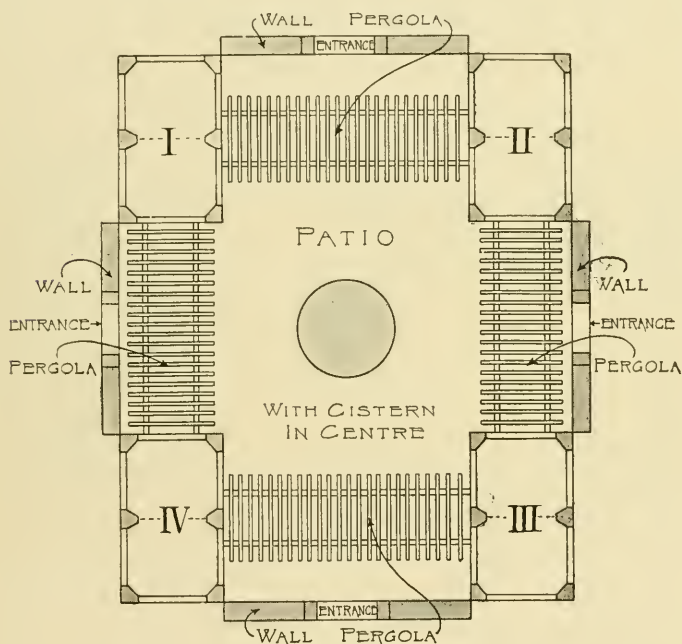
Since the roof is half the building, let me dispose of it first. Paper roofing or felt roofing is not very durable, it taints the water and looks cheap at best. Few people desire it as a permanent roof cover, although if carefully put on and frequently

AND SOUTHERN FLORIDA

painted, it is tight and lasts longer than one would expect under the trying conditions of the tropics.

We have no snow, of course, and steep roofs are therefore unnecessary; in fact the roofs I have built have grown flatter until I have now reached the flat roof stage. A flat roof is easier to build, requires less material and in heavy rains and high winds much of the water blows off instead of into the house.

Shingles taint the water, curl up and open up in the hot sun so that the rain beats in and insects find a fine harbor under

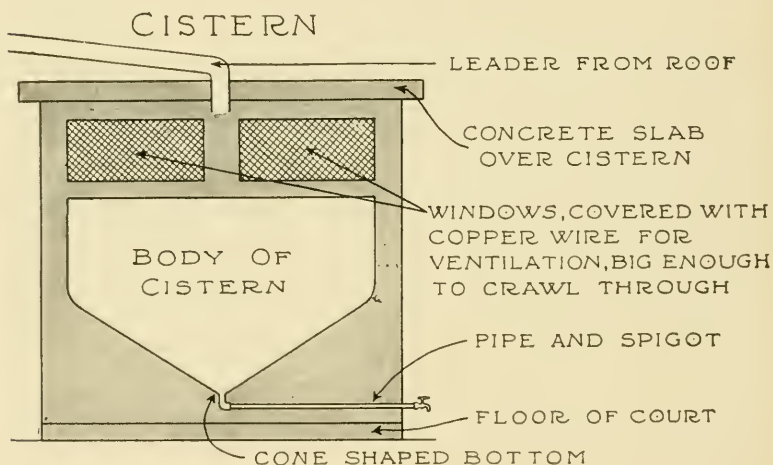


them. Corrugated iron is hot and noisy, although extensively used everywhere in the tropics, because it is cheap and quickly put on. It is tight and yields good water. Covered with concrete it forms a fine roof. Tiles are beautiful and cool, but they are seldom tight and since they are usually elevated on strips a couple of inches above the boards of the roof they form a fine harbor for rats and other vermin. If every crack is cemented

THE EVERGLADES

an enterprising tropical rat will work at a tile till he loosens it. In time he will succeed in pulling out cement enough to squeeze through. Then he has lovely quarters. He could not be safer from intrusion.

I no longer build large houses. I have adopted instead the unit system on the bookcase plan. Each unit measures twelve by twenty-two or thereabouts. These can be built around a central court in any number to suit the size of your family, your lot and your bank account. These may be connected by "blow-ways" or "dog trots" or "pergolas" or "galleries" or "porches." I was working toward this plan when I struck the following



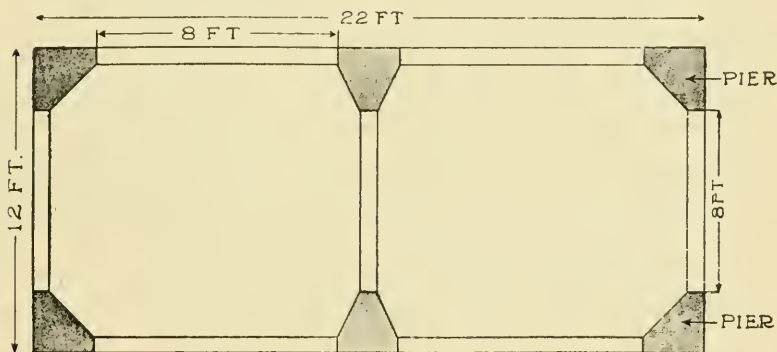
in an article on Chinese art in the International Encyclopedia: "A Chinaman's house, if he is a rich man, is a group of small one-story buildings interspersed with gardens, all within a bounding wall."

That fills my bill exactly, and I am neither Chinese nor rich. The cost of a unit is about \$200 and each unit ought to be rentable almost anywhere at \$5 per month. Suppose one owns only a small lot. Place a unit on each corner. Connect the units with pergolas and close the spaces open to the street with an attractive wall. In the center one would have a spacious patio.

AND SOUTHERN FLORIDA

In the patio is the place for the cistern, which should be built above ground. If above ground the water may be completely drawn off at any time by means of a spigot. The bottom of the cistern should be cone-shaped, with the apex down, from which the pipe leading to the spigot should start. In that way every speck of sediment may be drawn off at any time.

In the tropics the cistern should be screened and well ventilated. It is cooler above ground than below it. Pump water is always warm in cool weather. If the cistern material is slightly porous all the better. The evaporation will cool the water like a Spanish olla and on the basis of the iceless refrigerator. It is necessary to screen out the mosquitoes since cisterns are their favorite breeding places.



The flat roofs are fine places for solar heaters. A flat tank on the roof into which water may be pumped by hand with a small force pump in a sunshiny climate yields fine, warm water for bathing if covered with glass sash.

The following is a brief discription of how I build a unit house: I lay up a narrow wall of rough stone (12x22 feet), a foot or more above the ground. I usually build against boards and pile in mortar and rock. This enclosure I fill with rock, which is packed and pounded down solid. Over the surface of this I lay a cement floor.

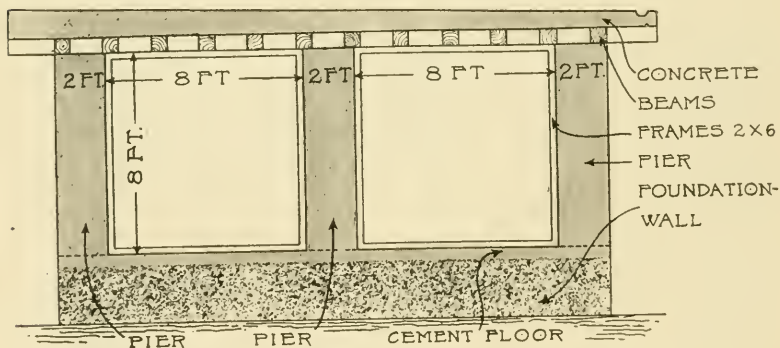
On the cement floor I set up frames of 2x6-inch stuff, each frame 8x8 feet, two frames on each side and one at each end.

THE EVERGLADES

This leaves room for three piers on each side. These piers are triangular in shape, showing two feet on each face on the outside. They are constructed of concrete, one part cement, two sand and four blasted rock. This mixture is thrown in a wet state inside of rough pier forms.

By making these piers triangular they are strong; it gives a fine space inside for hanging a mirror or picture or for shelves and it avoids sharp corners in the house. The tops of the 8x8 frames serve as a plate on which the roof beams rest. They rest also on the tops of the piers.

All roofs in the tropics should have a good overhang. In early times on this coast houses were built with practically no



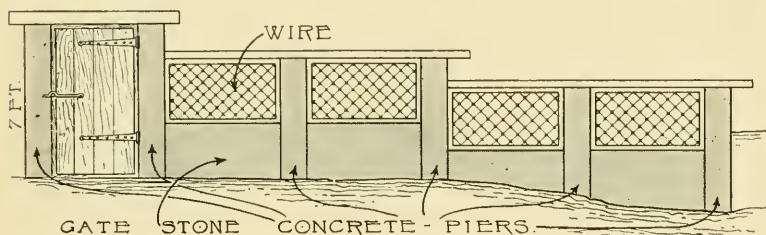
eaves. They saved lumber and felt safer in times of storm. Eaves throw the water from the house and shade the walls, thus rendering the house much cooler, since the secret of keeping cool in the tropics is keeping in the shade and in good ventilation.

On top of the roof-beams I lay corrugated iron. Boards may be used instead between the beams and afterwards removed. On this I lay four inches of concrete reinforced with poultry fencing, barbed wire or common galvanized wire of any kind. A rim of cement serves for a gutter and the slope is left to one corner or to the middle of one side. Thus iron gutters are dispensed with. This roof forms a pleasant mirador and a second story may be put on in the same way if the owner desires.

AND SOUTHERN FLORIDA

The main part is complete—the finish is easy. A Tropical house should have many openings so as to be all-porch in hot weather and yet tight as a drum in times of storm. Tongue and groove stuff shingled on the outside is good. I use narrow shingles (three-inch) and put one nail in each shingle. A small shingle when it contracts makes a smaller crack than a wider one and if only one nail is used it is less apt to split in the process of expansion and contraction. I prefer shingles and up-and-down boarding to clapboards, since then the rain drips or runs down with the grain of the wood. Good copper screening is necessary, but glass is often dispensed with, solid board shutters being often used.

Such a building is cool and cheap. It has no large timbers in it. It is anchored to the ground by stone pillars and a solid

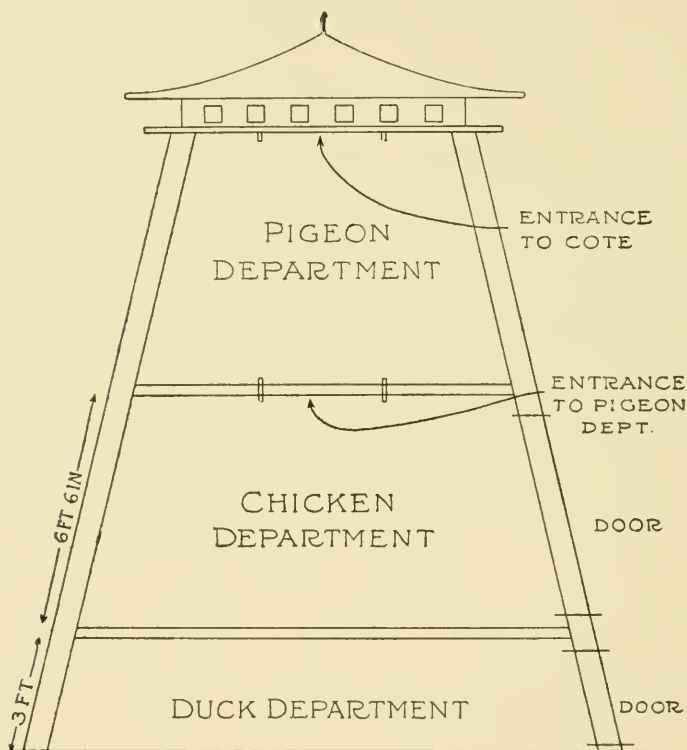


slab of a roof. One of the corner piers may be made hollow for a chimney, and a fireplace is pleasant since there comes a time in almost all tropical countries when a fireplace fire is grateful.

Such a house looks plain and solid—Assyrian or Zuni-like in character—quite in contrast to many of our ornate, ginger-bread carpenteresque constructions, but the shubbery in the patio and the vine-covered pergolas and fences with many shades of leaf and flower give it all variety necessary. These units may be connected with a fence and the following I have found to be very good and not very expensive: Put up posts ten or twelve feet apart, five or six feet high and one foot square, built in a form of the same kind of concrete mentioned above. Connect these with a wall two or three feet high. Run

THE EVERGLADES

a 4x4 railing along the top of the posts and fill the space with poultry wire. This is "horse high, pig tight and bull strong," and is at the same time attractive and fine for vines. These unit houses cannot properly be called bungalows, since a bungalow is supposed to be a low, flat, rambling, wooden structure, often with a thatched roof in the East Indies, but the term in America



now covers a multitude of sins. One of these unit houses I have built for a garage, but prefer to call it an "autola." One unit may be used for a kitchen and lavatory. In case the baby is cross or some one snores it is easy to relegate them to the units in the farthest corner of the patio. In conclusion let me add that no place, however small, is complete without a place

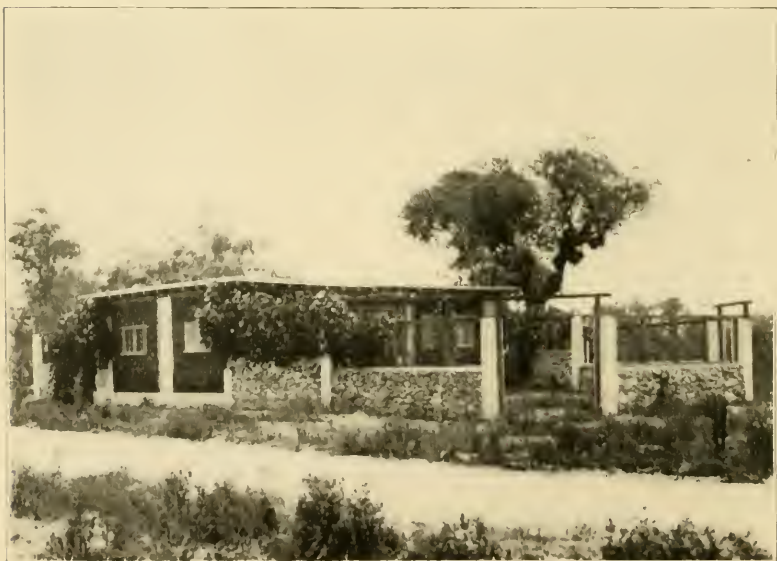
AND SOUTHERN FLORIDA

for animals of various kinds, the houses for which may be built in the same way around a central court. Then, too, many people are fond of pigeons. I have built a dove cote twenty feet in the air on top of four posts put slantwise in the ground. Two feet from the ground I have built a floor of boards which serves as a roof for the ducks and a floor for the hens. Six or eight feet higher up I have built another board floor, which serves as a roof for the chickens and floor space for pigeons. The whole is enclosed in netting. The pigeon house has a hole in the center underneath so that they can enter their department from below and thus be safe from intruding hawks,



A UNIT OR PUEBLO HOUSE IN PROCESS OF CONSTRUCTION. CONCRETE ROOF AND CONCRETE FLOORS. THIS HOUSE CONSISTS OF THREE UNITS JOINED TOGETHER ON A TRIANGULAR LOT. VIEW FROM SOUTHWEST.

(PHOTO BY KAUFMAN, MIAMI, FLA.)



SAME HOUSE—VIEW FROM NORTHWEST.

CHAPTER XIII.

THE EVERGLADES OF FLORIDA.



SOUTH of Lake Okeechobee, reputed to be the largest body of fresh water wholly within the confines of the United States except, of course, Lake Michigan, is a large tract of marsh land, called the Everglades. A glade is usually defined as a grassy opening, strip or lane, between growths of trees. There are many such little glades between the long pine-covered ridges which jut out into what the natives designate the main or Big Glades. This is, no doubt, the meaning of the word Everglades, the term *ever* signifying *all*, or wholly glade or grassy, with few islands—in short, mile after mile of low grass morass.

This territory is all south of latitude 27°, the same latitude as the valleys of the Nile and Ganges, and is the only part of the mainland of the United States with a tropical or Antillean flora, for although a part of Texas is also below this same parallel, the land is more or less arid, and there is no great body of warm water to the northwestward to temper the cold winds from that quarter. We may safely say, therefore, that the Everglade region is the only part of the mainland of the United States which is truly humid tropical, the only place where tropical crops can be successfully produced without irrigation, although irrigation is desirable in almost all tropical countries.

The warm trade winds reach us from the West Indies, so that climatically and botanically we are in the same class with Western Cuba and the Bahamas, and, although it is a little cooler here in winter, it is all the better, since cool weather, up to a certain point, of course, produces quality in fruits and

THE EVERGLADES

vegetables—that is, richness of flavor combined with firmness, permitting shipments long distances.

The Everglade region is over three million acres in extent, fully as large as Porto Rico or Jamaica. From the center of Lake Okeechobee to Miami is at least a hundred miles, and southward to the shore of the Bay of Florida is fifty more.

Although there are patches of sand and marl and rock, the soil of the Everglades is mostly black muck, the result of ages of decomposition of vegetable matter. Reclaimed muck lands throughout the world usually have great productivity, and, therefore, high value. The fact that these muck lands are in a region where tropical fruits and tropical staple crops, such as sugar cane, as well as Northern vegetables, grow in midwinter, gives this region an added value over muck lands elsewhere. I spoke above of "Northern vegetables," but we must not forget that the original home of many of these was in the Southland.

This vast area of mud sloughs is usually completely inundated for several months of the year. It is a weary waste of saw-grass, through which neither walking nor boating is satisfactory. Remove the water, burn off the saw-grass, and the aspect soon changes. The cool breezes sweep over it; it is a broad, level prairie; other grasses and wild flowers appear. With teams plowing and cattle pasturing, it would look not unlike the low countries of Europe, which the enterprising Dutch have wrested from the sea, nor unlike the prairies of Louisiana which our own people have reclaimed by holding the mighty Mississippi in its course. Although the whole body of the Everglades is considerably above sea level (Lake Okeechobee 23 feet), the water could not escape to the sea, because of sand dunes and a rock rim around the edges. This rock rim, although usually called limestone, is in reality in many sections a calcareous sandstone, and was once no doubt mobile. It was blown in by the wind in the form of a dune and afterwards hardened into rock called Miami oölite. These dunes, just as has happened in other parts of the world, notably the Landes of France, choked up the rivers, caused inundation, and this in turn caused the formation of muck and bottled up a great mass of

AND SOUTHERN FLORIDA

fertility for future use. Before this dune hardened many streams succeeded in working holes through it, and this explains many of the subterranean channels to the bay and ocean. This dune formation and wind origin of limestone ridges is no fairy tale. Go to Eleuthera, in the Bahamas, and other places of a like nature, and you will see it in all stages.

It is worthy of note in passing that just to the west of the Everglades are great deposits of phosphate, the remains of sea animals, rich in phosphorus, the scarcest and most precious of plant foods, in fact, also animal foods, since foods deficient in it are deficient in bone-making qualities. One-third of the world's phosphate supply is here in Florida, and in time the fertility of the great agricultural soils of the world will be measured by the amount of phosphorus available. It is more than likely that phosphate beds will be found in the Everglades.

On the south the Everglade region is bounded by a little-known section, usually marked on the map the Big Mangrove Swamp. Much of this section has never been surveyed, and less is really known about it than is known of Angola or Quintana Roo. On the maps the stream courses are usually marked with dotted lines. Some maps show White Water Bay as a big sheet of water; others don't show it at all. In this region there is considerable hardwood, even mahogany, locally known as madeira. It is so common in one place that it furnishes the name "Madeira Hammock." This madeira is the true mahogany, *Swietenia Mahagoni*, and samples which I sent to London experts were pronounced first class for solid furniture and appeared identical in character with a specimen of mahogany, or *Caoba*, which was sent by the government of Mexico to the Paris Exposition.

On the northwestern edge of the Everglades is the Big Cypress Swamp, one of the largest and finest bodies of cypress timber left in the South.

The drainage work now under way and certain to be completed within a short time, since the work is in charge of a competent engineer, and the contract has been let to a Baltimore firm accustomed to handling such big enterprises, is being paid

THE EVERGLADES

for by the sale of lands. The question of drainage resolves itself into two factors, all a matter of digging through mud and rock, opening the outlets to the sea and lowering the level of Lake Okeechobee. For example, suppose we have one big plate representing the Everglades as a whole. Inside this plate on the edge to one side is another very much smaller plate, representing Lake Okeechobee. Flowing into the small plate is a large quantity of water from another watershed. The small or Okeechobee plate spills over and in the course of time the Everglade plate spills over its rim into the sea. I have seen the water rise at the south end of the Glades without any rain or signs of rain. But it had rained up the State and filled to overflowing the Okeechobee plate. Of course, there are local rains which come quickly and heavily; in fact, there are rains called "glade rains." In the summer I have seen it day after day raining on the Glades, while the bay shore was suffering from drought. What passes away through underground channels and what passes away through evaporation and transpiration is probably quite equal to the precipitation, and I have always believed that if the excess from Okeechobee could be disposed of, floods would be seldom and of slight duration in the Everglades. The rivers which run into the sea are narrow and clogged with rocky bottoms. Two or three streams of considerable size disappear on the edge of the Glades and appear again in the form of big springs on the edge of Biscayne Bay.

There were attempts at drainage in times past, but they did little good. To be sure, they lowered the water a little and increased the zone dry enough for cultivation around the edge and permitted earlier cropping, but these attempts were like nibbles at a big project which had to be complete throughout and on a large scale in order to be effective.

The late Napoleon Broward, with the eye of a practical man, knew good land when he saw it, and knew also that water would run down hill. Used to pulling wrecks off reefs, he came to conclusions quickly and intuitively. When some insisted that it would take fifteen years of rainfall observations, several years of careful topographical surveying and the reports of

AND SOUTHERN FLORIDA

several expensive and conflicting experts to determine the feasibility of his scheme, he was abashed, but not discouraged. He replied: "I will be dead by that time. The State will be poor and the money thus expended would buy a couple of dredges. We can sell some land to build dredges and if my friends will hold the knockers in check, we can soon make a convincing ocular demonstration." Corporate interests which had lost their grip



A SCENE IN THE PINE LAND ON THE MAINLAND. THE PINES (*P. CARIBAEA*) IN THE BACKGROUND. THE ROAD IS CONSTRUCTED OF LIME-ROCK, ALSO THE FENCE. THE ROCK WAS TORN FROM THE CLEARING ON THE LEFT BY GRUBBING AND BLASTING. (PHOTO BY PROF. JOHN CRAIG.)

on these lands, of course, opposed him out of sheer bitterness, but there were also hundreds of knockers, strange to say, among home people, who had nothing to lose and everything to gain, and who talked it down by the hour on the street corners to every newcomer. I remember visiting the Everglades with one of the first groups of newcomers from New Mexico. They had heard so many stories that they were skeptical. Instead of being

THE EVERGLADES

disheartened at the sight of so much water, coming from a land of drought and desert, they enthused over it, and without exception bought, and most of them have bought and sold several times since.

To Broward the credit is due. He was to Florida what Bremon tier and Chambrelent were to France and Dalgas to Denmark.



SCENE IN EGYPT, WHICH IS IN THE SAME LATITUDE AS SOUTH FLORIDA, WHERE FLAT ROOFS NOT ONLY PREVAIL, BUT WHERE THEY ARE USED AS MUCH AS ANY ROOM IN THE DWELLING.

Broward possessed to a striking degree the three qualities that make good manhood and citizenship—he was honest, he had a lot of good common sense, and he had also the sense of humor. Above all, he had common sense—the sense of proportions—good judgment or the ability to do the right thing in the right way and at the right time. He worked against jealous and greedy corporations, rival politicians and a host of born knockers, but he fought a good fight, and Florida owes more to

AND SOUTHERN FLORIDA

Broward than to any other man. In Arcachon, in the Landes of France, there is a statue of Bremon tier, the man who added a new province to that Republic by the reclamation of swamp land. Soon there will be, probably in Jacksonville, a monument to Broward, the man who was the maker of South Florida.

I have called this the greatest conservation project in the United States because at the cost of about one dollar, an acre of land capable of producing net two hundred dollars' worth of vegetables annually is actually formed out of the useless mud sloughs. The saw-grass can be quickly burnt and the land is ready for the plow, with plenty of water for irrigation purposes, if it is necessary. Compare this with the cost of any of our irrigation projects. Think of buying a farm and paying for it with the first year's crop! Land dry enough to crop rents now at ten dollars per acre.

The Chattahoochie Canal is practically done. This leads from Okeechobee to the Gulf. A dredge is working southward from Okeechobee on the main canal toward Miami. Another is working northward from Miami, and two are at work back of Fort Lauderdale, well out into the Glades.

These are all fine, large canals and of great usefulness for transportation as soon as the dams are replaced by locks. Dams are now necessary to hold back the water to float the dredges.

What will grow in the Everglades is a hard question to answer. It would be easier to tell what will not grow there. Under the head of fruits there are about fifty kinds which grow in this region; add to this list almost all the vegetables grown in the tropics and the North; add to this many staples and forage crops; many bushes and vines and three hundred or more useful native and introduced trees.

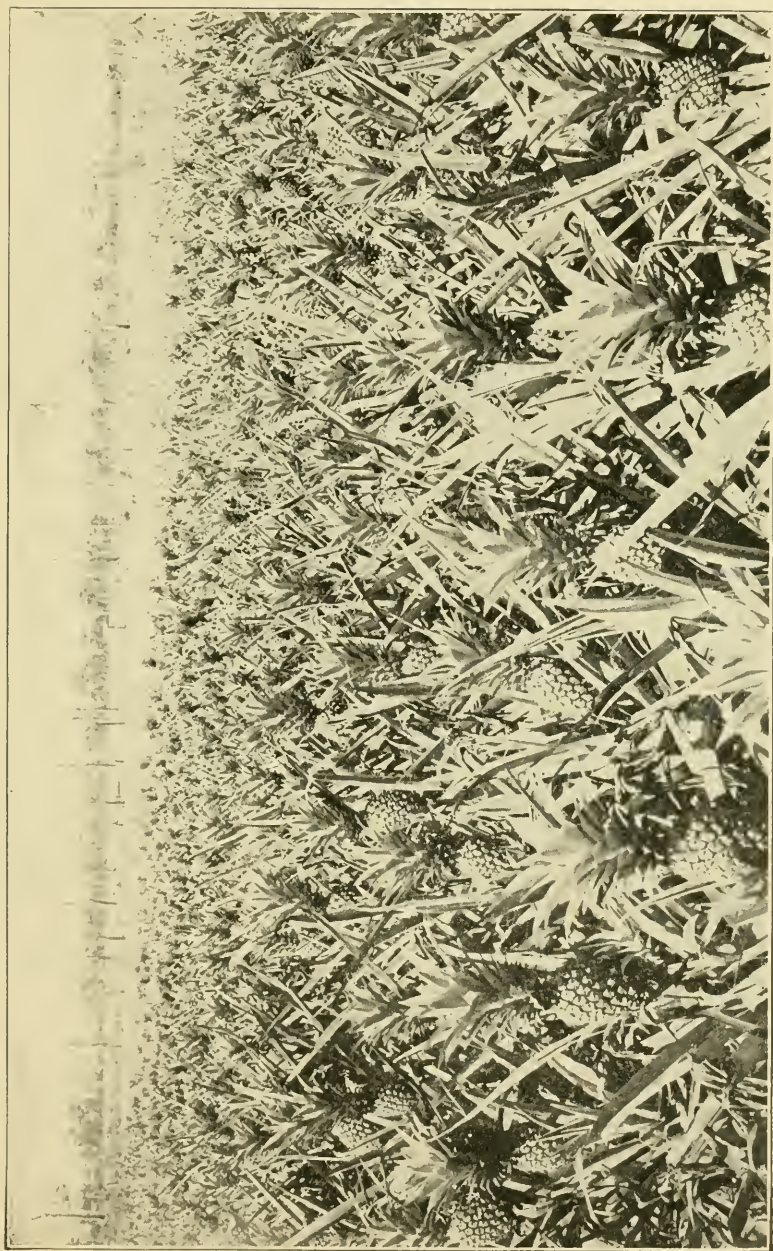
As the water goes down there is left over the Glades a deposit of lime. This is mostly precipitated lime, which goes to form marl. Mixed with it are the shells of fresh-water mollusks, and in some places tons of dead fish. During the past summer I saw pool after pool filled with dying and putrefying fish, emitting an unbearable stench. Around these pools were hundreds of birds, buzzards, herons and crackles, all eating their

THE EVERGLADES

fill from these charnel pits, and fighting and screaming over the booty. When the land is all drained these spots will have magical fertility.

That the Everglades will be drained within about a couple of years seems certain, and that people are coming here is already evident. Although houses to rent are scarce and board in the tourist season high, it is the land for the poor man. The climate is fine—fully as good as any Mediterranean, Caribbean or Californian climate. Wood is cheap for fuel and house construction. A rustic bungalow can be cheaply made and a pipe churned into the ground to a depth of fifteen feet or less yields an abundance of water. There is plenty of rock for roads, fences and house construction. The surrounding waters are famous for fish of many varieties. The inland canal route from Jacksonville to Key West is done. There will be miles of inland canals, and there is bay after bay along the shore.

In Southern California the hand of man has produced a highly developed and attractive region with no resources except vim and climate. Obstacles were met on every hand. In Southern Florida we have the resources, but the vim has been lacking. We have been reposing since the Seminole war. It is not laziness. We have been indulging our love of leisure. But it is this grappling with nature which develops the latent forces within the man. The coming age is to be an age of conquest, the conquest of nature, the reclamation of swamp lands and the irrigation of deserts.



PINEAPPLE FIELD, SOUTHERN FLORIDA.

CHAPTER XIV.

THE PROBLEM OF GROWING PINEAPPLES FOR MARKET.



FEW years ago the pineapple was extensively cultivated on the coral keys of Florida. The natives cut the forest, burnt the wood and debris on the ground and planted "pines" in the ashes. I protested against this method because it destroyed the humus, and ordered all wood and brush burnt in piles on my land. My man, a Bahaman negro, well versed in the pineapple business, insisted that the land must be "hot" for pines, that they needed the ashes, and that if the burning was done in a moist time only the surface rubbish would be destroyed. Time proved that he was right. These pineapple fields were weeded once or twice a year, no fertilizer was applied, but a heavy yield was secured in spite of the sparseness of the soil and the crude nature of cultivation.

But what a mess it was at harvest time! They commenced to break pines in early summer. The plants were full of spines and more than waist high. Canvas mittens were necessary. It was usually hot and the mosquitoes were a pest beyond description. The negroes toted the pines to the boat in baskets on their heads, over rough rocks along narrow, well-worn paths. There is uncut land left on these keys and a railroad is now in operation in a part of this region, but the pineapple business is practically dead. With a field of pines and a patch of lime and wrecking on the side these Key people were once well-to-do and their lands were valuable.

Further up the State along the East Coast there is a long stretch of sand dune country. It was covered with a sparse

AND SOUTHERN FLORIDA

growth of pine trees and the soil was naturally sterile. A balanced ration of fertilizer was applied by the pineapple growers and immense crops were produced, a few acres yielding a fine income. Of late, returns have been small and many growers have quit the business. Over in the Bahama Islands it is the same story.

In Cuba there is a lot of soil especially adapted to pineapple culture. An owner of a young citrus grove plants pineapples between the trees and thus receives a quick return. The Cuban people are fond of the pineapple or "la piña" as they call it. It is ground fine, sweetened and mixed with cracked ice. It is sold in this form at all refreshment stands and is certainly one of the most refreshing drinks imaginable on a hot day. If served throughout the United States in this way it would soon become popular. This would increase the consumption of this fruit to an enormous extent.

One hears complaints of small returns on pines even in Cuba. In fact it looks like a case of overproduction. The pineapple is well known in the North, is largely canned and relished by everybody. We import twelve million dollars' worth of bananas every year, but the pineapple, coming only at a special season and not having the filling food value of the banana, is at a disadvantage. The pineapple suffers severely in the process of transportation. It is usually picked too green. A pine is at its best when it ripens on the plant. A ripe pine may be located in the patch by the fragrance which spreads far and wide. A rat may have eaten one side but you will find the other side very delicious.

Good drainage seems essential to the pineapple and it is no doubt for this reason that it does so well in sandy soil. In the Hawaiian Islands they grow pines on a stiff soil, the favorite variety being the smooth Cayenne.

The pineapple is a strictly tropical fruit needing lots of warmth, and, although it will grow on sterile, sandy soil, it must be carefully and abundantly fed with fertilizer. The food it needs is rich—such as cottonseed meal, unleached tobacco dust and dried blood and bone.

THE EVERGLADES

Although the pineapple is referred to as a semi air-plant, since it belongs with a group of epiphytes, it must have something more than air to live on. Water often stands in little pockets at the base of the leaves. In this are often the dead bodies of insects and it is quite likely that the plant secures some sustenance in this way. It is a very shallow rooter and the roots must have air. I have known pineapples to actually sucker themselves out of the ground and have found them resting very loosely in the fluffy humus which covers the rocks on the Florida Keys. Although I have no means of positively knowing, I believe Florida produces one and one-half million crates of pines a year. Cuba probably exceeds this amount, also the Bahama Islands. This places the pine in the front rank with other staple fruits.

The Red Spanish is the chief commercial variety. It multiplies well, is hardier and ships better than any other sort known to the writer. The Porto Rico is a close second.

The pineapple is not seriously troubled by disease and in spite of the small returns it is still a favorite crop with many small farmers. It is easily reproduced from slips and suckers. Now and then a fertile seed is produced. Pines may be grown from rattoons which spring from the root, suckers which grow on the stem higher up, slips which grow at the base of the fruit, crown slips which grow at the base of the crown, and from the crown itself. In this district slips from the base of the fruit are ordinarily used. The bottom of the slip should be cut smooth with a sharp knife and the stem trimmed. There is less danger of a trouble called "tangle root."

Canning factories use many pines, but many go to waste that could be easily converted into commercial alcohol. It is one of the fruits which does not lend itself to wine manufacture but would probably yield a good cordial. The pineapple, it is claimed, contains a ferment similar to the ferment in the papaw which aids digestion. In the East the fiber of the leaf is extensively used for cloth manufacture. This cloth is as delicate and beautiful as silk. The fiber is used for nets, thread for sewing, etc., and although very fine it is strong. I have often wondered why an extensive industry in this line has not developed in the West

Indies. A pineapple field in dry weather, like a field of cane, is very combustible.

The scientific name of the pineapple is now *Ananas ananas*, which is also a common Spanish name for the plant although piña is much more frequently used. I have often thought that ananas would be a better common name for it than pineapple. It is, of course, nothing like an apple and was so called probably because it faintly resembles in shape the pine cone. We are calling grapefruit, pomelo; alligator pear, avocado; why not call the pineapple ananas?

It appears from present conditions that in pineapple culture, in spite of the duty, Western Cuba has the advantage. When solid trainloads of pines sweep by from Cuba over the Florida East Coast Railway, and when his returns come in, the Florida pineapple grower realizes that he has a competitor to the south of him and that he lives at a way station on a West Indian trunk line.



THE SUNDERSHA MANGO, ONE OF THE LATEST TO RIPEN.
(PHOTO BY KAUFMAN.)

CHAPTER XV.

THE MANGO, THE BEST OF ALL THE TROPICAL FRUITS.



OME call the mango "the apple of the tropics." It is more; it is the apple, peach and pear combined. The novice in eating the old common seedling sorts meets with difficulties. Such an experience is sure to prejudice him against mangoes forever. These old-time sorts have the smell and taste of turpentine and a tough cottony fiber around their big seeds which completely fills the crevices between the teeth, making business for the dental profession. It is mushy, slippery and hard to hold. The juice stains the clothing. One smells and feels and looks as though he had been the victim of a yellow paint accident. After eating such a fruit for the sake of three or four tablespoonfuls of pulp, one must take a bath and then retire to some shady nook for the rest of the day to pick his teeth. But some of the improved sorts which sell locally at twenty-five cents each are quite otherwise. The skin peels off easily, the aroma is pleasant, there is no fiber, the seed is small, the fruit weighs twenty or more ounces and the creamy, delicious peach-like pulp melts in your mouth. I have never tasted a mangosteen, which, according to the books, holds the world's record for goodness, but of all the fruits I know, temperate and tropical, two or three varieties of mangoes lead in my estimation.

South Florida is making rapid strides in mango culture. Many varieties have been introduced from all parts of the tropics, both by the Government and enterprising growers. Many choice

THE EVERGLADES

seedlings are just coming into fruit and our budders are learning the trick.

I have always contended that a Florida seedling mango will become the commercial mango of the future. None of the choice imported sorts fill the bill perfectly. There is usually some defect, such as shy bearing, poor carrying qualities, or lack of resistance against pests. If the Government had imported a large quantity of seeds of all the best varieties of mangoes the world affords ten years ago, we would now have several new varieties of local origin which would exactly fill the bill for home needs and shipment North. It is possible that we have it anyway in the form of a seedling Mulgoba, bearing this year for the first time; it is too early to say. But this tree bears fruits of a large size, of very beautiful coloring; hard, rather thick skin; no fiber; small flat seed and delicious flavor. It remains to be seen whether it is a shy bearer or not. This is the fault of many of these high-grade mangoes. It is possible that this difficulty may be remedied by root-pruning, girdling, or by proper fertilizing.

I have a little book on the mango written by Woodrow of India, the man who sent Mulgoba plants to Florida in 1889, in which over eighty varieties of mangoes are listed and this is probably not more than half of the varieties now known, many of which are of recent origin and many of which are no good.

For instance, the Alphonse, Alpoos or Alfoss is highly prized. Higgins thus describes it: "This is one of the most noted of the India mangoes. Size, medium to large; color, greenish yellow on the unexposed side and running to yellow on the exposed side, which is overlaid with light red; peeling qualities excellent; texture excellent, may be readily eaten with a spoon; flavor unique, with a peculiar mingling of acidity and sweetness in the bright colored fruit." In looking over Woodrow's list, on the other hand, one runs up against all kinds of Alphonse. For instance:

Afonza of Goa; Alphonze, Kirkee, "the keeping qualities of this fruit are excellent and it is generally admitted the best of all

AND SOUTHERN FLORIDA

mangoes. *The name is applied in the markets to many distinct sorts of greatly varied merit.*" (The italics are mine.) Kola-Alphonse; Kagdi-Alphonse, Bombay; Surawini Alphonse, Bombay. In fact, it seems that whenever they found a really good mango they called it Alphonse.

The Mulgoba, Cambodiana and a long yellowish kind from Burniah are my favorites. There is a little mango in Florida about the size of a peach, yellow in color, with a beautiful pink blush on one side. It has a thin skin, no fiber and delicious flavor. It is commonly called the "peach mango" and was raised from seed sent from Jamaica. For home use one would hardly wish for a more perfect fruit.

The Khatkia, according to Woodrow, is meant to be sucked, while others such as Fernandino II. of Goa are cooking mangoes. It should be stated to the credit of the mango that good apple pies can be made from the green fruit. The merits of the many kinds is a fruitful topic of discussion among mango cranks. Conclusions are not warranted as yet. It takes time to settle such questions. Some of the old timers with perverted tastes settle it by saying that the common turpentine mango is good enough for anybody.

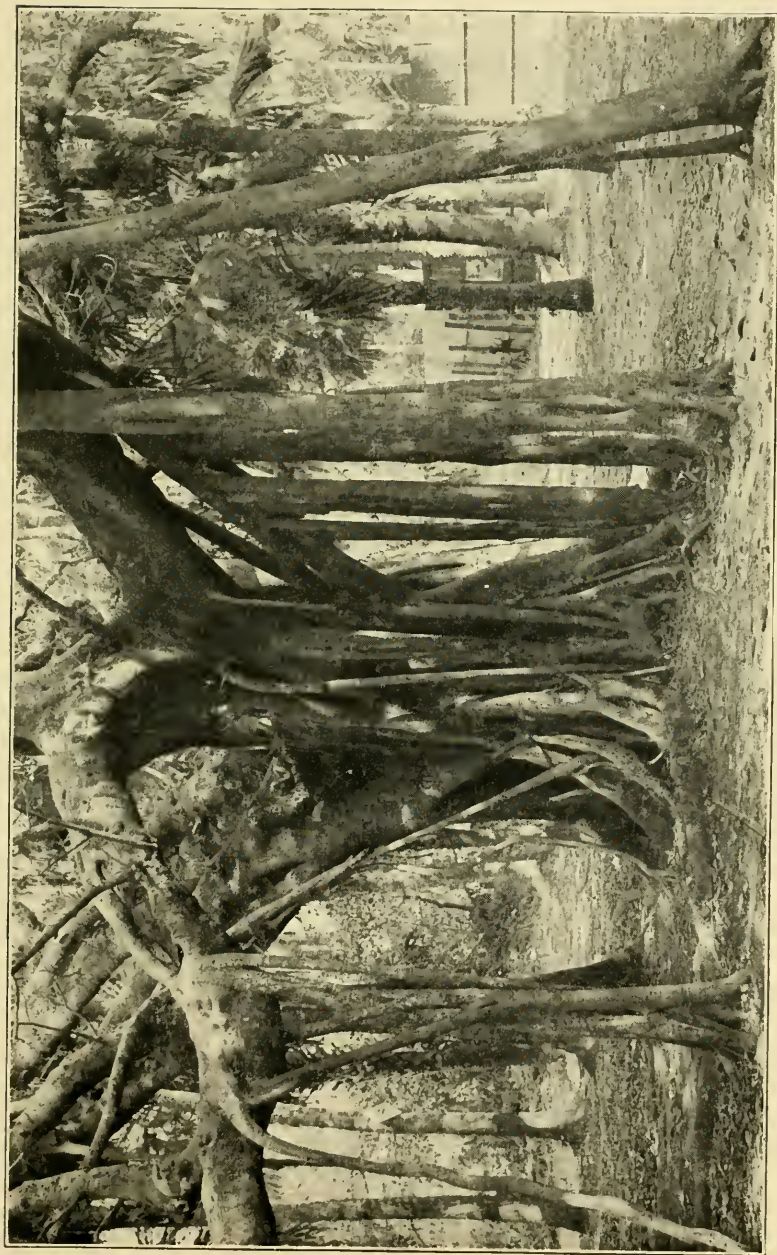
The mango belongs to a disreputable family, the Spondiaceæ or sumac family. It is probably the most respectable of all its relations. It is represented in Florida by a poison tree (*Mctopium Mctopium*) commonly called hog plum, poisonwood, bumwood and doctor gum. It includes the cashew nut (*Anacardium occidentale*), the jobo, pronounced hobo, (*Spondias lutea*), and the famous pepper tree (*Schinus molle*) so common in California.

In spite of the highly poisonous nature of many plants of this family, the mango is very wholesome although I have heard of one or two cases of "mango rash" due presumably to the excessive eating of this fruit. Negroes in many parts of the tropics practically quit work during mango season, devoting themselves assiduously to making the best of a good thing while it lasts.

THE EVERGLADES

The mango is a beautiful, broad-spreading shade tree. Its rounded crown and dense foliage form a perfect shelter from the sun. It has a dark green leaf larger than, but similar in shape to that of the peach. It is never leafless. The young leaves are a beautiful pinkish red. The tree grows to be very large and groups of such trees around the homestead are striking features of many tropical landscapes.

The flowers are small but profuse and a dry winter season is favorable to a good crop. Some of the common mangoes bear heavily almost every year, the branches bending to the ground with the weight of fruit. In planting the seed it is best to remove the outer covering or case by carefully cutting the margin with a sharp knife. The seed may contain two or three embryos, so that it is often possible to secure two or even three trees from a single seed. It is a promising fruit for South Florida and, although it bears in the summer when peaches and other Northern fruits are in the market, it will sell on its merits; and besides there is the probability of keeping it in cold storage till winter, when the tourists come with plenty of money and good appetites for the fruits of the land. By this means, too, the railroads and commission men may be prevented from robbing the owner of the fruits of his toil. Ten years in the future Florida mangoes will be famous. Many local varieties will be developed and perfected and become as well and as favorably known as is the Florida standard grapefruit or pomelo. The same prediction applies to the avocado or alligator pear.



A RUBBER TREE IN FLORIDA.

CHAPTER XVI.

THE GUAVA AND THE ROSE APPLE.



THE goat is the poor man's animal, the guava is his fruit. It has been called the "apple of Florida." When frozen to the ground or burnt by fire spreading from the forest to grass-grown clearings, it springs Phoenix-like from its root, soon yielding again an abundant supply of its welcome fruit. I believe the guava could be dried and cheaply shipped to all parts of the world. If so, it would be the cheapest dried fruit on the market. Guavas fit for jelly are usually worth one cent a pound.

The smell of the ripe fruit disgusts newcomers. Some time ago some Northern people claimed that there was a dead rat under their floor. The smell grew worse from day to day because it was all due to a guava tree by the dining room window ripening a heavy crop of fruit. Now the whole family is eating the fruit. Many are the stories told which hinge upon the smell of the plebeian but useful guava.

We have a bad smelling fungus here which some people call "buzzard fooler." A friend has suggested that this would be an appropriate name for the guava. Strange, indeed, how soon one can become accustomed to smells which are at first nauseating. I have heard it said that the Arab and one or two other races can't stand the smell of even a clean white man.

The odor of the guava and a few other tropical fruits, such as the ti-es and genipap, is mild in comparison with some cheeses. I have heard that the mangosteen, claimed by some to be the prince of all fruits, has at first a repelling odor which is soon counteracted by the lusciousness of the pulp.

AND SOUTHERN FLORIDA

The nose and the palate soon adjust themselves to strange smells and flavors. The first time I ever tried sour-sop-ade it tasted like cotton wool soaked in cider vinegar. Now it belongs in the same category with limeade and crushed pineapple.

The guava, although completely distributed throughout the tropics in both a wild and cultivated state, is undoubtedly an American fruit. It has a fine name, of Indian origin, guajava in Spanish, agreeably shortened to guava in English. In Porto Rico the guavá tree is always called guajava, while the term "guava" is applied to a large leguminous tree much used for shading coffee.

The home of the guava is probably Mexico and Central America; but birds and other animals carry the seeds long distances and, since it will grow almost anywhere in a warm climate, its distribution is wide. It is plentiful everywhere and countless varieties exist. It comes up quickly in abandoned clearings, which exist, strange to say, even in new countries, and when there is neither native nor jelly factory near, it furnishes food to many wild animals. I think it is generally considered the greatest of all jelly fruits, and guajava dulce holds a high place among Spanish-American peoples. The sale of this jelly brings many dollars to Florida, and I have seen cases of it on the platforms of backwoods stations consigned to almost every State in the Union and even to Canada and Europe.

They say when a Northern man gets stranded in Florida he does usually one of three things: he opens a law office, a real estate office, or a jelly factory, and I know of one man who combined these three industries in the same shop!

In addition to the common guava there are several other species of the genus *Psidium* which yield fruits of more or less value. In addition, there are fifty or more species of fruits in South America belonging to the order Myrtaceæ closely related to the guava which are still awaiting the skill of the horticulturist. We are now trying *Feijoa Sellowiana*, a guava-like fruit from Uruguay. The fruits are greenish, containing a rich pulp, and "so highly perfumed that baskets having held them will retain their perfume for weeks." The flowers are snowy white

THE EVERGLADES

and crimson and the petals are edible. I believe it has fruited in California. My plants have flowered, but as yet have formed no fruit.

The genus *Eugenia* alone, although it gives us the delicious Cayenne or Surinam cherry (*Eugenia pitanga*) and the rose apple (*Eugenia Jambos*), has twenty or more fruit-yielding species. Closely related to the guava is the rose apple, the fruits of which have such a sweet, rosy aroma that they are sickening to some people, as is the odor of the tuberose and several flowers in the tropics, which seem to overburden the atmosphere on moist, still nights. Enter a narrow tropical valley in a thicket of rose apple, with rose apples on the ground and rose apples in abundance on the trees, and it will smell the way I suppose an attar-of-rose factory smells. *Caryophyllus Malaccensis*, the large rose apple or Malay apple, with long, dark green leaves, white, purple or red flowers, and apple-odored, fine-flavored fruit, or the Malacca apple or the Java plum, I have not seen in Florida, but the rose apple is at home here and grows wild along water courses in the West Indies. In fact, the rose apple (*Eugenia Jambos*), called pomerosa in Spanish-American countries, has been planted for fuel in the neighborhood of sugar estates. For this purpose it is as good as eucalyptus, grows equally as fast, looks like an eucalypt in general appearance, but yields a fruit besides and seeds big enough to see and feel. The seeds of some eucalypts and melaleucos are so small that the slightest breath of wind will waft them away. Ants love to carry off these little seeds, so that one must have legs on the seed boxes and have each leg resting in a can of kerosene. Many of these fine seeds sprout to better advantage in the specially prepared sprouting media sold by nurserymen than in soil.

The rose apple and the guava have a great future before them, although both are strong smelling fruits, one highly sweet and rosy, the other foetid.

The ti-es is another promising Florida fruit. It is meaty, resembling the yolk of a hard-boiled egg, and attractive in appearance but, like the guava, has a smell that is sickening to some people.

CHAPTER XVII.

RUBBER IN SOUTH FLORIDA.



OWING to the great demand for rubber and the high cost of it to users of rubber goods, there arise from time to time rubber booms and the formation of companies which exploit new fields, new rubber-yielding plants and the pocketbooks of a large proportion of the confiding public, which to a certain extent, at least, to use a slang phrase, get "rubbered." There are very few, if any, successful planted rubber plantations in the world. The supply is still yielded by wild growths.

Newcomers are always interested to know if rubber trees will grow in South Florida; if rubber can be profitably extracted here, and if so, why someone has not been at it long ago. In fact, questions of this nature have been asked, and rubber trees of various kinds have been planted here and there in Florida for many years.

One fact must be borne in mind at the start in the discussion of a question of this kind: which is that rubber is rather widely distributed throughout the plant world, and that many plants contain it, but not in sufficient quantity to warrant its exploitation. It must also be borne in mind that a tree or plant which may be a good commercial rubber producer in one region may not yield sufficient in another, and the difference in the cost of labor may be in itself sufficient to mark the difference between profit and loss.

We have in South Florida two native rubber trees. One is *Ficus aurea*, called usually wild rubber; and the other is *Ficus populnea*, or wild fig. The former is a common tree in the hammocks. It starts on the limbs of other trees from seeds dropped

THE EVERGLADES

by birds, and as it grows gradually chokes to death its host by sending air-roots to the ground which in time become trunks. This is usually called the "banyan habit," although I know of only one true banyan tree in Florida. This came from India, but is similar to and closely related to our native rubber.

In addition to the above, we have several introduced species of *Ficus*. These trees contain rubber, but not in sufficient quantity or of such quality as to prove a profitable commercial venture in a land where labor is as scarce and expensive as in Southern Florida. This applies to fiber manufacture and many other industries which might be successfully operated had we an abundance of very cheap labor. Americans usually get over this difficulty by using labor-saving machinery, and I have not the slightest doubt but that some day, in case rubber is not synthetically manufactured from cheaper and more abundant materials, even small quantities will be extracted by machinery from many of the small plants which contain it.

The famous Para Rubber (*Hevea Brasilensis*), the Panama rubber (*Castilloa elastica*), and the Ceara rubber (*Manihot Glaziovii*), have all been planted here, and will grow here, but they do not flourish, and I doubt if they can ever be successfully propagated here. Of these three, the Ceara rubber grows best, and it is barely possible that this species may be successfully grown in large plantations in regions free from frost, since it does not require a rich soil and grows in dry, sandy or rocky limestone regions. In all the rubber-yielding plants mentioned above, the process of rubber extraction is by means of tapping—that is, various incisions in the trunk from which the sap flows, and is collected in some kind of a receptacle placed ready to receive it.

Of late years, however, there has developed another way. Out in Northern Mexico there grows a low bush on the desert called "Gayule." Land on which Gayule grew could once be had for the asking. Now it is held high, because this bush is collected in bundles or bales and shipped to the factory, where the rubber is extracted from it. I have no doubt but that this plant would grow on the rocky lands of Dade County, since it

AND SOUTHERN FLORIDA

grows in regions of little rainfall and in a climate which is at times much colder than ours.

Of late, however, I have been interested in several rubber-yielding vines. These are highly ornamental and worthy of cultivation simply as an adornment to any home, but if planted along fences I believe they could be cut to the ground each year, and from the enormous amount of leaves and twigs and stems which they develop rubber could be extensively extracted in a way similar to the Gayule industry of the deserts of Mexico.

One of these vines is native to South Florida. It grows in great masses on the shores of Biscayne Bay and on the Keys. It grows to the very tops of the mangrove trees and runs from ground to limbs in twisted, rope-like masses. The twigs and even the leaves are full of sticky milk. This vine is called *Rhabdadenia biflora*. It grows on muddy shores of South Florida and the West Indies, and according to Grisebach's Flora (p. 406), this species is a source of rubber in Jamaica. In this work it is called *Echites paludosa*, the old name for *Rhabdadenia biflora*. It belongs to the dogbane family, and its juice is probably poisonous. It is closely related to the Oleander and Allamanda and Crape Jessamine and other beautiful ornamentals. The flowers of *Rhabdadenia* are white, the foliage is a dark, lustrous green, and the vine may be easily propagated by layering or cuttings in moist, mucky soil.

The best of all rubber vines for South Florida is probably *Cryptostegia grandiflora*. This grows well in South Florida, although it comes from the Far East. This vine is being planted in the Bahama Islands, and the Board of Agriculture of the Bahamas reports that samples of rubber from this vine were shipped to New York and that the rubber it produced was pronounced of very fine quality. One report of the Curator of the Botanic Station at Nassau says:

"I hope to make experimental trials of the yield by cutting down the young shoots almost to the ground, then crushing the stems between rollers. Recent microscopical examination of the bark shows that the milky juice, or 'latex,' is contained in the pith of the young shoots, and in the middle layer of the bark, in

THE EVERGLADES

a network of minute tubes known as lactiferous vessels. These vessels run for the most part longitudinally in the plant tissues, forming a closed and connected system.

"I am positive it is well worth the while of all large proprietors to interest themselves in the rubber vine industry. It proves itself to be hardy and easily cultivated; it can be handled with ease and grows rapidly; produces a first-class rubber, second only, when well prepared, to the best Para rubber."

This is a beautiful ornamental vine of the milkweed family, and produces many seeds, from which young plants may be raised without any particular difficulty. With the new system of rubber extraction, I cannot see why they cannot be cut down each year, or perhaps oftener.

I believe a vine will yield more stems, twigs and leaves on the same piece of land, in the same length of time than will an herb, shrub or tree. The main source of African rubber for years has been from vines—various species of the Genus *Landolphia*. Then, there is not the wait of many years for a yield, as is the case with rubber trees.

In the farm of the future I believe horsepower is going to be gradually displaced by motor power, and that alcohol from waste fruits, etc., will furnish the power. Of almost similar importance is rubber for tires, unless rubber can be replaced by some other material or the amount used reduced by improvements in construction of wheels and springs, or the price of rubber lowered. I believe the high cost of rubber is due mainly, not to a scarcity of the product as much as to a colossal graft. It is still mainly a wild and not a cultivated industry. While the automobile served mainly the pleasures of the rich it little mattered, but now that these vehicles are becoming a necessity to the general public, the cost of tires is a matter of general concern, and the production of rubber a national question.

If some ingenious chemist does not succeed in making rubber out of some cheap product, let us hope that the Southern farmer may some day haul tons of rubber-yielding materials to the mill from his fields and thus share in small part, at least, in the many

AND SOUTHERN FLORIDA

millions which go to the millionaire magnates of New York and Newport and the smoky-colored natives of the tropical rubber jungles to the south of us.

Only a few days ago I pointed out to a Japanese gentleman from Formosa some rubber vines, and was surprised to see how quickly he photographed the plant and collected roots for shipment to Japan by the first mail. Who knows but these enterprising Orientals may not be some day shipping us rubber from a plant, found in Florida, growing rampant under our very noses.

In our modern rush and tumble we often fail to see the good things we actually stumble over. Maybe the vines in our woods which impede our way, which are recklessly cut with the machete, and which besmirk our clothes with a sticky gum, contain in abundance the very stuff we need on the tires of our wagons and the soles of our shoes.

How valuable these vines are as rubber producers is, of course, a question awaiting solution. It is just like a thousand other similar propositions in South Florida and the Tropics in general.

P. S.—A recent careful chemical analysis of *Rhabdadenia biflora* twigs and leaves gathered in South Florida seems to indicate that this plant does not contain sufficient rubber to warrant its cultivation for that purpose. It belongs to the *Apocynaceae* or Dogbane family, an order of plants which yield rubber of more or less value throughout the world. The following plants belong to this order and are classed as rubber yielders:

Actinella Richardsonii, Colorado Rubber; *Anodendron paniculata*, a liana of the East Indies; *Carpodinus lanceolata*, Root-rubber, Central African climber; *Clitandra Henriquesiana*, Root-rubber, an erect shrub of Central Africa; *Ecdysanthera glandulifera*, a climber of Cambodia; *Forsteronia floribunda*, milk-vine of Jamaica; *Forsteronia gracilis*, a liana of British Guiana; *Hancornia speciosa*, Mangaberia Rubber; *Landolphia florida*, Mozambique Rubber; *Landolphia Kirkii*, Zanzibar Rubber; *Landolphia ozeariensis*, Congo or Sierra Leone Rubber; *Landolphia Petersiana*, East African Rubber; *Leuconotis elastica*, Borneo; *Mas-*

THE EVERGLADES

carenhasia elastica, a tree of Madagascar; *Purameria glandulifera*, Talaing Milk Creeper, a Malayan liana; *Tabernamontana crassa*, a tree of Central Africa; *Ureccola elastica*, a climber of Burma; *Willughbeia firma*, Borneo Rubber, a large liana. Liana, or liane, is a term applied to many climbing tropical plants with woody, rope-like stems ascending to the tops of the tallest trees or running long distances on the ground. The above list of rubber-yielding plants of the Dogbane family is copied from Macmillan's "Tropical Gardening" to aid any person who cares to introduce and experiment with these rubber-yielding species in South Florida.



BEARING COFFEE TREE, UNITED STATES EXPERIMENTAL STATION, MIAMI.

CHAPTER XVIII.

COFFEE AND VANILLA IN SOUTH FLORIDA.



OR a summer home I would want nothing better than a coffee plantation in the West Indies or Mexico. They are usually at some elevation, in delightful wooded districts, and in themselves, irrespective of their surroundings, are so beautiful that they have few if any rivals. A coffee plantation is on a par with the finest cherry orchard or orange grove that

I have ever seen. The rich, dark green foliage, the profuse, fragrant white blossoms and the great masses of rich, red cherry-like berries is a combination seldom found in a single plant. Add to this the picturesque Indians, the long mule teams, the winding trails and a host of other pleasant memories and pictures, including, of course, the satisfying effects of a good cup of coffee when you are tired and hungry. I say "hungry," because a cup of coffee is rather a hunger than thirst satisfier.

I have listened to many planters and have diligently read literature on coffee culture and am, above all, impressed with the great variance of opinion and the many apparent contradictions on the subject.

I have heard it said that coffee must have elevation, that coffee must be shaded, that coffee demands a rich, deep soil, etc., etc. All such statements can be easily refuted since coffee has been grown and is growing in many places close to sea level, is grown without shade (is, in fact, a sun lover), and in soil which is neither rich nor deep—in fact, in many instances in soil which is very poor in quality.

As to elevation, it requires no very great stretch of the imagination to regard the earth as two mountains, base to base at the

AND SOUTHERN FLORIDA

equator, with the poles for their summits. Moving northward or southward toward the frost line from the equator being similar in effect to ascending a mountain in the Torrid Zone, the latitude of South Florida or of Southern Brazil and Paraguay produces conditions not unlike those obtained by ascending a mountain in the Torrid Zone to an elevation close to the frost line.

. This much can be said, however, that coffee, like almost all other plants, grows better if protected by windbreaks, grows better if the soil is rich and deep, grows better if there is an abundance of warmth and moisture, especially during the season while the fruit is forming, and, like all other tropical plants, must have a frostless climate.

It never pays to say that coffee will not grow in a certain place until you have tried it—in fact, until you have given it a fair trial, because it is not easily started and does not enjoy being transplanted from place to place.

Here in South Florida we have always taken it for granted that certain things would not grow. We began by trying many of the things which do so well in Southern California. Our rainy season comes in the summer time, and the things which seemed to me most promising here are those which come from South Brazil and Paraguay, or from mountain regions in the tropics close to the frost line.

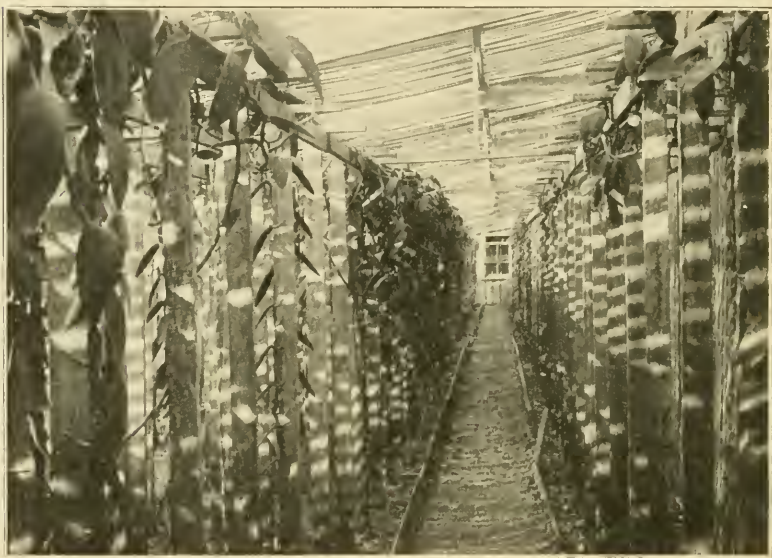
Coffee grows well in West Cuba, which is only a short distance to the south of us, with practically the same climate and same natural flora.

Coffee trees, here and there one or two, have been planted in South Florida for some time and some have fruited heavily, but the row of trees now growing in the Miami Experimental Gardens looks so vigorous and is so full of berries that I could not refrain from photographing a sample tree and from calling the attention of plant lovers to the fact that *real coffee can be, and is now being, produced in the mainland of the United States of America*. The illustration shows the berries in abundance, but these are only half grown. When mature this mass of fruit will weight the slender branches to the ground. There will be coffee enough on these trees to supply a White House banquet. I pre-

THE EVERGLADES

sume the majority of these berries should be used for seed, so that we may have home-grown plants from home-grown seeds.

Coffee probably will never become a staple product for Florida, but there is no reason why every family south of Fort Lauderdale should not have a tree or two. If one has a house with a central open court, coffee will grow in it, and it would be difficult to find a small tree or bush more ornamental in nature and better fitted for such a purpose.



VANILLA SHED, UNITED STATES EXPERIMENTAL STATION, MIAMI.

There is growing in our hammocks a bush or small tree called "Wild Coffee" (*Psychotria undata Jacq*). It resembles true coffee, belongs to the same family and is, I have been told, rich in caffeine. This last mentioned drug enters extensively into dope drinks, and there are many people who place coffee in the same class; but the person who goes wrong from drinking good coffee in moderation would probably go wrong anyway.

In the case of vanilla it is different, because vanilla is native here, and when a thing is native there can be no question as to its

AND SOUTHERN FLORIDA

adaptability. Chapman, years ago, listed it in his Flora of the Southern United States as *Vanilla planifolia*, the commercial vanilla. Small in his recent work gives it the same name, although I believe of late the Florida form has received a distinct specific name. Although it may differ a little from the Central American and Mexican forms, it is vanilla just the same, forming the same rich-smelling pods.

It is a succulent green vine with small leaves, if not at times almost leafless. Its snaky green stems, about the size of one's finger, are supported by aerial roots which cling to the bark of trees. It ascends to the tree tops and is almost epiphytic—in fact, I think wholly so when its aerial roots have sufficient hold on soft-barked trees.

It is an orchid and bears flowers of that same grotesque, attractive type which characterizes the great orchid family. The accompanying illustration shows a part of the vanilla shed in the Miami Experimental Gardens. Several forms of vanilla from various parts of the world are assembled here.

But with many of these things, such as coffee and vanilla and other attractive tropical plants, there is little hope for profit in South Florida, not because they will not grow, but because we have no cheap, semi-slave labor such as they have in many parts of the tropics, where men, women and children work long hours for very little, have but very little, and seem to need but very little. They seem happy in their blissful ignorance—in fact, their happiness is due mainly to ignorance. The morose and thoughtful workers are usually the ones to whom these burdens are most irksome.

It is difficult for Americans to fully comprehend the meaning of peonage. I once rented a cottage for the summer on a coffee plantation in Porto Rico. Here and there were the huts of the natives. They had never lived or worked elsewhere. They seemed like a part of the real estate. They would do their accustomed tasks and take what they could get for their services. Their pay amounted to the cost of the rice and salt fish which they consumed. The rest of their food was picked up here and there on the plantation. Of course, these conditions are changing, in

THE EVERGLADES

fact have changed in Porto Rico, and will soon, no doubt, begin to change in Mexico and Central America. But if South Florida had many other advantages favorable to the culture of coffee and vanilla it could not compete with countries where labor is still under the yoke and where men are paid with promises or with the barest necessities of life, which are in some tropical countries away down to the severest minimum.

CHAPTER XIX.

FRUIT QUALITY IN SOUTH FLORIDA.



IT IS unquestionably true that the fruits and vegetables produced in South Florida, both on 'glade and pine land, have exceptional quality. By quality is meant not only good flavor and color and shape, but also firmness, so that they carry well long distances, in spite of the hard usage to which they are usually subjected in transit.

It is, of course, true that we have excellent selected varieties, and that our expert plant propagators have bred for quality as well as quantity of yield. It is also true that the distance a fruit will carry depends upon the way it is packed and the number of times and the manner in which it is handled before it reaches the consumer. All except the railroads are beginning to realize that a fruit is a living thing even after it leaves the plant. It does not die until long after it is picked. If wounded by careless treatment it soon perishes. The germs of decay enter the injured parts and the complete death and ruin of the fruit is only a matter of a very short time.

Aside from the skill of our plant breeders and the care exercised in the handling of the products of the soil, the fruits and vegetables of South Florida have a quality of sweetness and firmness due, I believe, in the main to the climatic conditions of the region.

Although we have a rainfall fully equal in quantity to many other regions and quite sufficient to support a heavy vegetation, it comes in a bunch, is not evenly distributed throughout the year, and, although it is not always so, the winters are usually clear and very dry. The conditions are therefore droughty, because

THE EVERGLADES

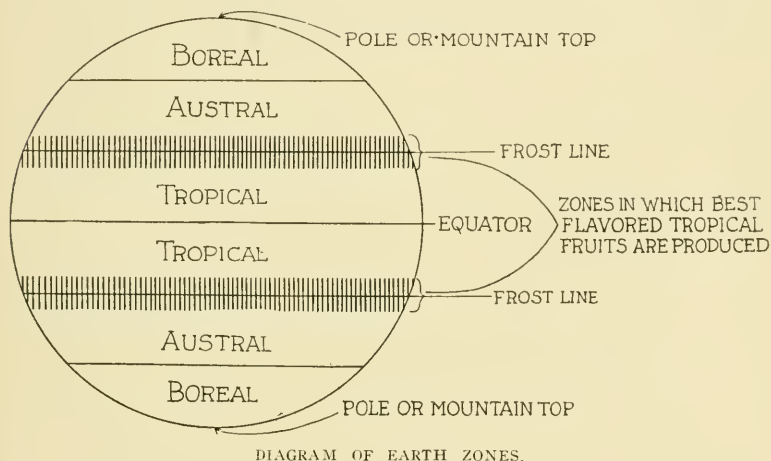
a rainfall to be effective must be evenly distributed throughout the year, regardless of its quantity. Our heaviest rainfall comes in the summer and fall, just the time when the majority of our crops are cultivated with the least success. Tender crops are beaten to the ground by the pelting force of the rain and wind, and a hard shower suddenly followed by a hot sun often does mischief rather than good. Another factor is the wind. The prevailing winds are from the east, and in spite of the fact that they come over miles of ocean, they are dry. It seems strange to speak of "dry ocean winds," but we have them throughout the American tropics. Everybody knows who has lived long in this region that throughout the winter, fogs and mists are very rare, and that wet clothes hung out in the wind from the east or south dry in a very few minutes. I have known workmen to jump overboard with their clothes on, then take them off, wring them out, put them on again, and in a few minutes they would be dry. Along the seashore in the North clothes thus treated would remain damp and clammy for a whole day. Last fall we had a dry hurricane from the South. Although this wind came over miles of ocean, it was so dry that tender vegetation was blackened and parched. Its effect was similar to the chinook wind of the Northwest or the mistral of South Europe. Even such weeds as the Spanish needle were killed, and the tender tips of many trees withered and dried up.

Yucatan is almost surrounded by water, but much of it is desert. The south shores of Cuba, Santo Domingo and Porto Rico are almost desert-like in winter. In fact, in these countries months pass without rain. The same is so of South Florida and the Bahamas, but to less extent. Two months have just passed practically without rain. One clear day usually follows another from October to June, and I have known workmen to lose not more than two days in a whole winter in consequence of bad weather.

Another point is that we have cool nights in winter, and sometimes a temperature close to the frost point. Once in a while it drops a little below the frost point and injures tender vegetables here and there. I doubt if any part of Florida has

AND SOUTHERN FLORIDA

been absolutely free from slight touches of frost. I presume some of the keys have not been touched, at least within the last ten years. These touches are slight, so slight, in fact, that tender tropical fruits are not injured, and I truly believe that a little frost is a blessing in disguise. It is always safe to assume that somebody to the north of us is getting more of it—in fact, too much of it—and, as I am about to explain, this check due to dryness and coolness in winter is what gives sweetness and firmness to our fruits and vegetables.

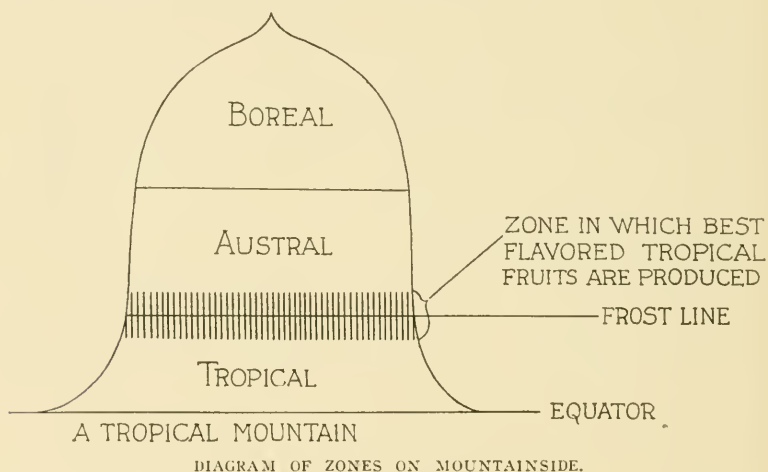


In short, the dry atmosphere and the coolness of winter check vegetative growth, increase productivity, give a periodicity to the crop and cause the formation of sugar with less acid and water. Sugar is a great preservative. It is, in fact, antiseptic. Cool nights produce sweet oranges.

Go to any coast town in the tropics and buy good fruit. Ask where it was produced and the answer will be, "up in the hills." In regions of abundant warmth and moisture throughout the year there is excessive vegetative growth, a small crop of fruit of poor quality. Fruit quality is easily influenced. For instance, the fruit of a young, quick-growing pomelo is usually thick-skinned and full of rag, and the same is so if this fruit is from a June blossom.

THE EVERGLADES

In the tropics it is often necessary to girdle trees to produce bloom. It is quite the custom to drive spikes into and hack the trunks of cocopalms to make them bear. A hurricane is usually followed by a good fruit year. Trees in the forest usually have a heavy seed year after their butts have been scorched by a bush fire. Mangoes bear best if the winter is dry, and root pruning is often practiced to force them into fruit. Trees well pruned are the best fruit producers. An unpruned grapevine is almost useless except for ornament. All these things act as checks to vegetative growth, and it is a law of nature that everything strives to reproduce its kind under adversity.



It is usually supposed that coffee must be grown high up in the hills in the tropics. Coffee will grow at sea level in many places and although it is regarded as a tender tree, even in the tropics, it fruits well at the Experimental station in Miami. The same applies to vanilla, one species of which is native to South Florida.

The olive grows well in South Florida, but does not fruit. The navel orange grows well in South Florida and the tropics, but bears best in California, where it is most prolific. The Mulgoba mango grows in South Florida in great luxuriance, but is

a shy bearer. Some of these things are hard to explain, but I believe the conditions here, in spite of our dryness and coolness in winter, are still too favorable; and like many rich men's sons, some trees are too prosperous to be fruitful.

Wherever I have been in the tropics I have been impressed with the fact that right under the frost line is the place where the best fruit is produced and the most of it, and where other conditions—social, etc.—are at their best. I am also convinced that in about latitude 26, which is the latitude of South Florida, we get practically the same conditions and effects that are secured by ascending a mountain in the Torrid Zone to a point just under the frost line.

Suppose we have a mountain on the equator; if several thousand feet high, we would pass in going from sea level to the top through the tropical, austral and boreal zones. Just where the tropical blends into the austral (other conditions being favorable) you would probably find the best fruit region.

In the same way we may regard the earth as two mountains placed base to base. The best fruit district on these mountains would likewise be (other conditions being favorable) right under the frost line, where the tropical and austral zones meet. This spot is about 26 degrees, which is the latitude of South Florida.

Therefore, treating the earth as two mountains, base to base, I cannot see why we should not expect all plants that grow well in the tropics up to the frost line to grow equally well in South Florida, with a few exceptions.

Over a mountain side in the tropics we have many advantages, especially nearness to market and quickness in transit, since in many cases, even in the West Indies, it is a longer journey in time from the hills to the coast than from Florida to the great consumption centers of the North.

There are thousands of useful plants in the mountains of the tropics of the world which should be introduced and fairly tried in Florida. Posterity will have something to do in this line for centuries to come.

It very often happens that a plant introduced into a new region does better than in its native land. Several American

THE EVERGLADES

trees do better in Europe than in this country. Being introduced into a new land, they often escape their old enemies. A large percentage of our useful plants have come from the far East. There are thousands more in Africa, Australia and South America.

It is impossible to say what will grow here until many trials have been made, but of the fruits and vegetables now produced here the *quality* is uniformly good. Take the common tomato, originally from the highlands of Mexico, for example. In the North in the summer it is usually watery and acid. It is, in fact, a vegetable, and is not palatable unless cooked or covered with condiments. In South Florida it is firm and sweet, may be eaten out of the hand, and is, in fact, a fruit.

And although we have insect and fungus pests enough, we have not the variety or quantity that exist in the regions south of us, close to the sea coast, with muggy Turkish-bath atmospheres.

The very luxuriance of many tropical regions is their main drawback. In many such places man vegetates, also. Even with plants, fruitfulness is increased by slight checks or obstacles. It is so throughout the whole living world. There can be no victory without a battle. Newcomers must not think that our problems have been solved or that the stage of experimentation is over, or even well under way. It has hardly begun. Only fifteen years ago our natives believed that fruits and vegetables could not be grown here. They lived on sea truck and the starch of a wild sago called *comptie* or *koonti*. Now millions of crates of fruits and vegetables leave this region by the carload. The production as to kind and quantity fifteen years hence is the purest kind of guesswork, but judging from the character of what is now produced, it would be safe to wager on its *quality*.

CHAPTER XX.

NEW ROOTS FOR OLD TREES.



IN SOUTH FLORIDA and the West Indies there is here and there a citrus grove which is sick and unproductive. In many cases this is due, of course, to improper care, insufficient fertilizer or moisture or unsuitable soil. In some instances, however, there are sick trees on good soil and in groves which are well conducted. These trees are often in the midst of healthy, heavily producing neighbors.

In my experience I find the soil not so important as one might suppose. Good, healthy trees are growing on all kinds of soil in South Florida—by this I mean marl, muck, hammock, sand or rock soils. Supply a citrus tree with the proper amount of water and the proper amount and kind of fertilizer, and give it the proper amount of cultivation, and it will grow and produce on any of the above-mentioned soils. It requires, of course, more fertilizer, water and cultivation to produce a good tree on some soils than others.

In spite of the soil and care bestowed on citrus trees, there are now and then sick ones, and now and then whole groves which have been, and continue to be, in a languishing condition. When one sees a sick tree he usually condemns the soil off-hand, and many a good piece of land has been thus unfairly abandoned. When a citrus tree which receives the proper amount of moisture, fertilizer and cultivation, becomes subject to insect and fungus pests there is often something fundamentally, physiologically wrong. It is very often the case that these pests are not the direct cause of the illness, but are a *consequence*. If a tree has the proper vitality it seldom falls a prey to pests.

THE EVERGLADES

One of the main troubles, if not *the* main trouble, is with the stock on which the tree is budded. Different localities require different stocks. Suppose I am about to start a grove in Cuba and I order from a nurseryman, pomelo or rough lemon stock. Being a new region I may not be certain that rough lemon stock is the best for that particular locality. I am also not certain that I am getting the stock I order. Just as a merchant may hand a five, ten or fifteen-cent cigar out of the same box, so do some nurserymen give you whatever is ordered from the same bed of trees.

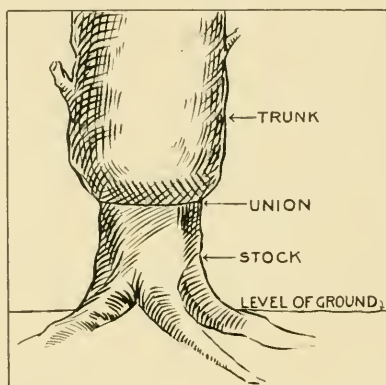


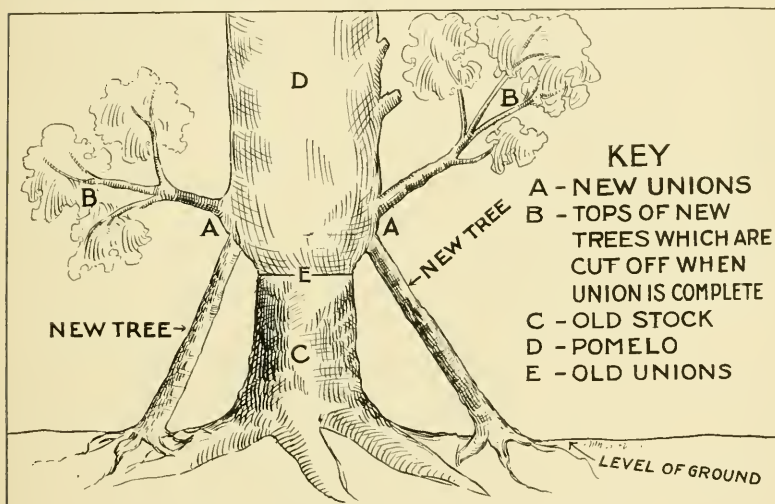
DIAGRAM SHOWING HOW THE PART ABOVE THE BUD UNION HAS OUTGROWN THE STOCK.

In examining many sickly trees in the West Indies and Florida, I have found that the sick ones are invariably on roots which the tops have outgrown. For instance, it is common to find trees with diameters twice as big above the bud as below it. It does not require an expert to see that such a condition cannot help but affect the nutritive processes of the tree, and that a tree with such a constriction at its butt might easily die of starvation in the presence of plenty of fertilizer and moisture. There is not the proper balance between top and root. It is, therefore, highly important to secure a stock that grows at the same rate as the bud in the special locality in which your grove is located. In other words, the kind of stock must be decided by experience

AND SOUTHERN FLORIDA

for each locality. In South Florida (on certain soils) the best stock for pomelo is rough lemon. Pomelo on lime stock produces a fine quality of fruit, but the grapefruit soon outgrows it and the top commences to die back and fall subject to disease. The tangerine does very well on lime stock in this district and I presume the tangelo, a famous new fruit, being a cross between the pomelo and tangerine, will also thrive on lime roots.

In South Florida there are many groves on the wrong kind of stock and many growers have begun to shift their trees onto new roots. This shifting of an old tree to new roots in a very short



INARCHING—REINFORCING A TREE WITH NEW ROOTS.

time has always appealed to me as a great horticultural triumph, just as building a new bridge in place of an old one without disturbing traffic is a triumph of engineering skill. The process is so simple, however, that almost anyone can do it. In fact, some growers are practicing it just to stimulate their trees and brace them against storm by extra rootage. The process is in brief as follows:

Plant two or three or as many small trees as you like of the kind of stock desired close to the old tree. As soon as they are

THE EVERGLADES

firmly rooted and growing, abrade the surfaces at the point of contact and they will soon unite with the old tree and help feed it. The place of union should, of course, be bound by wax and tape until the union is complete. The tops of the young trees may then be cut off. As soon as the young stems have reached considerable size the old root may be severed, but it does no injury and is usually left. This process of rootage reinforcement may be used at any time to give vigor to old trees. It is like putting new legs on an old man.

The quality of the fruit may be thus influenced also. It is usually said by horticulturists that the class of fruit produced by a bud remains always true to the bud and is not influenced by the stock. Every grower in this district fully realizes that if the same pomelo is budded on rough lemon and lime stock the fruit from the bud on lime stock will differ not only in appearance, but in flavor from the bud on rough lemon stock. The two trees may be set side by side. The fruit from the lime stock is smaller and cleaner, in fact better in flavor and texture, and many would use lime stock were it not for the fact that the pomelo outgrows it and the lime is not a deep rooter.

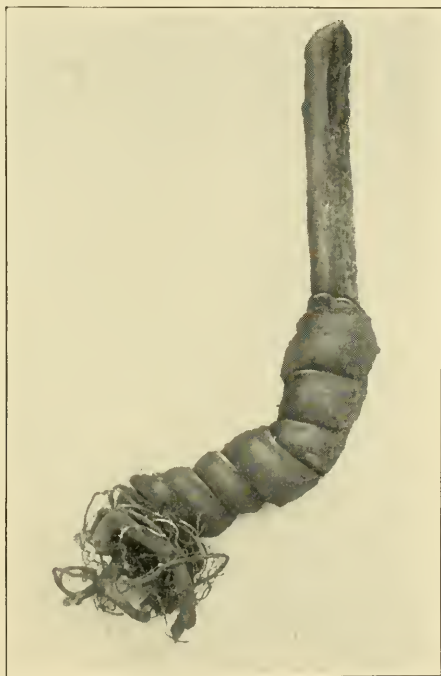
It is also said that the quality and appearance of a fruit is not modified by the pollen from neighboring trees of the same genus. Unless I am very much mistaken, the quality of limes grown amongst rough lemons is inferior from the contamination of the lemon pollen. The fruit is larger, coarser, and has a rougher skin. Cut away the lemons and an improvement is noticeable.

This seems true also of the mango. I know of one Mulgoba mango close to a common fibrous turpentine mango. The years when they bloomed at the same time the Mulgoba fruit was off color, stringy and poor in quality. The years when they did not bloom together or when the bloom from the turpentine mango was cut away the Mulgoba bore normal fruit, although few in number.

It is often the case that choice mangoes and other valuable tropical fruits are budded on stock which has been kept too long in pots. They have become, in fact, pot-bound and have a main

AND SOUTHERN FLORIDA

root which is the shape of a corkscrew. These roots seldom recover from this condition, and in spite of all the attention you may give the plant it will slowly go back on you. The top is too valuable to lose, yet the part above the union seldom grows into a healthy tree with a corkscrew root. The only way out is to plant a healthy seedling near it and then in-arch the top on the new root.



A CORKSCREW ROOT.

One of the main troubles with trees, anyway, is the maintenance of a proper balance between root and crown. It is always difficult to know just how much to prune. Pruning favors the root for a time, but if the root is unable to nourish the top die-back begins, and the sooner the old tree is reinforced or supplied with new roots the better.

THE EVERGLADES

The effects of the wrong kind of stock do not begin to show seriously until the tree is of some size—in fact, of good bearing age. It is too valuable to lose, and although men spend much time and money doctoring such trees by spraying, etc., it would pay at the start to give it a new root. Some men think their trees are all on rough lemon stock because their nurseryman said so, but it always pays to know; and the only way to be sure is to let the stock sucker from the root, and the leaves and spines in the sucker will usually tell the tale.

By examining the leaves of some suckers in a grove which was not prospering, we found pomelo on sour orange stock and on Sicily lemon and on lime stock, and we found orange on pomelo roots. A grove near by on rough lemon was in a flourishing condition. On other soils and in other localities, the reverse might be the case.

I can easily imagine the bewilderment of the young planter when he first discovers that the sweet orange is budded on the sour orange root, orange on lemon, lemon on orange, orange on pomelo, pomelo on orange, pomelo on lemon, tangerine on lime, pomelo on lime, lime on lemon, etc., etc. It would be sane to suppose that a plant would grow best on its own root, but the truth is, some varieties of citrus do better on one kind of root in one district and another kind of root in another district, and there is nothing more important than learning from your own or other people's experience the kind of stocks best suited for the special district in which your grove may be located. But look to the root—upon the character of the root depends the character of your tree.

When the young man dreams of golden fruits and golden dollars in the land of sunshine, he must not forget that there are many little things to learn, the failure of any one of which may break his hopes and bank account, if not his back.

CHAPTER XXI.

HOW TO GET A LOT OF WORK OUT OF A SMALL WINDMILL.



THE windmill and well need no description in this connection, since they are both as simple as possible in this section. Wind is steady and almost constant and water is almost always close to the surface, so that the lift is short and the power required light.

The tank (see page 142) consists of reinforced concrete set on six concrete posts. It is twice as long as wide and is divided into two parts, marked tank A and tank B. The tank should be plastered on the inside with rich cement mortar to which some air-slacked lime has been added. The air-slacked lime in small quantity in the mortar produces a tighter coating and helps to prevent leakage. The space under the tank may be used for laundry or other purposes. The mill pumps into tank A. When tank A is full up to the connecting pipe "B," the water flows into tank B. Tank B is covered with a glass sash, so that the sun warms this water and keeps it at a pleasant temperature for bathing purposes. When tanks A and B are full up to the top of the siphon "A," the contents of tank A rush out with force into irrigation pipes, horse or chicken troughs, fountains, etc. As soon as tank A is empty, the flow stops and does not commence again until the tanks are full. When the tanks are full it rushes out again until tank A is empty. By this scheme of duplex tanks and siphon one may have a constant supply of warm water on the principle of the solar heater for house use and at the same time a constant automatic flush for irrigation and general watering purposes. I have heard it said by experienced parties that a windmill arranged with siphon

THE EVERGLADES

tank, so that there is a strong flush at regular intervals, will sub-irrigate three acres of land.

Where it can be successfully worked, subirrigation through loose tiles is in my opinion the best of all methods.

In fact, as is done at Sanford, these tiles may be brought together at the end so that in wet weather they will serve as drain tiles. Tile for this purpose may be cheaply constructed at home from sand and cement.

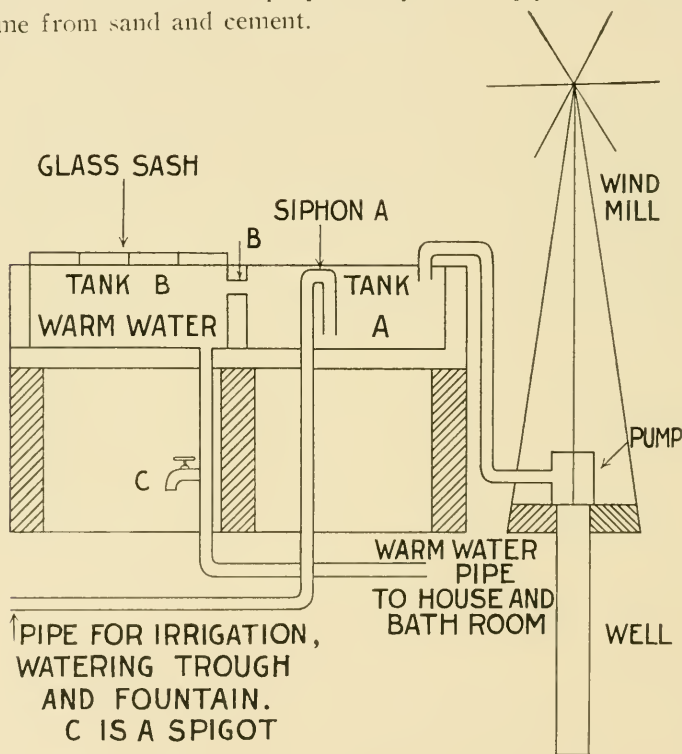


DIAGRAM OF A WINDMILL AND TANK.

A (see illustration page 143) is entrance to this network of loose clay or cement tile. B (see illustration page 143) is the exit. There must, of course, be a slight incline toward B. During irrigation the exit B is closed and the water enters A and flushes the whole system.

AND SOUTHERN FLORIDA

To convert this into a drainage system, the supply A is closed, the exit B is opened, but there must be, of course, a ditch at B to carry off the drainage water.

This system of irrigation may have its disadvantages and may only be applicable to certain locations and soils, but where it does apply it is certainly the best and cheapest.

In calling it "the best" I speak wholly from the standpoint of plant physiology and economy. The water which the plant

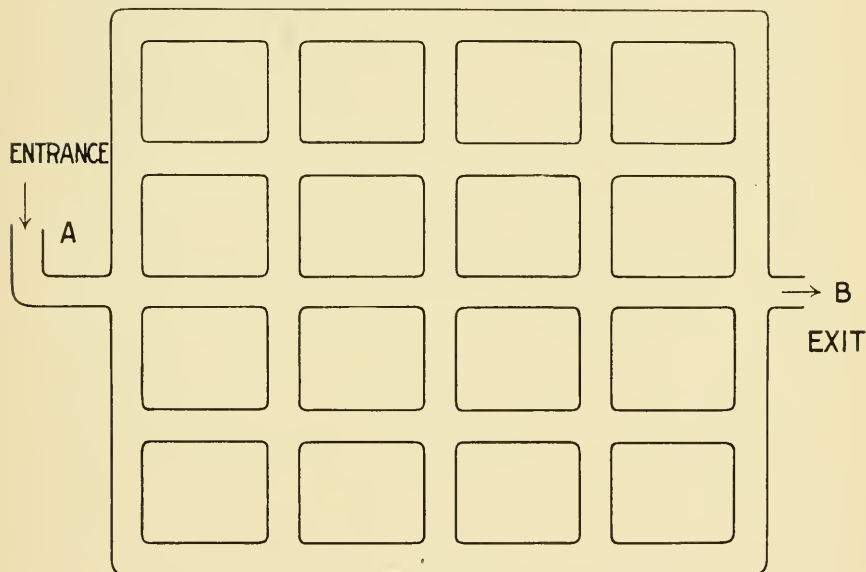


DIAGRAM OF A LOOSE TILE IRRIGATING AND DRAINAGE SYSTEM.

uses should come from below in a steady, automatic way. There should be a dust mulch on the surface, and the water should rise to the plant by capillarity. When there is a flush of water at regular intervals, as would be supplied by the tank siphon system, there is also a flush of air through the pipes; and air is just as essential to the roots of plants as is water. All air or all water in the interstices of the soil is not desirable. The application of water to the surface of a soil causes a superficial root

THE EVERGLADES

development. It often requires an enormous amount of water to wet some soils on the surface, especially some sandy soils in South Florida. After heavy rains on sandy soils one can often find dust a short distance below the surface. A large amount of water is lost by evaporation. Keep the soil moist an inch or more below the surface under a fine dust mulch and the conditions are best for a healthy tree growth. The soil should be driest on the surface, not wet above and dry beneath. Sub-irrigation combined with ditches will no doubt fit the Everglades better than any other system—in fact, by controlling the water-table by the aid of ditches and dams so that it can be raised or lowered at any time without difficulty a perfect system of sub-irrigation is produced without the use of pipes. In case, however, the water-table is too low, as it will no doubt be in many cases, it will be necessary to resort to pumps or tanks and pipes.

The Sanford system is the best I have seen, and although it may have objections and is by no means perfect and adaptable to all conditions, it costs less, and from the standpoint of botanical physiology supplies the water in the right way and in the right place. To be sure, the natural rain falls on the surface but the bulk of the water the plant uses sinks down first and then comes up again by capillarity. Water is the vehicle of the mineral plant-food and should be applied in such a way that it will have great solvent action and be constantly present in just the proper quantity for plant growth. It is better to have a little less water than too much of it. Too much of it washes away the fertility and is lost—too little merely checks growth for a time. When applied from beneath the surface there is less danger of soil saturation and better opportunity to keep the water-table just where it is needed for best results, especially if, as in the Sanford system, it can be used for drainage in times of heavy rain.

The two objections which I have heard to this system are first that there must be an impervious subsoil rather close to the surface soil to hold the water. I can't see, however, why an impervious subsoil is any more necessary in one kind of irrigation than in another. The water-table is not far from

AND SOUTHERN FLORIDA

the surface, anyway, in South Florida. There are times extending over weeks when there is plenty of moisture and when irrigation does harm rather than good. The second objection is that since these tiles are loose and not fastened together with cement, fine tree roots will work into the crevices and choke up the pipes. This is not a serious objection when you consider that such a growth is a sure sign that your trees are growing and that they are after just what you are giving them. One can dig up the tiles and shift them at very slight expense. To condemn the system for this reason would be like refusing to buy your son new clothes solely because he had outgrown his old ones. One difficulty has been to get force of water enough from a small windmill to carry to the end of your system, even if you have a good fall. This difficulty is automatically overcome by the siphon scheme in tank A. The whole question of irrigation and drainage is to have the water-table always at just the proper level in the soil to suit the kind of crop you are trying to raise. There is no simpler, cheaper or more efficient way of doing it than by a system of subirrigation and drainage similar to the methods applied at Sanford.

CHAPTER XXII.

WHAT IS MUCK?



MUCK in South Florida is a black *friable* soil consisting of decomposed vegetable matter mixed with marl, sand and other natural refuse. I have underscored the word *friable*, which means easily crumbled, or pulverized, or, as a farmer would say, easily "worked." The friability of muck distinguishes it from peat, which is fibrous, incompletely decomposed, poor in nitrogen and fairly free from marl, sand and other natural refuse.

I am about to put in black and white a sweeping statement based on my own as well as the experiences of others. It is a statement which I write guardedly after due reflection, but it is almost axiomatic, and is as follows: *The muck content of a marl or sand soil in South Florida is the measure of its natural fertility.*

In other words, if our sand or marl soils do not contain decomposed vegetable matter, which is muck or humus, they will produce without the application of fertilizer little more than pine trees and palmettoes. If there is any fertile soil in South Florida, it is the muck soil and the soil in hammocks. The hammock soil consists mainly of leaf mold.

Vegetable matter in a soil holds water as does a sponge; in coarse, sandy soils it fills the interstices and aids capillarity, as does a wick, and in tight marl or clay soils it imparts looseness and facilitates drainage. Although the above may sound contradictory, it is true that muck in mixture with sand or marl is a great quality evener, correcting the defects in both.

Returning to my definition of muck, it is only natural to ask the source of this "marl, sand and other natural refuse," which is usually mixed with muck, or vice versa. Enthusiastic gladers, in speaking of pure muck, often lay special stress on the word *pure*. Although apparently pure muck is plentiful, it is rare indeed unmixed with other materials to some extent. It is in fact usually mixed with sand or marl or both, and is all the better for it.

In my youth I worked in the cranberry bogs of New Jersey. In order to produce a great yield of berries it was necessary to "sand" the bogs from time to time. A layer of an inch or more was spread over the surface of the muck.

Marl is a fine deposit of the carbonate of lime, with perhaps other mineral ingredients which the water of the glades is no longer able to hold in solution in the process of evaporation. It drops in a fine flocculent state to the bottom, and for a time clings like slime to every twig and blade of grass. During times when the glades are not flooded it is no doubt washed by rains through the loose muck and forms in strata at varying depths.

It is hardly necessary to explain the source of sand, which is washed in and blown in from almost every direction. In fact, it comes up from below, where there are springs. Sand is, in fact, almost omnipresent in South Florida. Silica, or pure sand, enters into the composition of the outer coating of grasses; in fact, the stalks of corn, cane and bamboo are covered with it to such extent that they have a hard, shiny and slippery surface.

As to other "natural refuse," it would be difficult to enumerate its many sources. It includes the shells of snails, the bones of various animals such as turtles, the castings of many creatures invisible to the naked eye, the droppings of birds, the hodge-podge of wind and wave; and, although the Everglades look bare and lonely, there are many creatures there, both visible and invisible, benign, neutral or destructive. Even the alligator is by no means as yet nearing extinction.

Those delicately-fashioned, microscopic plants called "diatoms" usually swarm in such places. Their silicious castings,

THE EVERGLADES

although minute, exist in some parts of the world to such extent that they form strata of soil known as "diatomaceous earths." They enter extensively into the composition of some marls.

In general, the word "muck" has as broad a meaning as has the word "mud." Any kind of sloppy stuff may be safely called mud, and the same applies to the word muck. It is easy to throw different things together under the same name, even if they have only one unimportant quality in common. For instance, a mason will call his mortar "mud," just as electricians frequently call the current in the wire "juice." The word "muck" really means manure, as is indicated in the common term "muckraker." It is also applied to "vegetable mold commonly combined with earth, as swamp-muck," and no doubt the richness of the latter is the source of the application of the term to soil.

Those soils usually referred to as "rich black lands," especially in the Tropics, owe their color and fertility, of course, to the large percentage of decomposed vegetation which they contain. In fact, when one speaks of these "black lands" in a tropical country it is superfluous to use the adjective "rich," since their richness goes without saying. It also goes without saying that *when drained they are the first to sell*, and I think I am safe in saying that *the record prices for agricultural land are held by the reclaimed muck lands*. If poor land is worth fifty cents, an acre of good land ought to be worth five hundred dollars, in comparison; in fact, a cent a square foot seems cheap for everything except land.

Muck has a right to fairly reek with richness. In a warm climate the leaves and other detritus are constantly falling. Leaves are never heaped up in great piles all of a sudden, as they are in the fall in the North, just at a time when the cold of winter prevents decomposition. The moist, warm ground of the Tropics forms the very best bed for the activities of the organisms of decay. Decomposition is therefore not only quick, but continuous. In the shallow water of the Glades, at times dry and exposed to the sun, but usually (before drained) little more

AND SOUTHERN FLORIDA

than a slough hardly deep enough to float a flat-boat, decomposition must be rapid. The whole is usually covered with a mass of sawgrass higher than your head, falling in great masses, crop after crop, for ages past, with no cold to check vegetative growth or decomposition, mixed with deposits of marl and the detritus of living creatures great and small. All this was and is being deposited on the bed of an old bay or arm of the sea, as is evidenced by the great masses of shells, and the like, a few feet below the surface. *If the Everglades are not a great store-house of natural fertility no other place on earth has the right to claim it.*

Such terms as mud, muck, peat, marl, etc., are indefinite and loosely and variously applied in the many localities in which they are located, and may be, as they usually are, of very different composition.

Even the term sand, as commonly applied, relates more to the character and consistency of the substance than to its chemical composition. Pure sand is always supposed to be silica, but what is often called sand in South Florida and the West Indies may be ground coral or shell, and consists almost entirely of the carbonate of lime. The so-called "coral sands" of the Tropics often harden into limestone rock and may be burnt into lime.

Half the disputes of this character in this world hinge on definitions, and the more indefinite the terms the wider is the scope for discussion and altercation.

The great *sine qua non* for soils, the thing that imparts freshness and virginity, the thing that gives them life and productivity, is humus. Humus is decayed vegetable matter, and muck is a form of humus. The degree of richness of humus depends on the character of the detritus which forms it. If from leaves and wood of such trees as beech, oak or mahogany, it is extremely rich, and while that from grasses may not equal it, it is all more or less rich if completely decomposed. I have read of an old English gardener who was famous for the quantity, and especially the quality, of vegetables and fruit which he produced on a small area of land. His hobby was never to use any

THE EVERGLADES

kind of fertilizer except powdered rock, wood ashes and leaf mold. He could, in truth, have used nothing better.

When a soil is worn out, when a field fails to yield a sufficient return to pay for labor and seed, the trouble is usually due to a lack of humus. Capital must be put into it, rejuvenation must begin, green crops must be grown and plowed under and stable manure is usually lavishly applied; in other words, humus is added, not only to enrich it but to loosen and aerate it, as well as to increase its moisture content. Although in *spots* a little too duffy or peaty, and as yet incompletely decomposed into humus, the Everglades as a whole are almost pure humus, and would always be benefited by an admixture of sand or marl.

We must regard a soil as not merely the substances which constitute it. A soil is the home of countless living organisms. Alfalfa, for instance, will not grow in a soil which does not contain the alfalfa bacteroid. Darwin has shown what the earthworm can do; in fact, the soil in some places is a menagerie of minute living things—some good, some bad, but by far the majority in a soil rich in humus are beneficent. When we call a wornout soil "dead," we are literally correct. With the exhaustion of the humus upon which these organisms feed, their death ensues.

Nature is ever striving to correct this lack of humus. Vegetation is constantly shedding this fertility on the surface in the form of detritus, which rots into humus. The pioneer plants first appear on a denuded hillside or other bald region which for many reasons may be destitute of vegetation; seeds of many things are brought by the winds or carried by birds, and humus is very slowly added, if retarding influences, such as fire interfere; but in time, ages in fact, Nature wins out, and a climax forest, such as the tropical hammock, results.

In northern bogs the decomposition of organic matter is arrested not only by the cold which restricts the activities of the living organisms which cause it, but acids are produced which render the soil sour. The natural disintegration of vegetable matter is thus hindered to such extent that duff in such places as the Adirondacks accumulates several feet in thickness. In

AND SOUTHERN FLORIDA

bogs in the old country the peat is antiseptic, and natives bury perishable articles to preserve them. Logs such as bog-oak in the British Isles, and white cedar in New Jersey, have been buried for ages, and are today, when exhumed, as sound as ever. Peat from Holland is baled and shipped to Hoboken on the Dutch Line, and is used for bedding sick horses because of its absorbent and antiseptic nature.

In the Everglades, however, there is very little sourness or acidity, because of the natural alkalinity of the water. There is probably less acidity than on high lands which are covered with palmettoes. The roots of palmettoes are strongly acid and do not disintegrate for a long period of time. The waters of the whole Everglade region are charged with lime. Owing to the sweetness of the fresh soil, a good crop can usually be produced on Everglade muck the very first year, and there is, in consequence, never the long wait and expense of liming, which is usually the case in the sweetening and taming of bog lands in the North. This natural sweetness of the soil of the Everglades accounts in part also for the rapid decomposition, since the organisms of decay usually operate with greater vigor in a solution which is alkaline in nature.

If the Everglades had not been covered with an excess of water during a long portion of the year, it would have been a great hardwood forest, as dense and dank as the Anotalaaga Hammock; the soil would have been even more fertile, but the process of clearing would have been very expensive. It was for long periods too wet for almost everything except sawgrass and other aquatic plants. These for untold ages have been growing, falling and rotting until there is now in many places several feet of this rich, black vegetable matter, a great agricultural reserve material for the future, just as the phosphate beds are a great reserve of phosphorus from the bones, etc., of the animals of the sea.

This great body of muck formed in spite of the fires which swept over it during the dry season and which the Indians still set for various purposes. In fact, I have seen parties of white men fire the sawgrass just to clear the landscape and facilitate

THE EVERGLADES

walking. These fires, of course, have added a thin coating of ashes without injury to the roots, so that there has quickly followed another growth of sawgrass. When the water is off, wild flowers begin to appear, and up on the high white banks along the canals wild rubbers, the seeds of which have been dropped by passing birds, are already in evidence.

The bulk of our "hammock" bearing trees produce berries, the seeds of which are carried by birds and other animals. Very few, such as the mahogany, have winged seeds or samarras for distribution by the wind. When the Everglades are drained, if they are not immediately cultivated and kept in cultivation, the birds will supply the seeds, and with the moist, mucky germinating bed in waiting, and with the forcing house warmth and natural virility of the soil, a tropical forest jungle will follow with almost magical rapidity. If this muck had been covered with a dense forest growth even the most skeptical would never doubt its fertility, but the absence of trees is due solely to an excess of water. If the water had been salt it would have been, and perhaps at one time has been, a great mangrove swamp forest similar to the land south of the glades toward Cape Sable. The absence of buried logs and stumps would seem to indicate that for many ages it has been nothing but a fresh sawgrass morass.

Counting time as we know it, Nature has been, no doubt, cons in storing this decomposed vegetable matter for this the first generation able by its engineering skill to reclaim it. In a short time, no doubt, it will pass into the fertile field stage. An area equal to a province or small kingdom has been lying dormant all these years with its natural channels and openings clogged. Open the way and the great steamship lines which hug our shore so close that their whistles can be heard and smokestacks seen, will stop and carry the products of the land to our greatest markets at a third, if not a fifth, of the present transportation cost. Given quick and cheap transportation and an organized distribution of products, and little questions such as what is muck, and what will muck produce, will quickly answer themselves.

CHAPTER XXIII.

EVERGLADE SANITATION.



ACK of all this recent industrial development in the American Tropics is the fact that science has control of its worst enemy—disease—especially such diseases as yellow fever, malarial fevers, and hookworm. The discovery of the causes and means of transmission of these diseases is of very recent date. A careful study of mortality statistics soon convinces one that unhealthfulness is no longer a factor in preventing one from settling in a climate without winter; in fact, the equable temperature throughout the year of Southern Florida and the West Indies draws southward ever-increasing numbers of permanent settlers. For ages, however, development in tropical countries lagged—lagged because of one great fear—the fear of epidemics of various kinds which formerly discouraged capital and retarded progress of all kinds. When a great epidemic mowed down whole communities like the famous Juggernaut of old, nothing was left but despondency, and newcomers shunned such places for years. In spite of boundless natural resources there was, in consequence, stagnation.

This fear of the Tropics is still deeply grounded in the minds of many people, and nothing has done more to discredit Florida than the fear of malaria. The easiest and most effective way to “knock” a region is to pronounce it “sickly.” In this way fear instead of reason is invoked. There are many northern cities, and country districts as well, where malaria is prevalent and where it would be dangerous for a healthy person to tarry during the summer mosquito season without nets and quinine. There are parts of Florida also where malaria is common, but

THE EVERGLADES

to call the whole of Florida malarial is as much of a libel as it would be to call the whole of Pennsylvania and Maryland malarial, while it is true that in parts of the latter named states malaria is just as common as it is in any part of Florida.

To make a long story short, there is no place on earth freer from disease than the Everglades in its wild, uninhabited state; the only diseases which we need fear are those which will be brought in from other places by many newcomers, and the worst of these diseases are the kinds which will be transmitted from man to man through the agency of various insects such as the housefly, the flea or the mosquito.

The community's great safeguard, therefore, is in sanitation, which in this day mainly means the safe segregation of the dangerous sick and of their excreta and the control, and, if possible, the extermination of these pesky insect disease carriers.

A malarial mosquito or a yellow fever mosquito is no worse than any other kind of mosquito if it is not infected, and it will not be infected if there is no malarial or yellow fever patient for it to feed on.

I am glad to say there are very few mosquitoes in the Everglades. They are kept in check, no doubt, by their natural enemies, such as small fishes. The remarkable freedom of the Everglades from mosquitoes is a surprise to most people, but the fact has been known for many years. Years ago I heard the statement that the Indians always left the pineland for the Everglades during the summer to escape the mosquitoes. With the drainage of the swamp lands and the general removal of mosquito breeding and abiding places, this pest has gradually decreased in the region around Miami to such extent that what was once almost an intolerable condition in summer is not now considered a serious drawback, even by the tenderfoot.

The home of the housefly and the hookworm is in the stable and cow pen. The use of the motor is lessening this evil. We were pestered with houseflies in spite of good nets and a fairly clean stable. We sold the horse and bought an automobile. The fly nuisance stopped, and the safety from disease—since the fly carries typhoid and other ailments—not to mention the comfort

AND SOUTHERN FLORIDA

from this riddance, more than offsets any expense over the cost of a horse. I believe that a light machine carefully operated, considering the work accomplished and time saved, is cheaper than a horse. When a horse gets old you hate to kill him and you hate to sell him. In the end somebody must dispose of him.

The next nuisance to be rid of is the privy. There are privies and privies, some dignified with the name of earth closets, sanitary closets, etc., but they are all rotten at best, and always a nuisance to keep in a clean condition. I say this in spite of a most excellent bulletin on "The Sanitary Privy" by Stiles and Lumsden, of the United States Department of Agriculture. The sanitary privy therein described is, of course, better than the ordinary kind, and the ordinary kind is probably a little better than none, but all are poor enough. I think many women would be content to live far out in the country if they could have an automobile to move about in from time to time, and I think the majority of women would rather have a shack of two rooms with a water supply and nice bathroom than a palace without it.

I am fond of animals, but I believe it pays to cut out dogs and cats. They are certainly not fit to live with since they carry fleas, and fleas carry disease. Many a child has caught diphtheria from fondling a kitten. Well-bred and well-fed dogs and cats prowl with dirty dogs and cats in dirty places.

A favorite breeding place for many of these pests is the privy and the garbage pile. This applies to the country as well as to the city; and under the peculiar conditions of soil, moisture and warmth which will exist on the small farms of the Everglades, care should be exercised from the very start. The canals of the Everglades will be extensively used for transportation and should not be polluted with sewage. I have seen parts of the New River almost filled with over-ripe tomatoes. This may never happen again, but such fine streams of water should never be polluted with refuse. It would be far better to scatter it over the land or compost it for manure. I find it costs but very little to bury such refuse.

For drinking purposes I prefer rainwater in Florida. The majority of houses have good cisterns. Rainwater will keep

THE EVERGLADES

fresh a long time in a good covered cistern in South Florida. Cisterns, however, unless properly cleansed from time to time, get foul. Dust, pollen, bird lime, small winged seeds, etc., cling to the roof and wash into the cistern. Water often stands in rain gutters; leaves also are caught there; so that care must always be exercised to keep this rainwater pure and wholesome.

In communities of any size there should be ice plants. These ice plants should, in fact, be owned by the community, and ice should be sold at cost. In cities such as Miami the majority of people drink melted ice, or purchase distilled water direct from the ice factory. There is, of course, no water better or purer than cool distilled water or melted ice manufactured from distilled water.

Every small town should have an ice plant—not only *have* it, but own it, as a community or county, and sell ice and distilled water at cost. The health and comfort of the community would be thus safeguarded.

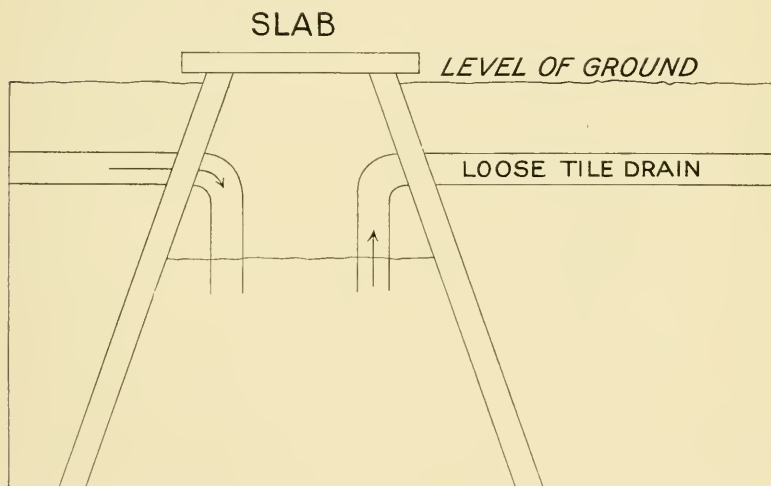
The inventor of artificial refrigeration was a Floridian. Dr. John Gorrie was born in Charleston, S. C., in 1803, and after graduating in medicine moved to Apalachicola, Fla. He was the father of mechanical refrigeration, a process for which he invented in the year 1845. He died in 1855. In 1911 ten thousand dollars was appropriated by the Florida Legislature to provide for a statue of Dr. John Gorrie in the National Statuary Hall in the Capitol of the United States at Washington.

Water for the bathroom and ordinary household purposes may be secured from shallow wells and pumped into a tank by hand, wind power or motor. The lift is so slight that one can pump directly into the bath tub and closet and thus dispense with a windmill and tank altogether. A pitcher pump and single length of pipe are inexpensive. This method of pumping directly into the bath tub and closet is frequently used by those who cannot afford a tank and windmill. A tank and windmill pay in the end, since they can be used also for irrigation purposes.

The sewage pipe from the kitchen sink and bathroom should run into a cesspool some distance from the house. It should

AND SOUTHERN FLORIDA

not be less than fifty feet in length, and need not be more than one hundred feet. The shape of the cesspool is not a matter of great importance, although the style shown in the accompanying drawing is easy to construct and very satisfactory. The shape is pyramidal with a concrete slab over the manhole at the apex. This cesspool may be easily constructed by digging down several feet. If rock is near the surface a hole should be blasted out with dynamite. Many of the cesspools in Dade

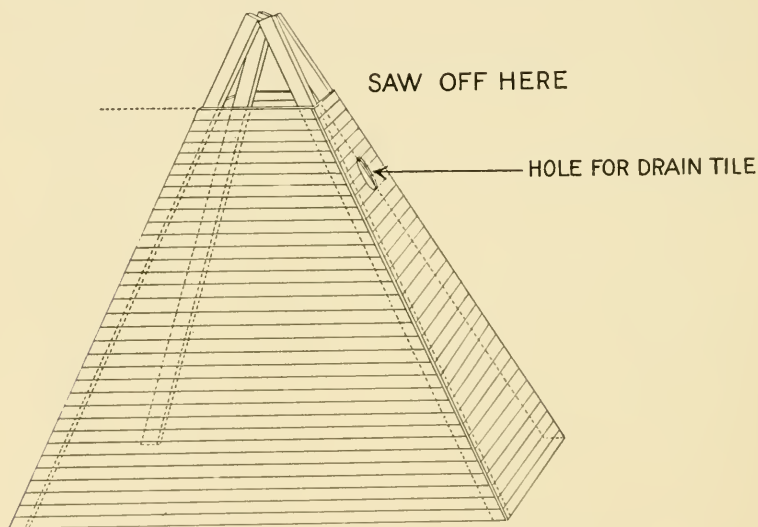


TRANSVERSE SECTION OF A CESSPOOL.

county on the rock ridge consist simply of holes which have been blasted in the solid rock. The top is covered with lightwood logs, and these are covered with a layer of soil. In soft soil it is advisable to build a cesspool of rock and cement mortar. The fine white rock from the canal banks, when mixed with a small quantity of cement, hardens into a durable stone. I usually put up four scantling (2 by 4 inches) for corners in pyramid fashion. I nail rough boards on these, and then build the walls on the

THE EVERGLADES

boards. Holes should be left for the sewage pipe to enter, and four holes for short, loose drain tiles. When the mortar has hardened saw off the scantling at the top, remove the boards inside and put a concrete slab over the top. The drain tiles carry off the liquid, and it is usually years before it is necessary to clean out the cesspool. The level of the liquid in the cesspool will usually correspond with the water-table in the surrounding soil.



WOODEN FRAME FOR THE CONSTRUCTION OF A CONCRETE CESSPOOL.

Over the cesspool and out ten or fifteen feet, corresponding to the distance of the loose tile drain, I plant bananas and other quick-growing vegetation. I find that bananas will consume an enormous amount of liquid and fertilizer of this kind, and do much toward disposing of all this household waste. They will yield a good return throughout the year and prevent the soil from becoming foul.

Florida has an active, up-to-date board of health, with headquarters in Jacksonville. They cheerfully answer questions per-

AND SOUTHERN FLORIDA

taining to health conditions and publish an interesting and useful monthly journal called the *Florida Health Notes*, which they will send free of charge to all persons living in Florida.

Florida, especially South Florida, is one of the healthiest places in all the world, and it behooves all of us to do everything in our power to keep it so. In fact, it is every man's duty to keep himself, his family and his farm in such condition that his neighbor will not suffer from his neglect. His duty extends further in using his influence within reason to urge others to do the same.

CHAPTER XXIV.

A HOME ORCHARD PLAN, WITH A LIST OF THE PRINCIPAL FRUITS, ALPHABETICALLY ARRANGED.



THIS often said that the farmer eats what he can't sell, while the agriculturist sells what he can't eat. The young folks are less inclined to leave a farm for the city if there is a good variety of good fruit on the place. A home in the country in South Florida isn't a home unless it has at least two and one-half acres of various kinds of choice fruits. A large number of people come to Florida to build such a home, and many start their orchards long before they have a roof over their heads.

Why two and one-half acres? The majority of holdings in South Florida are ten-acre tracts. This sounds small for a farm, but ten acres in a warm climate, where crops of many kinds may be produced continuously, is equivalent to a much larger area in the North.

A home orchard is, of course, supposed to be mainly for home use. The amount consumed, of course, depends on the size and appetite of the family, but by planting a great variety ripening at all seasons even a small family can consume a lot of it. Many of these fruits may be preserved, such as the guava, and excess oranges and grapefruit may be used for marmalade, while such a fruit as the avocado is more like meat than fruit. I have known workmen to make a hearty lunch from an avocado and half a loaf of bread. In some places the avocado is called "Midshipman's Butter."

AND SOUTHERN FLORIDA

A part of this two-and-one-half-acre space is occupied by buildings. Vegetables may be grown to advantage among the trees until the trees become too large, then the orchard may be used for poultry. The poultry will help keep insects in check, and will feed on many of the waste fruits.

Of course, this plan might be varied to suit each tract. The house should be located to suit the view and location, and if the land varies in quality the trees should be planted to fit this variation.

Trees should always be planted in group-like form, with ample wind protection. Put the hardy, storm-fast trees, such as the mango, on the rough land and on the outside.

Ornamental trees of various kinds are, of course, worth having, but they require almost as much fertilizer and attention as do the fruit producers. In the Tropics there are many trees highly ornamental, and fine for shade, which are at the same time fruit-bearing. There is no finer shade or ornamental tree than the mango, and if choice varieties are planted no tree which yields a finer fruit. I have heard it said that some Floridians in a pinch can live on guavas. If all the fruit yielded by a two-and-one-half-acre orchard cannot be consumed at home there is always a market for it, if it is choice in quality. Such fruits as guavas and limes are almost ever-bearing, the pomelo and orange have a long season, and bananas and pawpaws may be planted so as to produce continuously.

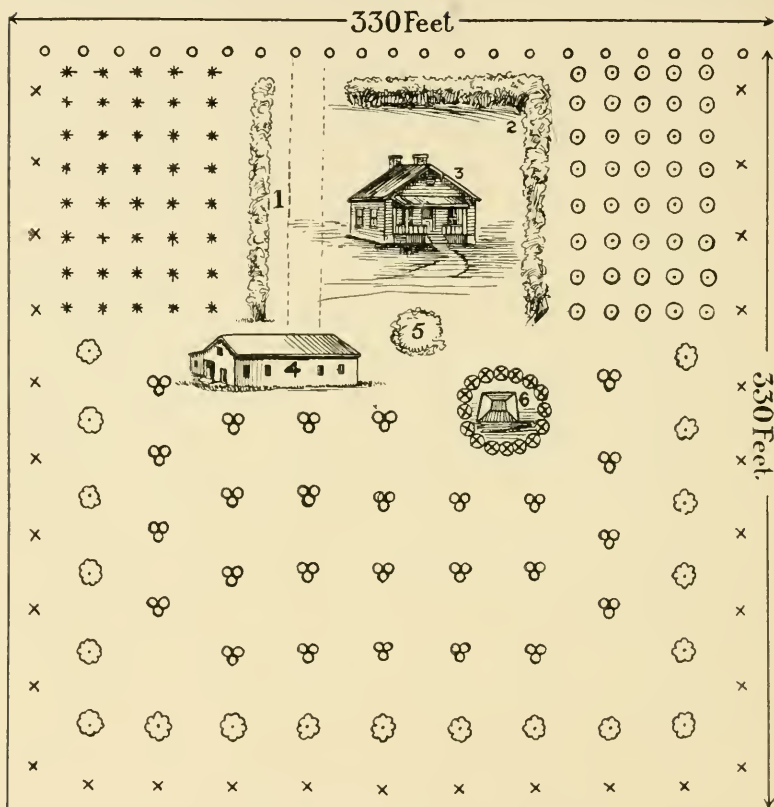
The carissa is an ever-bearing hedge plant from South Africa. It bears an abundance of plum-like fruits which, when cooked, are hardly distinguishable from cranberries.

The Surinam cherry is a beautiful bush, yielding an abundance of juicy cherries somewhat similar to Northern cherries. They are relished by many people, although the flavor is not always at first agreeable.

The limes should be seedlings from the Keys. Young plants may be had by the hundred from five to ten cents each.

The guavas should be raised from seed selected from choice fruits. The fruit of a good jelly producing variety can always be sold to the jelly factories for at least one cent per pound.

2½ Acre Home Orchard 330 Feet Square



◦=COCOPALMS

×=MANGO TREES

⊗=GUAVAS

*=LIMES

⊙=AVOCADO

⊗=POMELO & ORANGES

NOTE. PINE APPLES MAY BE GROWN

BETWEEN THE TREES IF THE SOIL IS SANDY.

1 & 2 CARISSA HEDGE

3 = HOUSE

4 = GARAGE - STABLE
OR PACKING HOUSE

5 = SURINAM CHERRY

6 = BANANAS & PAWPAWS
AROUND CESSPOOL.

AND SOUTHERN FLORIDA

The cocopalme will not grow everywhere, but it usually flourishes on moist soil within a few miles of the seashore. Sprouted nuts ready to plant are usually easily secured at ten cents each. The cocopalme likes to be shaded in youth, and care should be exercised to protect the growing shoot from rabbits, etc.

The pawpaw is grown directly from fresh seed, and bananas are produced from root-suckers. An old banana root may be divided into several parts, and each part will produce a plant.

Fairly good mangoes and avocados may be secured by planting the seeds. The best kinds are budded and are expensive.

Pomelo, oranges, tangerines, etc., may be had in abundance at the nurseries at reasonable prices. Care should be exercised in securing the proper kind of stock—that is, the stock best adapted to the soil of the special region in which you live.

Many people prefer to plant the sour stock and then bud the trees themselves. In that way they are sure of what they are getting and save a little by it.

Aside from the pleasure of having this fruit to eat, aside from the beauty and comfort it gives, a small orchard of this kind adds value to a piece of real estate far out of proportion to its actual cost. Many small places have sold to good advantage because of a few choice fruit trees around the house and barn. One choice bearing mango tree alone is worth as much as ten acres of ordinary bare land.

Next to climate, the greatest charm of South Florida is the great variety of choice quality of fruits it is capable of producing. Many of these fruits are solid, meaty foods, such as the avocado, banana, and guava.

In addition to the fruits above mentioned, pineapples may be grown between the trees, if the soil is sandy.

A LIST OF THE FRUITS OF SOUTH FLORIDA, ALPHABETICALLY ARRANGED.

Aberia caffra—Kai-apple.

Achras sapota—See Sapota zapotilla.

Akee—See Blighia sapida.

THE EVERGLADES .

Amygdalis Persica—Peach.
Anacardium occidentale—Cashew.
Ananas ananas—Pineapple.
Annona reticulata—Custard apple.
Annona glabra—Pond apple.
Annona muricata—Sour sop.
Annona squamosa—Sugar apple.
Annona cherimolia—Cherimöya.
Artocarpus integrifolia—Jak-fruit.*
Avocado—See *Persea gratissima*.



A FINE TYPE OF AVOCADO.

Banana—See *Musa paradisiaca*.
Blighia sapida—Akee.
Cantaloupe—See *Cucumis melo*.
Carob—See *Ceratonia siliqua*.
Carica papaya—Papaw.
Carissa grandiflora—Natal plum.
Casimiroa edulis—White Sapota.

AND SOUTHERN FLORIDA

- Cashew—See *Anacardium occidentale*.
Ceratonia siliqua—Carob.
Ceriman—See *Monstera deliciosa*.
Cherimoya—See *Annona cherimolia*.
Cherry surinam—See *Eugenia*.
Cherry—See *Laurocerasus sphaerocarpa*.
Chrysobalanus Icaco—Cocoplum.
Chrysophyllum cainito—Star apple.
Cicca disticha—Gooseberry tree.
Citrullus citrullus—Watermelon.
Citron—See *Citrus medica*.



A FINE TYPE OF BANANA PRODUCED ON MUCK SOIL AT COCOANUT GROVE.

- Citrus aurantium*—Sweet orange.
Citrus decumanna—Pomelo or grapefruit.
Citrus Japonica—Kumquat or Kin-Kan.
Citrus Limetta—Lime.

THE EVERGLADES

Citrus Limonium—Lemon.

Citrus medica—Citron.

Citrus nobilis—Tangerine.

Citrus vulgaris—Bitter orange.

Coconut or Cocopalm—See *Cocos nucifera*.

Cocophlum—See *Chrysobalanus Icaco*.

Cocos nucifera—Coconut or Cocopalm.

Cucumis melo—Cantaloupe.



AN AVOCALO GROVE.

Custard apple—See *Annona reticulata*.

Date Palm—See *Phoenix dactylifera*.

Diospyros kaki—Japanese persimmon.

Diospyros Virginiana—Native persimmon.

Egg-fruit—See *Lucuma Rivicoa* var. *angustifolia*.

Eriobotrya Japonica—Loquat.

Eugenia Jambos—Rose apple.

Eugenia uniflora or *Pitanga*—Surinam cherry.

AND SOUTHERN FLORIDA

- Feijoa Sellowiana, a recent introduction from Uruguay, allied to the guava.
- Ficus carica—Fig.
- Fig—See Ficus carica.
- Fragaria Americana—Strawberry.
- Gooseberry tree—See Cicca disticha.
- Grape, Key—See Vitis sp.
- Granidilla—See Passiflora edulis.
- Grapefruit—See Citrus decumanna.
- Guava—See Psidium.
- Hibiscus sabdariffa—Roselle or Jamaica Sorrel.
- Jak-fruit—See Artocarpus integrifolia.
- Kai-apple—See Aberia caffra.
- Kumquat or Kin-Kan—See Citrus Japonica.
- Laurocerasus sphaerocarpa—West India cherry.
- Lemon—See Citrus Limonium.
- Lime—See Citrus Limetta.
- Loquat—See Eriobotrya Japonica.
- Lucuma Rivicoa var. angustifolia—Ti-es or Egg-fruit.
- Mangifera Indica—Mango.
- Mango—See Mangifera Indica.
- Mammee—See Mammea Americana.
- Mammea Americana—Mammee.
- Melicocca bijuga—Spanish lime.
- Mulberry—See Morus nigra and rubra.
- Monstera deliciosa—Ceriman.
- Morus nigra—Black mulberry.
- Morus rubra—Red mulberry.
- Musa paradisiaca—Banana.
- Muscadinia munsoniana—Wild shore grape.
- Muscadinia rotundifolia—Scuppernong.
- Natal-plum—See Carissa grandiflora.
- Olea Europea—Olive.
- Olive—See Olea Europea.
- Orange—See Citrus vulgaris and Citrus aurantium.
- Opuntia ficus-indica—Tuna.
- Otahaite apple—See Spondias dulcis.

THE EVERGLADES

- Pawpaw—See *Carica papaya*.
Passiflora edulis—Granadilla or Passion Flower.
Persimmon—See *Diospyros*.
Peach—See *Amygdalus Persica*.
Persea gratissima—Avocado.
Phoenix dactylifera—Date-palm.
Pineapple—See *Ananas Ananas*.
Pomelo—See *Citrus decumana*.



THE TI-ES, A LITTLE KNOWN BUT PROMISING FRUIT.

- Pomegranate—See *Punica granatum*.
Pond apple—See *Annona glabra*.
Punica Granatum—Pomegranate.
Psidium lucidum—Chinese Guava.
Psidium Cattleianum—Cattley Guava.
Psidium guajava—Common Guava.
Rose apple—See *Eugenia Jambos*.
Roselle—See *Hibiscus sabdariffa*.

AND SOUTHERN FLORIDA

- Sapota zapotilla—Sapodilla.
Sapodilla—See Sapota (or Achras) zapotilla.
Scarlet Plum or Spanish Plum—See Spondias purpurea.
Scuppernong grape—See Muscadinia rotundifolia.
Shaddock—See Citrus decumanna.
Sour-sop—See Annona muricata.
Spanish lime—See Melicocca bijuga.
Spondias dulcis—Otahaite apple.
Spondias purpurea—Scarlet or Spanish Plum.
Star apple—See Chrysophyllum cainito.
Strawberry—See Fragaria Americana.
Sugar apple—See Annona squamosa.
Surinam cherry—See Eugenia.
Tamarind—See Tamarindus Indica.
Tamarindus Indica—Tamarind.
Tangerine—See Citrus nobilis.
Ti-es—See Lucuma Rivicoa var. angustifolia.
Tuna or Prickly pear—See Opuntia ficus-indica.
Vitis sp. Key grape.
Watermelon—See Citrullus Citrullus.

There are many wild fruits in the Tropics awaiting introduction and improvement. Some kinds may never develop into productive fruit bearers in this region and some may be of value only as stocks for other fruits, but with the species mentioned above, already divided into many varieties, and those which will be soon introduced and improved, the subject looms up both big and varied for the horticulturists of the future.

*The jak-fruit has fruited in Florida at the home of W. A. Hobbs Cocoanut Grove, Florida. The variety is probably the "Johore jak," which has a small fruit weighing about ten pounds, and although highly esteemed in the East, has a sickening odor. It is claimed that some of these jak-fruits grow to a weight of one hundred pounds.

CHAPTER XXV.

THE HUMBLE KOONTI.



HE koonti, in spite of its queer Indian name, is not a spook or a rare wild animal. It is a beautiful, wonderful, humble little plant that grows in the hot sands and among the rough limestone rocks of South Florida. It is commonly spelled coontie or comptie, but in a report on the Seminoles issued by the Bureau of Ethnology the form koonti is used. The word in Seminole apparently means more than the mere name of the plant. I have heard it has the significance of the word "bread," or "grits," or "grub," since koonti starch has been for many years the farinaceous mainstay of this people.

Usually when a man needs bread he raises the wheat or buys it. The semi-nude Seminole orders his squaws to dig it. With clumsy sticks they pry the roots, or rather the underground stems, out of the ground. They pound them fine with mastic-wood pestles in cavities cut in a pine log. Then by settling, straining, washing, etc., the fine starch is separated.

Aside from its connection with the Seminole, it supplied the early settler with food, and today, to some extent at least, enters into the arrowroot biscuit of commerce.

It was no doubt used for food by the Indians which preceded the Seminole. The latter is really a newcomer in South Florida, and but very little is known of the aborigines except that they were fierce fighters, good navigators and closely related to the Indians of the West Indies. It is barely possible that a few of these may have escaped the slave-hunting Spaniards and afterward amalgamated with the Seminole.

AND SOUTHERN FLORIDA

Koonti grows in the West Indies; practically the same plant may be found on Andros Island in the Bahamas, and the natives still manufacture the starch, which they sell in Nassau for washing and other purposes.

The koonti is a sago, but the starch which it yields is known on the market as Florida arrowroot, though the true arrowroot starch is yielded by another and very different plant. Over in the Bahama Islands koonti is called bay-rush.



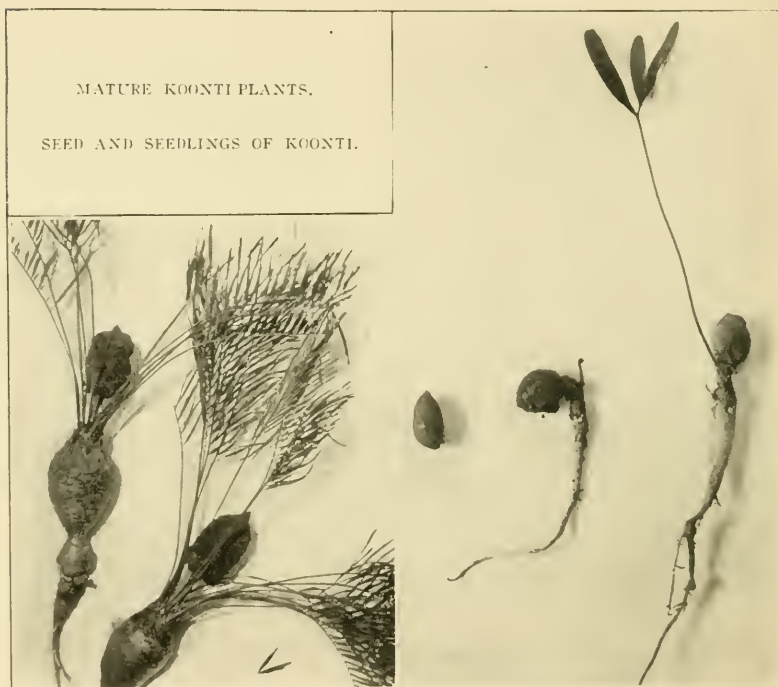
THE KOONTI-LOG. COPIED FROM U. S. ETHNOLOGICAL REPORT ON THE SEMINOLES.

Koonti grows on the high, dry land among the pines and palmettoes; in fact, they say, in locating land for a home, "Look for koonti. Where koonti grows the land is never flooded." I used to wonder at the large number of old blazes on pine trees. I have since learned that they marked the tasks for the koonti diggers. Although there are the ruins here and there throughout the woods of primitive koonti mills, a few are still at it, and one man near here has a comparatively large plant with considerable

THE EVERGLADES

machinery. The refuse from these factories is useful for fertilizer. This would serve no doubt much better as a filler for commercial fertilizer than brown paper or mud from lake bottoms.

Fire sweeps over these pine lands frequently, but the koonti is safe; in fact, better off, since the main part of the plant is underground and the fire opens the cone-like fruits and helps



ABOUT ONE-TENTH NATURAL SIZE.

ABOUT NATURAL SIZE.

to scatter the seeds. One could easily form a permanent koonti farm in the pines by grubbing up the palmettoes and fire-flashing the surface once a year at a time when there is the least danger of doing damage. This is about the best, in fact the only way of keeping the fire damage down in a pine-covered palmetto country. It is an old Indian method, but is practiced even in France with its up-to-date foresters. There would be little need

AND SOUTHERN FLORIDA

of fencing such a plantation, since few things except the koonti worm eat it a second time. In its raw state, leaves, seeds and stems are undoubtedly poisonous.

Animals which drink the red-water from washing the starch usually die, not a quick death but a slow poisoning. The seeds form in a brown cone-like head and resemble very large grains of fresh corn. The natives call these seeds koonti or comptie corn. I have heard it said that crows eat "comptie corn" and live, but that one reason why turkeys are not successful here is that they kill themselves by eating comptie corn.

The koonti is a very small plant with a large underground stem. This stem is as big as a turnip and is full of starch. The foliage, which is often very scant, especially when the seed head is mature, consists of a tuft of fern-like, glossy green leaves.

A fine healthy specimen forms a beautiful pot plant. Koonti plants have been shipped North for this purpose. It grows easily and is easily transplanted. According to the botanists, there are two species in South Florida, one is *Zamia Floridana* and the other is *Zamia pumila*. The latter inhabits Central Florida and the former is found on the east coast below New River.

Its great botanical interest lies in the fact that it is a link between the highest cryptogams and lowest phanerogams. The fecundation of this plant is peculiar and difficult to explain in detail in this connection. Suffice it to say that the pollen grains develop spermatozoa which wiggle about at such a lively rate that one might easily believe that the koonti, after all, is partly animal.

This subject has been carefully studied by Dr. H. J. Webber, and embodied in Bulletin No. 2, 1901, entitled "Spermatogenesis and Fecundation of *Zamia*," United States Department of Agriculture, Bureau of Plant Industry.

Dr. Webber found the mature spermatozoids of *Zamia* to be the largest known to occur in any plant or animal. They are even visible to the naked eye. He kept them alive in sugar solutions and found their motion to be due mainly to the action of cilia.

THE EVERGLADES

Such a plant ought to be very carefully studied and improved. It is rare, indeed, that nature, off-hand, produces such an agricultural snap. It yields starch of good quality; it plants itself and grows without care or cultivation; it is not injured by fire, and, because of its poisonous nature, has few if any enemies; it grows on very poor land which can at the same time be producing timber.



ROOT NODULES OF KOONTI,
ABOUT ONE-THIRD NATURAL SIZE.

P. S.—Since writing the above article on the Humble Koonti in the January issue of the *Garden Magazine*, I have read in the *United States Agricultural Year-Book* for 1910 that plants of the order Cycadaceæ have large nodules on their roots and are capable of appropriating nitrogen through this agency, as do the legumes. Since the koonti belongs to the Cycad order, I began a search at once, and was soon rewarded by finding the typical Cycad nodule on its roots.

AND SOUTHERN FLORIDA

This plant, already famous because of its peculiar fecundation, is also unique in being, so far as known to the writer, the only *root-crop* capable of capturing its own nitrogen direct from the air of the soil by means of these peculiar coral-like bacteroid root masses.

No wonder this plant flourishes where other root-crops would starve without the application of fertilizer! No wonder the red-water from the starch washings enriches the soil! No wonder the pumice residue from this starch manufacture is excellent for a fertilizer filler or a mulch around citrus trees! The supply of nitrogen has really come from the air, and has been "fixed," or captured by these bacterial nodules!

This plant is indeed a wonder. It grows in the hot sands and rocks among pines and palmettoes and is burnt over by forest fires without being choked out or killed. All the while, in fact, the soil is being improved by its presence. Being the only root-crop capable of garnering its own supply of nitrogen, this plant should be improved, and its cultivation encouraged over a wider area. By inoculating the soil with its special type of bacteroid, as is done with clovers, it might succeed and prove of great value in certain dry tropical districts where other root-crops fail. A root-crop on some of the rocky limestone lands of South Florida, where soil of any kind is at a premium, seems anomalous; nevertheless, the roots of this hardy plant find places in the crevices. On well prepared soil the returns could be, no doubt, increased many fold. The largest nodules of this kind known occur on the velvet-bean, which grows so luxuriantly in this region and is so famous as a cattle fattener and producer of finely-flavored meat. It is said that the velvet-bean nodule is often as large as a baseball. The nodules on the koonti roots are also large, bunches the size of black walnuts being common.



AVENUE OF AUSTRALIAN PINES.

CHAPTER XXVI.

THE AUSTRALIAN PINE—A PROMISING TREE FOR SOUTH FLORIDA.



THE She-Oak, Beefwood, Casuarina, or Australian Pine, as it is commonly called in Florida, has come to stay. It is rapidly becoming the most popular tree for roadside planting in the Biscayne Bay district. The County Commissioners of Dade County will furnish these trees gratis to any person who will plant them along a public highway. It is the favorite tree for schoolhouse yards and public grounds in general. The reason, or rather the reasons for this popularity are plain. A few of them are as follows:

Rapid growth, adaptability to all kinds of soil and conditions, straight growth, ability to withstand gales of the severest kind.

Some ardently admire it, others are not so fond of it, but all admit that for quick results on all kinds of soils it has few, if any, rivals. It grows well on marshlands subject to tidal overflow; it grows well on sand beaches close to the sea; it grows well on moist muck lands, and, strange to say, it grows almost as well on high, dry sand and rock land. It is a vigorous feeder, finding nourishment and congenial surroundings in places where other trees would quickly languish and die.

The tree is no new introduction into Florida. A few trees have been planted here and there for many years, but only recently have they been planted by the thousands for windbreaks, ornamental purposes and, incidentally, for timber. This tree may be planted close and clipped to form a very pretty and effective hedge.

THE EVERGLADES

There is a spot on Biscayne Bay called "The Cedars." It has been a favorite landmark for years. It consists of Australian pines which were "left-overs" in a nursery. New ones have come from seed, and the seeds have washed from place to place, so that here and there along the shore young Australian pine trees may be seen growing vigorously and apparently as much at home as in their native land. This tree is, however, now common throughout the Tropics. It encircles the globe and appears to be native to East Africa, South Asia, North Australia and Polynesia. I have heard it said that its wood furnishes war clubs to the savages of the Eastern and Southern Seas, as well as golf clubs to their more cultivated neighbors.

The accompanying illustration shows a fine avenue near Miami on the estate of the late General Samuel Lawrence. This distinguished man could not have a better monument. This picture was taken in this special location to show how close an Australian pine will grow to our native pine. I know of no other tree which would grow in the shade of and so close to the roots of an old large-sized native slash pine tree. Our native pine usually consumes all the fertility and moisture within reach of its roots. Every tree that I know of except the Australian pine would die with the best of care in a similar situation. This is not on muck land, or even sand land, but on a high, rocky ridge, where there is a scarcity of soil of any kind.

I have received many inquiries in reference to this tree from newcomers, and from two or three corporations considering the planting of a large area of salina land for timber. The following remarks will answer the majority of these questions:

The tree is an early seed bearer. It is characteristically tropically precocious. It begins to yield an abundance of seed when only two or three years old.

Under very favorable conditions, I have known these trees to grow ten feet per year during the first three years, and I would expect this rate of growth at least for the first five years of its life on Everglade soil. In its native land it is long-lived and reaches a maximum height of 150 feet. Many fear and many predict that this tree will be short-lived, will begin to die

at the top and get stag-headed at an early age. Were it a soft-wooded, brittle tree, such as the majority of quick-growing species, like the poplar, this would be so; but its wood is as hard and tough as the toughest oak. There are several trees in South Florida well on in years, and many in the West Indies of large size, which show no signs of decrepitude.

The wood of this tree is splendid for fuel, leaving little ash and yielding great heat. For fuel purposes, however, our native Florida buttonwood has no superior. I would never recommend planting trees, anyway, solely for fuel. Limbage, slabs and other refuse from good timber ought to supply fuel demands in a South Florida climate. Although I have never verified the statement, competent authorities say that Australian pine will yield four times as much fuel wood in the same length of time on the same amount and quality of land as any hardwood tree of the temperate zone.

The Australian pine outgrows any species of eucalyptus that I have seen in South Florida. The Australian pine grows naturally straight, the eucalyptus naturally crooked. The eucalyptus gets top-heavy and blows over easily unless deeply rooted; the Australian pine, on the other hand, is a gale defier. Too much, however, must not be expected of it as a windbreak, because it lets the wind pass. Its thin, leaf-like branchlets give with the wind. In fact, the whole tree bends like a whip, and rarely, if ever, breaks.

This tree is often called Polynesian Ironwood because of the hardness of its wood. The wood is red when fresh, but turns dark brown with age. It is often beautifully marked, resembling meat in color, giving rise, no doubt, to the common name, beefwood.

J. H. Maiden is Government Botanist of New South Wales and Director of the Botanic Gardens at Sydney. He is the author of the "Forest Flora of New South Wales." I know of no better authority on Australian trees. In his district the Australian pine is called "she-oak." He has written a "Plea for the Cultivation of She-Oaks" in Australia, from which I quote the following:

THE EVERGLADES

"I go farther, and say that if Australians would only take it into their heads to grow their she-oaks (and we have species for salt-water, fresh-water, for arid situations, and sterile places) they would be charmed at the result. A well-grown she-oak is one of the most beautiful trees in Australia, and affords a pleasing contrast to the trees usually grown, and in most cases suits our climatic conditions far better than the imported pines. The seed is very cheap (anyone can gather a few cones, place them on a sheet of newspaper and let them shed their seeds), the seed readily germinates, the trees are remarkably free from disease, grow rapidly, and their timber, apart from other uses, forms the best fuel we have."

Casuarina wood is used for furniture manufacture in many parts of the East. In fact, it may be used for any one of the many purposes to which a hard, tough wood may be put. In outward appearance it resembles a pine, but the wood is as heavy and hard as the hardest oak.

The tree grows straight by nature and bends like a whip in times of gale. These trees are seldom broken or uprooted by the storm, although fully exposed to the fury of it on the shore of the sea. The Australian pine has no leaves. The green parts of the tree are slender, drooping, jointed branchlets.

Botanists have been at a loss to know just where to place this group of trees. Casuarina is the only known genus of a very distinct family. This genus was once classed with the pines. Now it is placed by some botanists close to the family to which the walnut and hickory belong. The Casuarinas are probably more closely related to this alliance (walnut family) than to any other. The scientific name of the species so common in Biscayne Bay region is *Casuarina equisetifolia*. It was called *Casuarina* because its leaves resemble the feathers of the Cassowary bird. The specific name, *equisetifolia*, means "with leaves like the genus *Equisetum*," a group of jointed-stemmed plants commonly called "horsetails."

The native pine of South Florida (*Pinus Elliottii*) is going. The Casuarina, from far-off Australia and Asia, is coming. In clearing the land of its native pines and in planting fruit trees

and exotics of various kinds the pioneer feels that he is planting a better tree than the fallen. There is an old seal known as the "Seal of the Territory of the U. S. N. W. of the River Ohio," on which there is a picture of the first tree felled by the ax and cut into logs, succeeded by, apparently, an apple tree laden with fruit, with the inscription in Latin, "He has planted a better than the fallen."

It may be in many cases that he has not planted "a better than the fallen," but he meant well and should have credit for the spirit displayed because the clearing of the forest and planting afresh requires much toil and much courage. In a tree you plant and tend yourself, just as in a piece of furniture constructed by your own hands, you undoubtedly have a fuller sense of ownership and a greater pride. Turn the old pines into materials of construction, clear the land, transform it by ridding it of weeds and wildness, plant it to the choicest fruit-bearing and timber-producing trees of all the world. Leave it better than you found it, "plant a better than the fallen."

It is in the coast salina land and in the mucky glades, where there is no virgin forest to cut, that this tree will flourish to the greatest degree. Rows of these trees along canals, around dwellings, etc., will do much to render this vast treeless area attractive and suitable for homes. These trees will help to break the winds from the northwest and will help to give the balmy east wind and the gulf stream influences uninterrupted swing throughout the year.



A GUMBO LIMBO TREE ON THE ROAD BETWEEN MIAMI AND COCOANUT GROVE.

CHAPTER XXVII.

THE GUMBO LIMBO.



ACCORDING to a local rhymester, "the gumbo-limbo, with limbs akimbo, with gum like gumbo, with name a lingo, belongs, I guess, in limbo." Like the jobo of Spanish-America, this tree is not held in high esteem. A native will hack it regardless and pass the remark that it is "nothing but a gumbo-limbo." Since a weed is usually defined as a plant out of place, the gumbo-limbo would be classed in many instances in this category. All because it grows so rapidly and so easily and does not produce a wood which can be cut into boards for commercial purposes. When one sees acres of chestnut and white pine dying from disease with mankind unable to check it, it is refreshing to find a tree that will grow, and grow quickly, without the slightest difficulty and under conditions that seem almost impossible. For instance, blast a hole two or more feet deep in solid lime rock, dig up a gumbo-limbo tree twenty or more feet high, cut off its roots and cut off its branches, then set it in the hole, right side up or upside down, pack the powdered rock and dirt firmly around it as you would a fence post, omit water and fertilizer, and in a very short time it will sprout and grow vigorously. It is therefore a great tree for live fence posts. Its great usefulness, however, is in the fact that it is a pioneer, paving the way for better kinds. It grows only in frostless regions and shows the greatest amount of vigor in limestone soils, no matter how rocky or barren these may be.

Suppose a man desires to convert a pine woods into a hardwood hammock. He can get quick results by setting large gumbo-limbo poles in the ground just as willows are often started

THE EVERGLADES

in northern countries. The gumbo-limbo will soon shade the ground and shed a litter over the soil, and with the protection from sun and wind thus afforded other more delicate plants may be gradually introduced until the whole becomes in time a thick hardwood forest.

I know a man who used gumbo-limbo stakes for his orange trees. He left home for a few weeks' visit in the North and when he returned his grove looked like a gumbo-limbo plantation. This tree and the jobo (*Spondias lutea*) are of great service to the small West Indian farmer, who cannot afford the common kind of fence posts. He makes a hole with a crowbar and sticks in a gumbo-limbo or jobo limb about two inches in diameter. These are placed every four or five feet. On these the fence wires are strung. They soon strike root and the farmer has a cheap but lasting hedge-like fence. Although the gumbo-limbo is one of those "no-account trees which will grow any old way," the small West Indian farmer would be hard pushed for fence posts without it. When forage gets scarce, as is often the case during the long droughts which often occur in parts of the American tropics, the tops of the live gumbo-limbo fence posts are fed to the cattle.

Its wood is almost as soft as cheese. A big tree can be easily felled with a machete. An ax can be completely buried in a gumbo-limbo tree with one hard stroke. It is also full of gum. When cut into boards, this gum ferments and the board becomes black and mouldy. If properly treated, this wood might be used for veneers for vegetable and fruit baskets and crates.

Its scientific name is *Bursera simaruba*. *Bursera* is for Burser, a German botanist, but *simaruba* is an Indian word, the meaning of which I have never heard. This tree should not be confounded with *Simaruba glauca*, the Paradise tree, which is common also in South Florida. Newcomers asking the name of *Bursera simaruba* think the word "gumbo-limbo" a joke. They are incredulous when you give its West Indian name, "almacigo," but when you call it the West Indian birch they are better satisfied, since it has a ragged, papery bark similar to the birch of the North. Over in Nassau they call it "gamolomie," which is a cor-

AND SOUTHERN FLORIDA

ruption of gum elemi. Trees of this group yield an elemi gum. A thick-lipped negro could easily twist the word gum elemi into gumbo-limbo.

Its limbs are easily shattered by the wind, and they grow so crooked that the tree is almost always irregular in shape. Its naked trunk looks like burnished copper, and although this tree may not be beautiful, it is certainly striking.

I believe the wood has been used for cheap buckets, and I have heard that the gum is capable of being substituted for gum mastic as a transparent varnish. The wood is rarely used for fuel and yields a very poor grade of charcoal.

It is, however, one of the trees which will be left when the better kinds are cut. We would prize it highly if Nature had not been so lavish in supplying us with so many kinds. It fills a place, however, in furnishing the poor man with fence posts and in covering with green many rocky places which would be bare without it.

CHAPTER XXVIII.

THE CAMPHOR AND THE CAJEPUT.



THE great turpentine industry is passing. Greed and fire will soon finish it. The introduction of the cup system instead of prolonging its life, is hastening the end. It permits the bleeding of the small trees which are too small to box by the old wasteful system. Unlike the situation in France (see photo, page 6), the essential elements of silviculture are disregarded. In France small trees are bled to death only to thin the forest, or for other silvicultural reasons. In the illustration on page 6 the pine is being bled to death to make room for the more valuable cork oak visible on the left.

In America the owners of the land are after the largest possible immediate return. The big trees are boxed, the little trees are cupped. Then follow the lumberman and forest fires. Then this dry, denuded, and impoverished soil is "real-estated"—that is, by glowing advertisements and smooth-tongued agents is sold to the unwary newcomer.

The process has been downward except as to profits received by the turpentine magnate, timber baron and land speculator. The newcomer, with plow and harrow, starts the upward course, but the process is slow and labor and fertilizer and patience are essential to final success. In the case of the Everglades the conditions are reversed. Nature has not been robbed. Man begins at once with a useless, unproductive morass. By drainage a fertile soil results and tree planting begins. The process is *constructive* from the start, and not destructive.

It is easy to classify the man who taps a pine tree the size of your arm for half a pint of turpentine. It is probably best

AND SOUTHERN FLORIDA

to let the turpentine era pass. The labor conditions and other influences connected with it have not been of a high order, and probably never will be. Turpentine will eventually be produced synthetically in the chemical laboratory. The division of these lands into small holdings is, after all, a gain, and the planting of various kinds of trees will in time bring new industries and add variety to the landscape and to the lives of the inhabitants of the pinewoods districts.

It is probably fortunate for the Lower East Coast that the pine trees are not profitable turpentine producers.

Everglade drainage is a theme "worthy the best quality of constructive statesmanship." Unfortunately, many of our statesmen and other government officials represent corporations, capitalists and monopolists engaged in destructive industries, and not the men who are making plantations and bettering soil conditions.

In previous chapters I have mentioned many trees worthy a fair trial on Everglade muck. There are two species which at this writing appear to the writer to be full of promise. Both are from the East Indies and are well known throughout the world as camphor and cajeput.

I have already referred to cajeput on page 24 of this volume.

The camphor tree has really long passed the experimental stage in South Florida. In recently passing through the central and western part of this State I was impressed by the number, size and beauty of camphor trees which have been planted here and there for shade and ornament. There is a popular belief that the camphor trees near a grove of citrus fruits keep off the white fly. This has never been proven, of course, but it is a poor popular belief that has not back of it some basis of truth or reason.

There is one camphor tree in Pascoe County called the Renfro tree, which is five feet in diameter close to the ground and seventy feet in height, with a spread of about eighty feet. This tree is about twenty-one years old.

Camphor trees may be had in quantity and at a reasonable price at almost any well-conducted Florida nursery.

THE EVERGLADES

The United States Department of Agriculture has an experimental camphor plantation near Orange City (see Camphor Cultivation in the United States in Yearbook of the Department of Agriculture for 1910). The conclusions reached from this experiment are that camphor does well in Florida "on light, sandy lands not well suited to general farming;" that there "is every indication that camphor growing on this land can be made a commercial success;" and that "it appears probable that an



A CAMPHOR TREE.

area of 500 acres will warrant the installing of sufficient machinery to produce camphor at a minimum cost."

It is safe to say that on fertile, moist, but well-drained soil it would yield far richer returns. The camphor tree is excellent for windbreaks and hedges and every clipping may be used in the manufacture of camphor.

The camphor tree yields a valuable wood for chests. For this purpose it is equal, if not superior, to the finest red cedar.

AND SOUTHERN FLORIDA

I have known soldiers returning from the Philippines to hold their camphor chests, or "ditty boxes," in the highest esteem of all their trophies.

Because of its great usefulness as a drug and in the manufacture of explosives and celluloid, large quantities are consumed.

It seldom sells for less than fifty cents, and sometimes as high as \$1.25 per pound, at wholesale.

Although there is some camphor in several islands of the Eastern Seas, Formosa is the main source of supply and the Japanese have control of it.

The cajeput (*Melaleuca leucodendron*) is full of promise for the low, moist soil regions of the southernmost part of the State. Like the Australian pine, it withstands salt water overflow. In temperate regions I know of no tree that will stand salt water overflow. In the Tropics they can be counted by the dozen. The growth of the cajeput on mucky land subject to tidal overflow along the shore of Biscayne Bay has been so rapid that its adaptability to such situations cannot be questioned. It grows by the side of the Australian pine, and although it cannot equal this marvelous grower in rate of growth, it is a close second, and the pair in mixture would form a combination difficult to duplicate in efficiency for shore plantings in places subject to strong sea winds and occasional tidal overflow.

In Australia this tree is known as the broad-leaved tea-tree. The volatile oil yielded by its leaves and twigs is a valuable solvent and of great use in medicine. It is commonly applied externally in India for rheumatism. It is excellent in place of turpentine for stupes. It is used, I have been told, as a basis for some massage creams. It is used for many purposes, and I have even seen it sold to negroes in the South as a toothache remedy.

The bark of this tree is white and papery on the outside, and corky and spongy to a depth of half an inch or more, even on small trees. The aromatic leaves and twigs are fine for decorative garlands. They remain green a long while and emit a pleasant fragrance. It belongs to the same order, and is closely

THE EVERGLADES

related to the genus *Eucalyptus*, but is superior to any *Eucalyptus* that I know of which would grow under similar conditions.

The seeds of this tree are unfortunately very minute and therefore difficult to sprout. They are, in fact, as fine as finely ground red pepper. They must be carefully sprouted under cover in some good sprouting medium.

My trees are now twelve to eighteen feet in height and I received the seeds in a letter from Dr. Maiden of Sydney, Australia, about three years ago.



A GROUP OF YOUNG CAJUPUT TREES, THREE YEARS OLD AND TWELVE TO EIGHTEEN FEET HIGH.

They are already blooming profusely and yielding an abundance of seed. The flowers are at times covered with honey bees. It is therefore probably a great honey yielder.

"Several thousand camphor trees have recently been planted by the officials in charge of the East Bay Florida ranger station at the forest nursery located there, and, according to the state-

AND SOUTHERN FLORIDA

ment of Forest Supervisor Eldridge, the indications are that this valuable tree will do well in this forest, which will prove much to this section of the State if this be true."—From February Issue of *American Forestry*.

CHAPTER XXIX.

TWO PROMISING BUSH FRUITS FOR FLORIDA.



THE cultivation of two new and interesting fruits is just beginning in the southernmost part of Florida. These fruits have been, of course, long grown in their native lands, and are simply new in the sense that they are little known and as yet only slightly grown in a very limited area in this country. They are nevertheless very valuable fruits, and are destined soon to be extensively grown in the regions suitable to their production. I refer to *Carissa grandiflora* and the Surinam cherry.

Both these plants are shrubs. They are free from disease, and are easily grown. In addition to yielding valuable fruits, they are highly ornamental. They fruit in mid-winter in this climate. As yet the supply of fruit is only sufficient for local demands, but no doubt some day they will be shipped to northern markets, in case they prove equal to the ordeal of transportation.

*Carissa grandiflora** is the amatungula of Natal. It belongs to the Apocynaceae family. It is full of a milky juice, and I have read that a near relative of the species in the Senegal regions yields caoutchouc. It is also, I believe, closely related to a fruit in West Africa called aboh (*Vahca florida*), which might also be introduced to advantage into Southern Florida. The carissa is evergreen, with beautiful, rich-green, glossy leaves. The flowers are large, white and fragrant. The fruit is red and about the size of a plum. Its skin is thin, and the seeds are few and small. The fruit is acid, and is relished even by people not accustomed to eating it. When cooked, it makes a sauce which looks and tastes like cranberry. The plant is well supplied with formidable thorns, so that it makes a very useful as well as beautiful hedge. I believe the fruits could be successfully dried.

AND SOUTHERN FLORIDA

The carissa may be easily propagated from layers. The lower limbs touch the ground, and by covering them with sand, they soon take root and may then be easily separated from the parent plant. It grows fairly well on poor sand or limestone rock, but, like the majority of things, does much better when well fertilized. It probably will not stand much frost.



THE CARISSA.

The second fruit, the Surinam cherry, comes from South America. Its scientific name is *Eugenia micheli* or *pitanga*. Several species of this famous genus yield cherry-like fruits. I believe it is called pitanga in Spanish. To this same genus belong the Malay apple, Java plum and Rose apple. The fruits of this genus, like several other tropical fruits, have an aromatic and slightly turpentine-like flavor. The Surinam cherry is cer-

THE EVERGLADES

tainly a delicate and delicious fruit, and is now so common in Southern Florida that they can be purchased in season at some of the stores.

The plant is a handsome evergreen shrub, with glossy leaves. The flowers are white and small in size. The fruit is the size of a big cherry, red in color, with a seed in the middle about the



THE SURINAM CHERRY.

size of a cherry seed. There are sometimes two seeds to each berry. The seeds do not keep long—in fact, should be planted at once. The fruit is very juicy and agreeably acid. It is not perfectly round, and is markedly ribbed. Many persons do not like it at first because of its turpentine flavor, but those who do like them are passionately fond of them, and eat them in quantity with impunity.

AND SOUTHERN FLORIDA

The plant is easily produced from seed and bears profusely in two or three years. Like the carissa, the Surinam cherry is not particular about the quality of soil in which it grows, and since it stands some frost, may be grown over a broad area. The Surinam cherry is, however, not so hardy as the carissa. That these two fruits will be extensively grown and improved in size and quality, I have no doubt. Dr. F. Franceshii, a great authority on tropical and semi-tropical fruits, refers to the Surinam cherry and carissa as follows:

"*Eugenia pitanga*, from Brazil and Argentina; a tall, compact growing shrub, with myrtle-like, glossy leaves and pretty white flowers; fruits ribbed, shaped like a small tomato, of the brightest scarlet color, and having a peculiar taste, by most people preferred to any of the guavas. They make also a first-class jelly. Other species of *Eugenia* from the same region are being introduced also, among them *E. edulis*, having fruits of the size of an apricot, and said to be of delicious taste. All of them make also very ornamental shrubs and ought to be seen in every garden.

"*Carissa grandiflora*, from Natal, South Africa; growing not over six feet, very bushy and compact, with thick, dark green leaves and curious, double-pointed thorns, quite suitable for hedges. Flowers look like large, pure white jasmines, and have the same scent; fruits oval-shaped, size of an ordinary plum, dark crimson in color, and full of a crimson pulp which makes delicious jelly. Also this possesses so many points of merit that it ought to be in every garden."

*Description furnished by the United States Department of Agriculture:

Carissa grandiflora

Amatungulu.

From Natal, South Africa.

A food plant of considerable importance in Natal, where it is found in large quantities on the market, and from which is made a very valuable jelly. The plant, grown in hedge form in and about the city of Durban, is a handsome thing; its large white flowers and crimson fruits stand out in beautiful contrast with the background of dark green foliage. In order to produce a good hedge, the young seedlings, when from three to six inches high, should be transplanted from the seed bed and set either in a single row one foot apart or in two parallel rows, alternating two feet apart in each row. (F.)

CHAPTER XXX.

SHADE FOR TROPICAL FRUITS.



THE horticulturist of the North usually plants his trees wide apart. Some favor one distance, some another; some plant one way, some another. The space between the trees is usually kept in good tilth or is utilized for field crops or sown to a cover crop to protect and enrich the soil.

In horticulture, as well as in silviculture, what applies in the North does not apply in the Tropics. A Northerner often works to a disadvantage, being prejudiced by Northern notions.

In Italy, for instance, much is crowded upon an acre. There may be mulberries to yield leaves for silk worms, willows and poplars and other trees are lopped and pollarded for basket material, fagots and fodder, grapevines are twined to the trees and wherever there is a foot of vacant soil a vegetable of some kind is grown. Fruit trees are grown on trellises to economize space and improve the quality of the product. In fact, throughout the world all gradations of husbandry may be found, from the loose, wide-open orchard plan to the densely planted forest.

I believe that there is a sort of middle ground where forester and horticulturist can meet to advantage in the tropics. In the wide-open orchard plan much cultivation is necessary to give the results attained by the silviculturists without the use of hoe, harrow or plow. The silviculturist plants close and works for a canopy over the soil as soon as possible. In the majority of fruit groves a canopy is not formed until the trees reach maturity. A canopy of foliage not only protects the soil from sun and wind and rain, but feeds it with humus. This undisturbed humus on

AND SOUTHERN FLORIDA

the surface is the home of many beneficial living things, such as fungi which cause decay of organic matter, and earth worms and toads and other animals which work for good.

The richness in this humus comes, of course, in part from the air, but the mineral ingredients were garnered by the tree roots from the deeper layers of the soil and deposited on the surface. This leaf fall is periodic in the North, but in the Tropics it is almost continuous.

If protected from pelting rains, scorching suns and shattering winds by half-shade, I believe that northern vegetables can be successfully grown in South Florida, and the Tropics in general, in summer. They can be grown to better advantage in winter if thus protected, and I believe that several northern plants which as yet have not been successfully grown in the Tropics will thrive if grown in half-shade.

In the West Indies there are many acres of land called "ruinate," land which was once forest covered. This forest was cut, the land was cropped, it lost its freshness and fertility, it became in time dead, literally dead, because its condition was such that beneficial fungi and animals could not live in it. It seems unable to recover itself. Although once covered by a dense forest and rich in humus reeking with fertility, it remains dead under the blighting influences of a strong sun, dry winds and the erosive and pelting action of heavy downpours of rain. Plant it to quick-growing leguminous trees, shade the ground, protect it from fire so that humus will collect, and in time its fertility will return.

This half-shade is produced by using cheesecloth, as is common with tobacco in Cuba, or slatted sheds, such as are used for pineapples in parts of Florida, or by planting certain trees, as is common with coffee, chocolate, vanilla, black pepper, nutmegs, etc., in many parts of the Tropics. I believe the latter method the best for the majority of cases, and at the end of this article will mention some of the trees which may be used for this purpose.

THE EVERGLADES

Some of the best crops of the tropics are produced in small, secluded clearings. The best tropical pastures are usually shaded. Half-shade is always necessary for nurseries.

The best results may be had from planting in compact groups and not singly. This applies to orchard trees, as well as to trees for ornament. It is best to do this, even if some trees must be sacrificed later. The best bearing grapefruit grove that I know of is close planted and forms a complete canopy. No cultivation of the soil is necessary. The fertilizer is scattered over the surface of the ground. This grove, by the way, is on grapefruit roots on the edge of the Everglades.

The party who has charge of my lime grove is a colored man of more than ordinary intelligence. After years of experience I have learned to listen to his statements. He lives practically alone among his trees. He is seldom bothered by the opinions of other men. His conclusions are his own. They are the product of the thorns and rocks with which he toils. "Limes," he says, "and I guess other things, too, must be planted close together, so that the ground is soon covered. The lime is a half-wild crop, anyway, and the less you prune or meddle with it the better." Many tropical crops are like the blueberry of the North. They resist civilization. My man believes in planting trees close and in doing nothing further except to cut the vines and other weeds, and to scatter fertilizer on the soil whenever it is needed. In planting close in group form and supplying here and there sufficient windbreaks, one accomplishes in part what is accomplished by the planting of nurse or shelter trees, as is common with coffee and chocolate.

In union there is strength, which applies to trees as well as men, and in the Tropics *protection* is the keynote of success. This applies to the North, as well, but in the South we have trees which are *shade demanders*. In the North our trees are either *light demanders* or *shade endurers*, but in the Tropics many trees do not thrive without some shade.

I can fully realize also why some orchardists in the Tropics will not allow a plow or even a hoe in their groves. Good fruit

AND SOUTHERN FLORIDA

soils in South Florida are usually loose enough, if not too loose, so that cultivation is not only useless, but harmful.

I am sure it pays to plant a large percentage of our tropical trees in compact groups with windbreaks as well, and many tender crops will not succeed without the shade of nurse trees. "Plant in a well-drained soil rich in humus, partially shaded and well protected from the winds," is a common direction for tender crops.

In the North the majority of our trees have thin, transparent leaves, which transmit the light. In the Tropics many have thick, shiny leaves which reflect the light. For shelter and nurse trees the loose foliated, thin-leaved kinds are best, especially those with leaves which close at night, of the leguminous order, which also capture and conserve the nitrogen in the air in the interstices of the soil.

For windbreaks the hard-foliaged types are good, such as the sapodilla, which never blows over if its roots have half a chance, and the mangrove, which fringes the shore of the sea, grows in the water and repels even the fury of the ocean waves.

In some parts of the Tropics rains are so violent that they strip the tender leaves from trees or level weaklings to the ground.

I have seen a young avocado grove ruined in a couple of days by the wind because the planter had neglected to stake the trees. The swaying of the trees makes a hole around the butt close to the ground, so that if the root is actually not twisted or broken it soon becomes parched.

I doubt if any of those quick-growing shade or nurse trees are moisture conservers. Of course, the humus in the ground and the shade check evaporation, but this is probably more than offset by the immense amount of water transpired by a quick growing tree in a tropical country.

The limbs and trunks of trees should never be exposed to the direct rays of the sun, if it is possible to avoid it. Many sick trees are suffering from "bark scorching" and "sun cracks," although this is not nearly as common in the Tropics as one

THE EVERGLADES

would expect. One must prune carefully in the Tropics, since some trees, such as the lime, will dieback when pruned.

Mr. H. F. McMillan, in a work entitled "A Handbook of Tropical Gardening and Planting," says: "That suitable shade trees, thinly planted and properly attended to, have beneficial effects, physically and chemically, upon most crops in the Tropics is a well-established fact. They help to preserve moisture, aerate the soil by means of their deep-feeding roots, which bring plant food from the under-strata of the soil, to be returned again in the form of mulch by the fallen leaves. Leguminous trees are thus preferable for various reasons: (1) They are usually fast growers; (2) their thin, feathery foliage does not form too dense a shade; (3) their leaves have often the habit of closing up at night, and (4) many of the family have the property of collecting free nitrogen by means of nodules on their rootlets."

We have two native leguminous trees which might be useful for this purpose: *Ichthyomethia piscipula*—the Florida Dogwood—and *Lysiloma latisiliqua*—the Wild Tamarind.

Pithecolobium dulce, or Guamachil, grows most luxuriantly in South Florida and is especially fitted for this purpose.

The Australian pine and Eucalyptus are wholly unfit. Few, if any, plants will grow in their shade. Various species of *Cedrela* (Spanish cedar) and *Swietenia* (mahogany) have been suggested for this purpose, and it is more than likely that they may fill the bill, any shortcomings which they might have being offset by the value of timber yielded.

Many trees might be mentioned for this purpose, and the following is a list of the leguminous trees which the office of Foreign Seed and Plant Introduction of the United States Department of Agriculture have for distribution while they last:

Albizzia Moluccana—A large leguminous tree, native of the Molucca Islands and widely distributed through insular and continental India. Appears to be well adapted to avenue planting in Southern California and Florida because of its delicate, feathery foliage and ornamental flowers produced in small, globular heads.

Cassia grandis—A tall, leguminous tree attaining a height of fifty-five feet and producing a very handsome, fine-grained wood.

AND SOUTHERN FLORIDA

Occurs in many parts of tropical America, where it is frequently planted as an avenue or shade tree on account of its dense foliage. The flowers are produced in April and are very handsome. Will not stand frost.

Ceratonia siliqua, *Carob*—Dwarf evergreen tree, twenty feet high, with thick trunk and shiny leathery leaves. The female trees produce dark brown pods, about four to ten inches in length, commonly known as St. John's Bread. These are eaten for their sweetish pulp. They also form a very nutritious food for cattle.

Erythrina Indica—Useful hedge tree of rapid growth, thirty feet high. The foliage provides excellent fodder for stock and the light wood is used for implements. Easily propagated from cuttings of any size. For testing as hedge plant and for wind-breaks in the South and Southwest. Several species of *Erythrina* are used for nurse trees throughout the Tropics.

Erythrina lithosperma—Medium-sized, soft-wooded tree with showy, papilionaceous flowers. Much planted in tropical countries for shade in coffee and cacao plantations and for its value as a soil improver.

Hacmatorxylum Campechianum, *Logwood*—Tall, leguminous tree with racemes of handsome yellow flowers, rich in honey. The brownish-red heart wood is useful in turning. Its principal economic product is the valuable black dye extracted from it. Recommended for trial as a shade tree.

Inga edulis—Medium-sized, leguminous tree occurring southward from Central America to the Amazon valley, producing curiously-shaped pods about an inch thick and one to two feet long, usually twisted and crooked. These seeds are surrounded by an acidulous, whitish, edible pulp of rather indifferent flavor. Two species of this genus are used in Porto Rico for shading coffee.

Pithecolobium dulce—Thorny, leguminous tree, native of Mexico. Rapid grower, frequently used as a shade tree for coffee or cacao. Produces long pods in which the seeds are enclosed in a sweetish pulp, which the natives are very fond of.

THE EVERGLADES

The bark of the tree contains considerable tannin. Recommended as an ornamental.

Pithecolobium Saman, *Rain Tree*—Medium-sized, deciduous tree, with spreading branches and pods resembling those of the mesquite bean, and well liked as fodder by cattle and horses. The tree flowers in early spring before bursting into foliage. For testing for ornamental and economic use in Florida and California.



COFFEE SHADED BY PITHECOLOBIUM SAMAN TREES IN PORTO RICO.

Toluifera Percirae, *Peru Balsam*—Tall, leguminous tree with thick brown bark, glossy foliage and ornamental yellow flowers. The commercial balsam is obtained from incisions in the bark and is very fragrant, with a sweetish taste.

And many more of a similar nature too numerous to mention awaiting experimentation at the hands of some patient, long-lived individual or individuals.

CHAPTER XXXI.

A LIST OF THE TREES OF SOUTH FLORIDA, NATIVE AND INTRODUCED.

The following list is of course by no means complete. Florida is a land of many flowers, fruits and forests. It is difficult at times to distinguish between a shrub and a tree. New trees are being introduced into this country almost every day, and of the great number of tropical trees in the world there are many which have never been tried and which will probably grow here as well, if not better, than in their native land.



WEST INDIAN ALMOND TREES BENT BY THE WIND.

ORDER CYCADACEAE. CYCAS FAMILY.

Cycas revoluta.

Sago Palm.

To this same order belongs our common coontie or comptie (*Zamia Floridana*), a valuable starch-yielding plant, which might be used to advantage in the manufacture of grain alcohol.

AND SOUTHERN FLORIDA

Sabina Barbadosensis.

Pencil Cedar.

Formerly called *Juniperus Barbadosensis*.

The famous pencil cedar of Florida. Some years ago forests of cedar and live oak were reserved in Florida and elsewhere on the coast to insure a future supply of these valuable timbers for our navy. These were, of course, abandoned when steel replaced wood for this purpose. These, however, were our first national reserves.

Other conifers in cultivation are:

Araucaria excelsa.

Norfolk Island Pine.

Cedrus Deodara.

Deodar Cedar.

According to Reasoner, this tree succeeds everywhere in the South. It is very similar to the cedar of Lebanon and the Atlas cedar.

PANDANACEAE. PANDANUS FAMILY.

Pandanus utilis.

Screw Pine.



A MAHOGANY TREE IN THE BAHAMAS.

ORDER POACEAE. GRASS FAMILY.

Bambos spp.

Bamboo.

Several species are growing here and the government has started a bamboo farm at Brooksville, Florida. *Bambos vulgaris* is abundant along water courses in the West Indies, forming stately groves. Since it loves moist stream banks it will, no doubt, be a great favorite

THE EVERGLADES

ORDER PINACEAE. PINE FAMILY.

Pinus clausa.

Sand Pine.

Coast of East Florida on sand dunes.

Pinus Caribaea.

Cuban Pine.

The common timber pine of South Florida. Grows also in West Indies and Central America. Also called *Pinus Elliottii*—Slash Pine. This pine and the Longleaf or Yellow Pine yield the naval stores of our South. It is generally believed that resin will not run satisfactorily in Tropical Florida. The wood resists sea worms better than any of our native pines.

ORDER JUNIPERACEAE. JUNIPER FAMILY.

Taxodium distichum.

Bald Cypress.

A valuable timber tree.

Taxodium imbricarium.

Pond Cypress.

A species recently named by Harper.



AN AVENUE OF THE WEST INDIAN ALMOND, A FAVORITE SHADE TREE IN THE WEST INDIES. NOT SIMILAR TO NOR RELATED TO THE ALMOND OF COMMERCE.

Thuja occidentalis.

Arborvitae.

Various cultivated varieties of this tree commonly planted for shade and ornament. Probably does not extend naturally southward further than the mountains of North Carolina.

Sabina Virginiana.

Red Cedar.

The word "sabina," corresponding to the English savin, is a better name than the old name *Juniperus*. Sabina is the common name of the following species in Cuba and Santo Domingo.

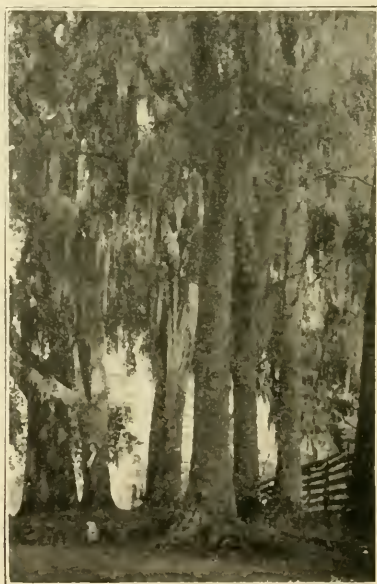
THE EVERGLADES

for Everglade planting. It throws a heavy shade and is a fine protective cover for poultry and social birds.

ORDER ARECACEAE. PALM FAMILY.

<i>Thrinax Floridana</i>	}	Palmettoes
<i>Thrinax microcarpa</i>		
<i>Thrinax Keyensis</i>		
<i>Cocothrinax jucunda</i>		
<i>Sabal palmetto</i>		
<i>Serenoa arborescens</i>		

The leaves of these palmettoes are highly valued in some countries for thatch, also for mats, baskets, etc. The leaves of the "Pond Thatch" in the Bahamas last longer than shingles. *Thrinax Keyensis* is good for this purpose. When timber gets scarcer, they will be more extensively used, just as straw is used on even expensive buildings in Holland.



THE LIVE OAK.

PALMS.

Pseudophoenix Sargentii.

Sargent Palm.

Southern Keys and the Bahamas. Resembles the date palm. Getting very scarce.

AND SOUTHERN FLORIDA

Roystonea regia.

Royal Palm.

This majestic tree reaches its optimal growth in Cuba, of which country it is emblematic; it adorns the Cuban two-cent postage stamp and coat-of-arms and its rich berries fatten many swine for their Christmas festivities. Extensively planted in South Florida and appears to be indigenous in several patches in the neighborhood of the Everglades.

Cocos nucifera.

Coco Palm.

One of the most beautiful and useful members of the plant world, yielding food, drink and shelter to many primitive peoples of the world. This tree grows in sandy soil along the seashores of tropical Florida and although most of the nuts were planted by the



SEMINOLE INDIANS COMING TO TOWN
WITH VENISON AND SKINS.

hand of man, undoubtedly some have sprung from seeds which have washed ashore and been buried in seaweed and sand on the beach. The original home of the coco palm is probably not known and since it grows as well in South Florida as elsewhere, it deserves to be listed at least as a naturalized member of our silva. Rabbits are fond of the young sprouts. They must be protected in youth.

Phoenix dactylifera.

Date Palm.

Phoenix Canariensis.

The Canary Island Date Palm.

Washingtonia filamentosa.

Fanleaf Palm.

THE EVERGLADES

MUSCAEAE. BANANA FAMILY.

The banana is, by some people, called a tree, because of its size, but according to the accepted definition of a tree, the stem must be woody in nature.

CASAURINACEAE. BEEFWOOD FAMILY.

Casuarina equisetifolia

Australian Pine

A tree of the East Indies and Australia, but now common throughout the tropics. Grows close to the sea, and has been used in



AN AVENUE OF ROYAL PALMS—ANOTHER FINE TREE FOR MUCKY SOIL.

the fixation of moving dunes along the seashore. It is usually called Australian Pine, but a patch of them on Biscayne Bay is known as the "cedars." The tree has become naturalized in South Florida and young trees of this species are growing here and there on the shore, the seeds of which have no doubt been washed ashore. It is a valuable addition to the silva of the State of Florida. Should be extensively planted for timber. It withstands the gales and yields a wood like oak.

AND SOUTHERN FLORIDA

JUGLANDACEAE. WALNUT FAMILY.

Hicoria pecan.

Pecan.

The king of nuts extensively cultivated in improved form in North Florida. Both the words "hickory" and "pecan" are probably of Indian origin. It is quite probable that some Spanish tree names such a "Ucare" are corruptions of hickory since hickory has been extensively used by West Indian peoples for barrel and hogshead hoops.

The pecan grows well in Florida, but apparently does not flourish south of central part of the State.



ALEURITES TRILOBA — THE CANDLE-
NUT. HAS FRUITED IN SOUTH
FLORIDA AND IS A VALUABLE TREE.

MYRICACEAE. BAYBERRY FAMILY.

Morella cerifera.

Wax Myrtle.

SALICACEAE. WILLOW FAMILY.

Salix longipes.

Long Stalk Willow.

FAGACEAE. BEECH FAMILY.

Quercus Virginiana.

Live Oak.

Excellent timber tree, common in Florida, also Mexico, Cuba and

THE EVERGLADES

Central America. These sturdy, broadspreading live oaks draped with Florida moss form a very characteristic feature of the Florida landscape.

Quercus myrtifolia.

Myrtle Leaved Oak.

ARTOCARPACEAE. MULBERRY FAMILY.

Morus rubra.

Red Mulberry.

Common throughout the State.

Morus nigra.

Black Mulberry.

Commonly planted for its large, black, juicy fruit. Probably originally came from Persia.



A MASTIC TREE IN THE HAMMOCK.
(PHOTO BY DR. R. M. HARPER)

Morus alba.

White Mulberry.

From China. Introduced mainly for silk-worm food.

Broussonetia papyrifera.

Paper Mulberry.

From Japan. Common throughout the State.

Ficus aurea.

Golden Fig.

South Florida and the West Indies. A striking weed tree in the forest. Grows first on limbs of other trees, throws down aerial roots

AND SOUTHERN FLORIDA

to the ground and finally chokes and kills the tree upon which it started.

Ficus populnea.

Poplarleaf Fig.

South Florida and the West Indies. Easily propagated from cuttings and might prove a satisfactory shade tree for South Florida.

Ficus carica.

The Fig.

Cultivated throughout the South for its fruits.

Ficus nitida.

Spanish Laurel.

A beautiful shade tree in Nassau and Key West. Also common in Cuba. A very satisfactory tree for roadside planting.

Ficus religiosa.

Sacred Bo of India.

Growing in favor as a shade tree in Tropical Florida. Very common avenue shade tree in Cuba.

Ficus altissima.

East Indian Rubber.

Makes excellent growth in Southern Florida.

Ficus glomerata.

Cluster Fig.

Of India. Grows well and bears well in Southern Florida.

Artocarpus integrifolia.

The Jack Fruit.

This tree, similar to the Bread Fruit, has fruited in South Florida.

ULMACEAE. ELM FAMILY.

Trema Floridana.

POLYGONACEAE. BUCKWHEAT FAMILY.

Coccolobis uvifera.

Sea Grape.

Common on the seashore of Southern Florida, also West Indies.

Coccolobis laurifolia.

Pigeon Plum.

South Florida and West Indies. A fine tree in the hammocks of Southern Florida. (A hammock is a rich hardwood jungle. It is probably an old Indian word and the old spelling "hamak" is sometimes still used.)

ALLIONIACEAE. FOUR-O'CLOCK FAMILY.

Pisonia obtusata.

Blolly.

Sea beaches and shores of brackish lagoons. Tropical Florida.

ANONACEAE. CUSTARD APPLE FAMILY.

Anona glabra.

Custard or Pond-Apple.

Anona squamosa.

Sugar Apple or Sweet Sop.

Anona muricata.

Sour Sop.

Anona reticulata.

**Custard Apple, called also Bullocks's,
Heart or Corazon.**

Anona cherimolia.

Cherimoyer.

THE EVERGLADES

The fruit of the latter is very highly prized in Spanish-American countries. It can be budded on our native Pond-apple. The wood of Pond-apple is very light and useful for net floats and stoppers in place of cork. *Canarium odoratum* of this order, a few of which have been planted in South Florida, yields the famous ilang-ilang perfume. To this order belong several important genera, such as *Uvaria* and *Rollinia*, which yield valuable fruits.



THE SUGAR APPLE.

MAGNOLIACEAE. MAGNOLIA FAMILY.

Magnolia glauca.

Magnolia or Sweet Bay.

A beautiful tree which should be more extensively planted. Grows well on Everglade soil.

CAPPARIDACEAE. CAPER FAMILY.

Capparis Jamaicensis.

Florida Caper.

AND SOUTHERN FLORIDA

MORINGACEAE. HORSERADISH TREE FAMILY.

Moringa moringa.

Horseradish Tree.

The root of this tree, finely scraped, is eaten as horseradish. The Oil of Ben, used by perfumers, is extracted from the seeds of this tree.

AMYGDALACEAE. PLUM FAMILY.

Chrysobalanus Icaca.

Coco-plum.

Amygdalus Persica.

Peach.

Laurocerasus sphaerocarpa.

West India Cherry.

Eriobotrya Japonica.

Loquat.

LEGUMINOSEAE. BEAN FAMILY.

Pithecolobium unguis-cati.

Florida Cat's Claw.

Pithecolobium dulce.

Gaumachil.

One of the fastest-growing trees ever introduced into Florida. It grows five feet in height per year, on rocky land. Grows well in regions of very slight rainfall. The pulp of the pod is eaten by the poorer classes of Mexico. Pods are a good feed for cattle, and the bark contains twenty-five per cent tannin and is therefore extensively used for tanning purposes in regions where it is plentiful.

Pithecolobium saman.

Rain Tree or Guango.

Similar to the above.

Pithecolobium Gaudeloupense.

Goatbush.

This is a native bush, but sometimes reaches tree proportions. It is valuable because it is the first hardwood leguminous shrub to appear in the pine woods. It enriches the soil by its litter and paves the way for other hardwoods. It marks the beginning of the transition from pinewoods to hammock conditions.

Albizzia Julibrissin.

A favorite shade tree in the Southeastern United States.

Albizzia Lebbek.

Siris or Lebbek Tree.

Called Woman's Tongue in Nassau.

Lysiloma latisiliqua.

Wild Tamarind.

Common in places on the Keys. Wood, heavy, hard, tough, close-grained, rich brown, tinged with red.

Vachellia Farnesiana.

Yellow Opoponax.

Called also Popinac. The flowers are used for perfume.

Leucaena glanca.

Mimosa spp.

Dalbergia Sissoo.

Sissoo Tree of India.

It is a species of this same genus that yields one variety of "Rosewood."

THE EVERGLADES

Tamarindus Indica.

Ceratonia siliqua.

Haematoxylon Campechianum.

Grows well on dry, rocky ridges.

Cassia fistula.

A favorite ornamental tree.

Delonix regia.

A favorite shade tree.

Tamarind.

St. John's Bread or Carob.

Logwood.

Shower of Gold.

Poinciana Tree.



THE WILD TAMARIND.

Ichthyomethia piscipula.

Jamaica Dogwood.

A common and very valuable timber tree for South Florida. Might be used to advantage as a shade and ornamental. Grows quickly, has an abundance of pea-like flowers in clusters which honey bees are fond of. As the name indicates, it is a fish poison. The bark and twigs are bruised and lowered in a basket into the water. A poison is dissolved which stupefies fish that comes near it. They float to the surface and are easily captured. This tree grows well from seeds and its propagation should be encouraged.

Bauhinia spp.

Several species, beautiful, ornamental small trees.

Cajan cajan.

Pigeon Pea.

Makes a small but useful tree. Poultry are fond of its seeds and its leaves enrich the soil.

Erythrina arborea.



A CEDRELA TREE—GROWN FROM A CUTTING. RATE OF GROWTH TO DATE, TWO FEET PER MONTH.

THE EVERGLADES

ZYGOPHYLLACEAE. CALTROP FAMILY.

Guaiacum sanctum.

Lignum Vitae.

Very hard, slow-growing wood.

RUTACEAE. RUE FAMILY.

Fagara fagara.

Wild Lime.

Fagara flava.

Yellow wood.

Valued for timber in the Bahamas. Good for plane stocks, tool handles and furniture.

Fagara clava-Herculis.

Prickly Ash.

Fagara coriacea.

Amyris elemifera.

Torchwood.

Wood heavy, hard, strong, close-grained; very resinous, very durable; light orange in color.

Amyris maritima.

Amyris balsamifera.

Vitrus vulgaris.

Bitter Sweet Orange.

Citrus aurantium.

Sweet Orange.

Citrus limonium.

Lemon.

Citrus limetta.

Lime.

Citrus medica.

Citron.

Citrus decumanna.

Grapefruit, Pomelo, or Shaddock.

Citrus nobilis.

Tangerine.

Citrus Japonica.

Kumquat.

SIMARUBACEAE. QUASSIA FAMILY.

Simarouba glauca.

Paradise Tree.

South Florida and West Indies. A pretty, quick-growing tree in the hammocks. Would make a handsome avenue tree.

Bursera simaruba.

Gumbo-Limbo.

South Florida and West Indies. Grows easily from a cutting or large limb stuck in the ground, frequently used in this way for live fence posts. Grows very quickly and has a very striking, bronzy red trunk, with papery bark. The term gumbo-limbo is probably a negro corruption of the term gum-elemi. Called "gamolinie" in the Bahamas, which is probably a corruption of gum-elemi.

MELIACEAE. MAHOGANY FAMILY.

Melia azedarach.

China Berry.

Called also "Lilaila." In the northern part of the State and along the Gulf Coast a variety of this tree, *umbraculiformis* or "Umbrella China Tree," or "Texas Umbrella Tree," is the favorite tree for shade and ornament. Although a native of Persia, is now naturalized in the Southern United States.

AND SOUTHERN FLORIDA

Swietenia mahagoni.

Mahogany.

Called also *madeira*, the latter word being simply the Spanish for "wood." Common on the Keys and parts of the southern mainland. The king of all woods. Something ought to be done to encourage the perpetuation of this, our choicest native hardwood, in the only part of the mainland of the United States where it can possibly grow.



A RUBBER TREE KILLING A COCO PALM. WILD RUBBER TREES ARE PER-
NICIOUS WEEDS. THE SEED IS DROPPED BY A BIRD IN THE FORK OF
THE TRUNK OR IN THE CREVICE OF THE BARK. IT SPROUTS, ITS ROOTS
RUN DOWN THE TRUNK TO THE GROUND. IN TIME IT CHOKES TO
DEATH THE TREE WHICH SUPPORTED IT IN YOUTH.

Cedrela Sinensis.

Cedrela toona.

The toon tree of India, called Red Cedar in Queensland.

Cedrela odorata.

Spanish Cedar.

THE EVERGLADES

EUPHORBIACEAE. SPRUCE FAMILY.

Drypetes lateriflora. Florida Plum.

Also called "white-wood." South Florida and West Indies.

Drypetes Keyensis. Guiana Plum.

Also called "white-wood." South Florida and West Indies.

Gymnanthes lucida. Crabwood.

Southern Florida and West Indies. Some say this wood is poisonous. It is, however, a very pretty wood and is often used in the manufacture of canes, paper-knives and similar articles.

Ricinus communis. Castor Oil Tree.

Attains the size of a small tree in South Florida. Valuable plant. Oil is very useful, seed pumice is a valuable fertilizer and the plant is not exhaustive to the soil.

Hura crepitans. Sand Box Tree.

Manihot manihot. Cassava.

Aleurites triloba. Candlenut Tree.

Hippomane manicinella. Manchineel.

Southern Florida and the West Indies. A tree to be shy of; fortunately not common on the mainland. Poisonous to the touch to many people, producing a distressing dermatitis worse than poison ivy. It is called "guao" in Cuba, and I have known persons who have handled it without knowing suffer agonies with face and hands a solid mass of large blisters. It has a small fruit of pleasant appearance which might be eaten by children with dire results.

SPONDIACEAE. SUMAC FAMILY.

Metopium metopium. Poison Wood.

Very common in Southern Florida. Poisonous, and when bruised exudes a gum which blackens the trunk of the tree. One of the first trees to come up after hammock land has been cut and burnt.

Mangifera Indica. Mango.

Extensively planted in the southern countries, producing an abundance of choice fruits, some of the recent imported and improved varieties ranking with the choicest of our fruits. At the same time a valuable shade and ornamental tree.

Anacardium occidentale. Cashew Apple.

Cashew Nut.

Spondias dulcis. Otahaite Apple.

Spondias purpurea. Scarlet or Spanish Plum.

Schinus molle. Pepper Tree.

Phyllanthus (Cicca) distichus. Gooseberry Tree.

AND SOUTHERN FLORIDA

AQUIFOLIACEAE. HOLLY FAMILY.

Ilex Cassene.

Dahoon.

CELASTRACEAE. STAFF TREE FAMILY.

Gyminda Grisebachii.

False Boxwood.

Schafferia frutescens.

Boxwood or Yellow Wood.

ACERACEAE. MAPLE FAMILY.

Acer rubrium.

Red Maple.

SAPINDACEAE. SOAP BERRY FAMILY.

Sapindus saponaria.

Soap Berry.

Exothea paniculata.

Inkwood Ironwood.

Wood very hard and heavy. Used for tool handles, etc.



A BAMBOO GROVE IN JAPAN—A FINE TREE FOR MUCKY SOIL.

Hyperlate trifoliata.

White Ironwood.

Wood used in shipbuilding in Bahamas. Berries edible.

Cupania glabra.

Blighia sapida.

Formerly known as *Cupania edulis*, is the Akee of Africa and Jamaica. This tree has fruited at the Sub-Tropical Gardens. The white covering of the seeds is a wholesome vegetable; the rest of the fruit is poisonous, so that great care must be exercised in using it.

Melicocca bijuga.

Genip.

Pulp edible. Nuts in Venezuela are roasted and eaten like chest-nuts.

THE EVERGLADES

FRANGULIACEAE. BUCKTHORN FAMILY.

<i>Rhamnidium ferreum</i> .	Black Ironwood.
<i>Colubrina reclinata</i> .	Nakedwood.
<i>Reynosa latifolia</i> .	Darling Plum.
Fruit edible.	

MALVACEAE. MALLOW FAMILY.

<i>Hibiscus tiliaceus</i> .	Mahoe.
<i>Thespesia populnea</i> .	
This tree is called "majagua de Florida" in Cuba.	
<i>Gossypium religiosum</i> .	Tree Cotton.
<i>Ceiba pentandra</i> .	Silk Cotton Tree.

CANELLACEAE. WILD CINNAMON FAMILY.

<i>Canella Winteriana</i> .	Cinnamon Bark or White Wood.
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CLUSIACEAE. BALSAM TREE FAMILY.

<i>Clusia flava</i> .	
<i>Mammea Americana</i> .	Mammee Apple.

PAPAYACEAE. PAPAW FAMILY.

<i>Carica papaya</i> .	Papaw.
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BIXACEAE. BIXA FAMILY.

<i>Bixa Orellana</i> .	Annatta.
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A small tree yielding an orange-colored dye, used for butter color.

PROTEACEAE. PROTEA FAMILY.

<i>Grevillea robusta</i> .	Sheoak from Australia.
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FAMILY LAURACEAE. LAUREL FAMILY.

Persea gratissima, aquacate, avocado, avocado, alligator pear, butter pear, midshipman's butter, palta, etc.

A salad fruit. A species, *P. sylvestris*, grows wild in Cuba. Practically naturalized in South Florida. Extensively cultivated for home consumption and shipment North. Several improved varieties propagated by budding.

<i>Persea borbonia</i> .	Red Bay.
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Common throughout Florida. Called sometimes "Florida mahogany," but should never be confounded with the true mahogany which grows on the Keys.

<i>Persea pubescens</i> .	Swamp Bay.
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The term "bay" sometimes applied to trees may come from the French *baie*, meaning berry; it may have to do with the color of the wood, although the word *bay* in this sense is usually only applied to horses and in the case of "bay-wood" sometimes applied to mahog-

AND SOUTHERN FLORIDA

any bay may refer to the "Bay Islands" in the Gulf of Honduras, a great mahogany center.

Ocotea Catesbyana. Lancewood.

A very valuable wood.

Misantica triandra.

One tree 18 inches in diameter and a few small ones found by Miss Olivia Rodham in the Brickell Hammock, near Miami. Identified by C. S. Sargent. Broad-topped, handsome tree, native to Cuba.

Cinnamomum camphora. Camphor Tree.

Grows well throughout the State. Well-established plantations of this tree in the proper locations would probably in time bring large returns.

According to a recent report citrus groves with camphor planted here and there are not infested with white-fly.

Cinnamomum cassia. Chinese Cinnamon.

A magnificent shelter tree, very dense and of quick growth. Will grow throughout the State.

Laurus nobilis. Apollo's Laurel.

PUNICACEAE. POMEGRANATE FAMILY.

Punica granatam. Pomegranate.

TERMINALIACEAE. WHITE MANGROVE FAMILY.

Conocarpus erecta. Buttonwood.

Southern Florida. Chiefly along salt shores. Highly prized for fuel. The best fuel I know of, since it makes great heat and almost no smoke.

Bucida buceras. Black Olive Tree.

Keys and West Indies.

Laguncularia racemosa. White Mangrove or Buttonwood.

South Florida and West Indies. Muddy shores, common.

Terminalia cattappa. West Indian Almond.

Common West Indian shade tree.

MYRTACEAE. MYRTLE FAMILY.

Eugenia buxifolia. Surgeon Stopper.
Spanish Stopper.

South Florida and West Indies.

Eugenia monticola. Stopper
White Stopper

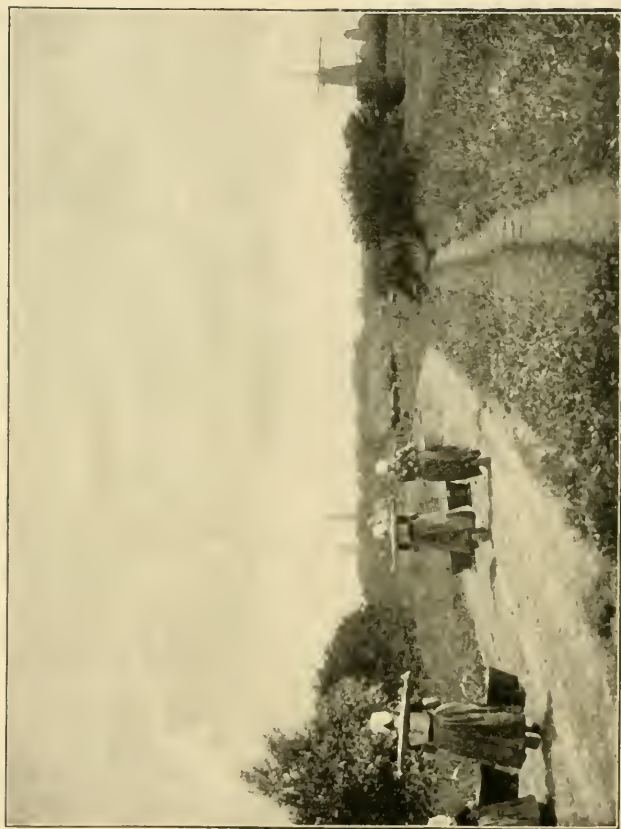
Southern Florida.

Eugenia Garberi. Garber Stopper.

South Florida and West Indies.

Eugenia procera. Red Stopper.

Keys.



A SCENE IN HOLLAND, ONLY A FEW YEARS AGO THIS SPOT WAS COVERED WITH
NAVIGABLE SALT WATER.

AND SOUTHERN FLORIDA

Eugenia jambos.

Rose-Apple.

A common introduced species; although a native of India it is naturalized in the West Indies. *Eugenia Micheli* is the much-prized Surinam Cherry in Dade County.

Eugenia longipes.

There are many species of *Eugenia* in South America which yield valuable fruits.

Ananomis dichotoma.

Naked Stopper.

South Florida.

Chytraculia chytraculia.

Stopper.

South Florida and West Indies.

Psidium guajava.

Common Guava.

Probably the greatest of all jelly-producing fruits. Common throughout Florida.

Eucalyptus spp.

Many claim that the right species of the many kinds are the most promising of all trees for planting in Florida, because of their great rapidity of growth and aid to drainage, since they suck up in the process of transpiration many times the amount of water which falls upon the surface of their foliage in the form of rain.

The following kinds have been highly recommended for trial:

E. meliodora, *E. viminalis*, *E. citraodora*, *E. robusta*, *E. rostrata*, *E. crebra*, *E. corynocalyx*, *E. resinifera*.

Melaleuca leucodendron.

The Cajeput Tree.

Grows well in Florida and yields Cajeput oil.

RHIZOPHORACEAE. RED MANGROVE FAMILY.

Rhizophora mangle.

Red Mangrove.

South Florida and the West Indies. A wonderful tree, grows in salt water and of great value in consolidating muddy shores; it has been called the "Land Former." Deserves to be protected because of the protection it affords to exposed shores in times of storm. Plantations on the Keys in the shelter of mangroves suffered little damage in the great storm of the fall of 1906, while those exposed to the fury of the waves bearing floating wreckage were ruined. Seeds of this tree have been sent to the Hawaiian Islands to be planted for this purpose, and when the mangrove takes hold along the line of the railroad to Key West it will safely protect it against the severest storms.

THEOPHRASTACEAE. JACQUINIA FAMILY.

Jacquinia Keyensis.

Joewood.

According to Nash, in the Bahamas the bark is mixed with lime, placed in a bag and put in the water to stupefy fish.

THE EVERGLADES

ARDISIACEAE. MYRSINE FAMILY.

Icaoreoa paniculata.

Marlberry Cherry.

SAPOTACEAE. SAPODILLA FAMILY.

Chrysophyllum oliviforme.

Satin-Leaf.

Southern Florida. Highly prized as an ornamental tree because of the bright golden color on the under side of its leaves. To this same genus belongs the beautiful "Cainito" or Star-apple, a fruit relished by peoples of the West Indies. It might be possible to bud the Star-apple on the native Satin-leaf.

Mimusops Sieberi.

Wild Dilly.

Keys.

Sapota zapotillo.

Sapodilla.

Naturalized on the Keys, where it is a common fruit. Planted also on the mainland. A tree hard to start, but hardy when started, yields an everlasting wood and a gum called Chicle.

Sideroxylum mastichodendron.

Mastic.

Valuable forest tree of Southern Florida. Grows to be large and is quite common, shedding an abundance of yellow fruits which are edible in case one likes the flavor. Mastic would probably make a satisfactory shade tree.

Dipholis salicifolia.

Bustic or Cassada.

Southern Florida and West Indies.

Lucuma Rivicoa var *angustifolia.*

Ties, or Egg Fruit.

Chrysophyllum cainito.

Star-Apple.

A fruit highly relished in the West Indies.

Lucuma mammosa.

Mammee Sapota.

EBENACEAE. PERSIMMON OR EBONY FAMILY.

Diospyros kaki.

Japanese Persimmon.

Diospyros Virginiana.

Persimmon.

Throughout Florida. There is a curious mix-up in names in connection with the persimmon and the sapodilla just mentioned above. The black persimmon of Texas and Northern Mexico is called "Chapote," which is a slight modification of the name Sapota. The Spanish for sapodilla is Nispero, the name of the European Medlar. From Nispero comes the term Naseberry, a name frequently applied to the Sapodilla in the British West Indies. Both words, Persimmon and Sapota, are probably of Indian origin, the one North American and the other South American.

AND SOUTHERN FLORIDA

OLEACEAE. OLIVE FAMILY.

Olea Europea.

Olive.

Grows luxuriantly in South Florida but does not fruit. There was the same difficulty with it in Southern California. With proper treatment it might yield a valuable crop for this region.

APOCYNACEAE. DOGBANE FAMILY.

Nerium oleander.

Oleander.

A beautiful ornamental but poisonous. According to report on the subject by the Arizona Experiment Station, the physiological effects are similar to those of digitalis, and if enough poison is obtained the patient is sure to die. Fifteen to thirty grains of the leaves will kill a horse, ten to twenty grains a cow, and from one to five grains a sheep.

Plumieria rubra.

Frangipani.

A fine ornamental.

EHRETIACEAE. EHRETIA FAMILY.

Cordia Sebastina.

Geiger Tree.

Bourreria Havanensis.

Strong Bark.

Bark used in making tea in the Bahamas.

VERBENACEAE. VERBENA FAMILY.

Citharexylum villosum.

Fiddlewood.

South Florida. One must not assume from both the scientific and common names that this wood is good for fiddles; quite otherwise, because the wood is heavy and exceedingly hard. Both names are supposed to be mistakes, or rather the common name is a corruption of the French "fidele," meaning true or strong, and the scientific name is merely a translation of the common name. On the other hand, one softer and lighter wooded member of this genus might have been used for this purpose. Bello gives the common name "palo de guitarra" to *C. quadrangulare* in Porto Rico, and Cook says the natives make their guitars of this wood.

Avicenna nitida.

Black Mangrove.

Very valuable tree, like the red mangrove, for consolidating muddy shores.

BIGNONIACEAE. BIGNONIA FAMILY.

Crescentia cujete.

Calabash.

Crescentia ovata.

Black Calabash.

THE EVERGLADES

OLACACEAE. XIMENIA FAMILY.

Ximenia Americana.

Purging Nut.

Called also Mountain Plum, in Jamaica. Fruit eaten.

RUBIACEAE. MADDER FAMILY.

Exostema Caribaeum.

Princewood.

Bark a tonic. Would probably make a useful bitters.

Coffea Arabica.

Coffee.

Coffee has fruited in South Florida.

Genipa clusiifolia.

Seven-Year Apple.

Fruit eaten.

Guettarda elliptica.

Guettarda scabra.

Nakedwood.

Psychotria undata.

In addition to the above mentioned trees, I have seen two specimens of *Kigelia pinata*, the Sausage Tree of Africa; *Cecropia peltata*, the Trumpet Tree; *Castilloa elastica*, the Mexican rubber tree; *Manihot Glaziovii*, Ceara rubber; one specimen of the true banyan, *Ficus Indica*, a *Covillea* from Madagascar, and other not sufficiently tried to be worthy of record until they grow older.

INDEX.

	PAGE
Acajou trees	73
Agents for selling land.....	10
Agricultural possibilities in the Everglades, and experiments in fer- tilization	19, 20, 46 47
Alfalfa	45
Almond, West Indian.....	221
Annatta	220
Anonas	46, 211
Apple, Rose.....	223, 114
Apple, Pond	211
Apple, Sugar	211
Apple, Custard	211
Apple, Cashew	218
Apple, Mamnee	220
Apple, Star	224
Apple, Seven Year	226
Arborvitae	204
Ash, Prickly	216
Australian Pines, or Beefwood.....	177, 208
Avocados	13, 46, 160, 162, 164, 220
Bamboo	48, 205, 219
Bananas.....	38, 39, 41, 46, 83, 162, 165, 208
Banyan trees	118
Bay, Red	220
Bay, Swamp	220
Berry, Soap	219
Blolly	211
Bo, Sacred	211
Boxwood	219
Bungalows	83-88, 102
Bustic	224
Buttonwood	51, 221
Cajeput	50, 186, 189
Calabash	225
Camphor Trees.....	186, 188, 221
Canals: Their Dredging, Dams, and Aid to Fertility.....	9, 44, 101
Candlenut Tree	209, 218
Caper, Florida	212
Carissa grandiflora	192, 193
Carissa or Natal Plums.....	52, 161
Carob	214
Cashew Nuts	111, 218
Cassada	224
Cassava, or Sago.....	55, 218
Castor Beans	53, 218
Casuarina Wood	180
Cat's Claw, Florida.....	213
Cassa or Natal Plums.....	52, 161
Cedar, Pencil	205
Cedar, Red	204

INDEX—Continued.

	PAGE
Cedar, Spanish.....	50, 63, 215, 217
Chattahoochee Canal	101
Cherimoyer	211
Cherry, West India.....	213
Cherry, Marlberry	224
Chicle	36, 51
China Berry	216
Cinnamon Bark.....	220
Cinnamon, Chinese	221
Citron	165, 216
Citrus Trees and Groves.....	135
Coco Palms.....	13, 27, 48, 163, 207
Cocoplums	213
Coffee Culture	124, 226
Coffee Plantations	124
Conservation of Land.....	101
Coontie, Comptie, or Koontie.....	47, 54, 170
Copra	30
Coral Formations	14
Coral Islands	16
Corn	45
Cotton	46
Cotton, Tree	220
Cotton, Silk Tree.....	220
Crabwood	218
Crops, Semi-yearly Rotation.....	10, 46
Cypress, Bald	204
Cypress, Pond	204
Dahoon	219
Diatoms	147
Dilly, Wild	224
Dogbane	119
Dogwood, Jamaica	214
Drainage.....	1-12, 21, 95, 143
Egg Fruit	166, 224
Eucalyptus Trees	22, 223
Experiments in Rubber.....	119
Fiddlewood	225
Fig, Common	211
Fig, Cluster	211
Fig, Golden	210
Fig, Poplarleaf	211
Florida Considered as Part of the Tropics.....	13
Florida Fruits, Alphabetically Arranged.....	163-169
Forage Crops	43, 46
Frangipanni	225
Gaamachil	213
Gayule Industry	119
Geiger Tree	225
Genip	219
Gooseberry Tree	218

INDEX—Continued.

	PAGE
Grapefruit	137, 198, 216
Grapes	58
Grape, Sea	211
Goat Bush	213
Guango	213
Guavas	52, 114, 161, 223
Gumbo-limbo Trees.....	183, 216
Hammock Lands and Forests.....	14, 18, 54, 74, 75
Hookworm	153, 154
Horseradish Tree	213
Humus	149
Importance of Careful Handling of Fruit in Shipment.....	129
Inkwood	219
Inland Canal Route.....	102
Ironwood, Black	220
Ironwood, White	219
Jak Fruit	211
Jamaica Dogwood	51, 214
Jobo Trees	183, 184
Joewood	223
Koonti, or Comptie.....	170-175
Kumquat	216
Lancewood	221
Landes of France.....	3, 5, 7, 96, 101
Laurel, Apollo's	221
Laurel, Spanish	211
Lebbek Tree	213
Lemons	167, 216
Lignum Vitae	216
Limestone Formations	16, 75
Limes	161
Lime Trees	33, 34, 52, 57, 138, 216
Lime, Wild	216
Logwood	214
Loose Tile Drainage Systems.....	141, 142
Loquat	213
Magnolia	212
Mahoe	220
Mahogany.....	50, 51, 60-64, 70-84, 217
Maintenance of Soil Fertility.....	44
Malaria	153
Mammee Sapota	224
Manchineel	218
Mango Culture	109-112
Mangoes	13, 46, 138, 161, 218
Mangosteen	109, 114
Mangrove Islands and Swamps.....	14, 18, 29, 74, 75, 221, 223, 225

INDEX—Continued.

	PAGE
Maple, Red	219
Mastic	51, 224
Muck Soil	146-149, 151
Mulberry, Black	210
Mulberry, Paper	210
Mulberry, Red	210
Mulberry, White	210
Myrtle, Wax	209
Naked Wood	220, 226
New River; Its Relation to the Canal Project.....	8
Nut, Cashew	218
Nut, Purging	226
Oak, Live	209
Oak, Myrtle-leaved	210
Oats	44
Oleander.....	225
Olives	132, 225
Olive Tree, Black.....	221
Opoponax.....	213
Oranges	162, 216
Palmetto	16, 75, 206
Palm, Canary Island Date.....	207
Palm, Coco.....	207
Palm, Date.....	207
Palm, Fan Leaf.....	207
Palm, Royal.....	207
Palm, Sargent.....	206
Paradise Tree	216
Paw-paws or Papayas	38, 40, 83, 220
Peach.....	213
Peonage	127
Pepper Tree.....	218
Phosphates	97, 151
Pigeon Pea Bushes	53, 214
Pine, Australian	177, 208
Pine, Cuban.....	204
Pine, Norfolk Island	205
Pine, Sand.....	204
Pine, Screw.....	205
Pine for Construction.....	16
Pineapples.....	13, 15, 79, 104-107, 162
Pineland.....	14, 16, 74, 75
Plum, Coco.....	213
Plum, Darling.....	220
Plum, Florida	218
Plum, Guiana.....	218
Plum, Pigeon.....	211
Plum, Spanish or Scarlet.....	218
Pecan.....	209
Persimmon.....	224
Poinciana.....	214

INDEX—Continued.

	PAGE
Poisonwood.	218
Pomegranate.	221
Pond-apples	54, 211
Princewood	51, 226
Pruning Trees	139
Rainfall	130
Rain Tree	213
Reclamation of Land.	10, 42, 43, 96
Red Cedar	73, 204
Red Gum Trees.	23
Red Mahogany Gum Trees.	23
Rice	45, 46
Rootage Reinforcement Process.	138
Rose Apple, or Pomerosa.	24, 49, 116
Rubber and Rubber Trees.	117-118
Rubber Varieties.	118, 121, 122, 211
"Ruinate" Land	197
Sago.	171, 203
Sand Box Tree.	218
Sandstone	75
Sanford System of Irrigation.	144
Sanitation	153, 156
Sapodillas	33, 35, 46, 51, 224
Satin Leaf.	224
Seminole Indians.	11, 19, 170
Sewage Systems	157
She Oak.	220
Shower of Gold.	214
Siris Tree.	213
Sissoo Tree.	213
Soapberry.	219
Softwood Timber	50
Soil: Formation of Deposit; Silicious; Limestone; Mineral Matter; Betterment.	7, 11, 25
Sop, Sweet.	211
Sop, Sour.	211
"Sours and Dillies".	33
Spanish Cedar.	63, 68, 73, 215, 217
St. John's Bread.	214
Stopper Woods.	221, 223
Strong Bark.	225
Sub-irrigation	142, 144
Sugar	79
Sugar Cane Development.	45
Surinam Cherries	53, 116, 161, 193
Tamarind, Wild.	213, 214
Tangelos	137
Tangerines	137, 216
Temperature	130, 131
Ti-es	114, 116, 168, 224

INDEX—Continued.

	PAGE
Timber Statistics	60
Tobacco	46
Torchwood,	216
Transpiration of Trees Throughout the Year.....	22, 98
Transportation of Freight by Water.....	11
Trees and Drainage.....	21, 24
Trees for Shade.....	196, 197, 200-202
Trees, Indigenous and Native.....	203-226
Turpentine	186, 187
Unit Houses	87-93
Vanilla	57, 71, 126
Vegetation.....	11, 14, 15, 21, 73
Vines	56-59
Wells	141
Whitewood,	220
Willow, Long Stalk.....	209
Windbreaks	199
Windmills	141
Yams	57
Yellow Wood,	216

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