

SECOND ANNUAL REPORT

OF THE

CANAL ZONE

Plant Introduction Gardens

**Covering the Two Fiscal Years of
1925-1926**



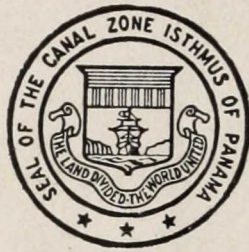
THE PANAMA CANAL PRESS
MOUNT HOPE, C. Z.
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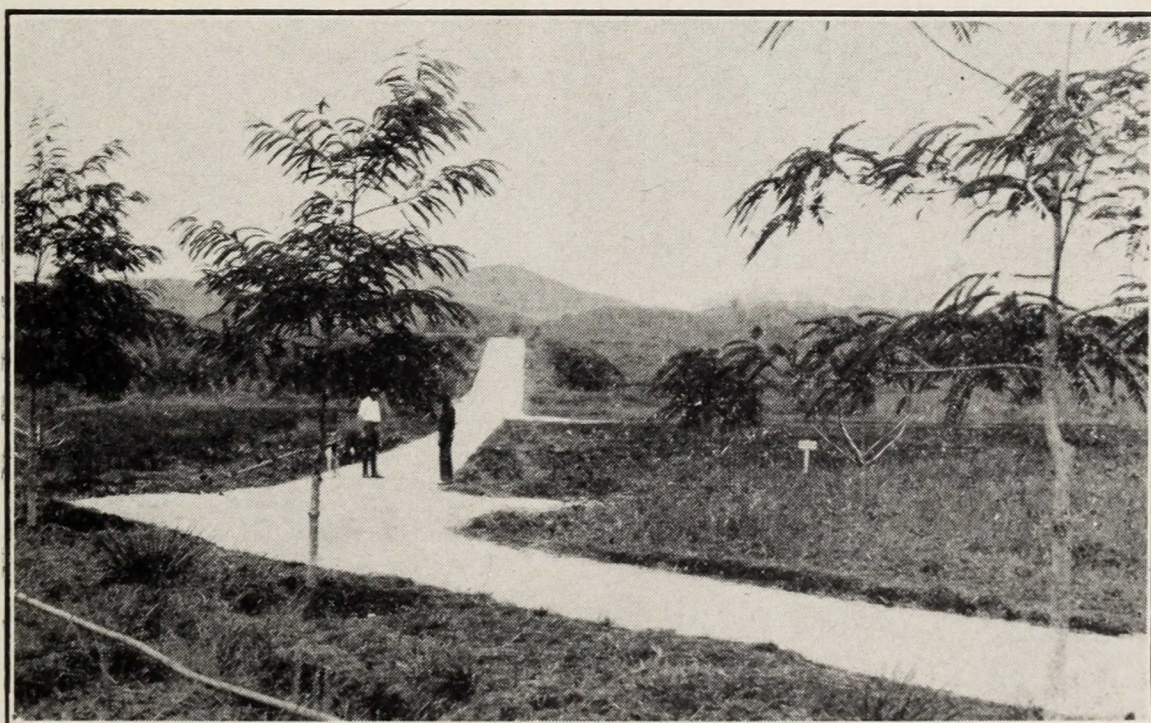
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SECOND ANNUAL REPORT

SUMMIT, C. Z., *June 24, 1926.*

Mr. R. K. MORRIS,
Chief Quartermaster,
BALBOA HEIGHTS, C. Z.

SIR: I have the honor to submit the following illustrated report of operations of the Plant Introduction Gardens for the two fiscal years ending respectively June 30, 1925, and June 30, 1926, recommending that it be printed and published as the second annual report of the Canal Zone Plant Introduction Gardens.



Part of newly constructed road at Summit Botanic Gardens.

The time covered by the present report has been one of considerable growth and greater activities for the gardens. Most of the projects outlined in 1923 and 1924, and mentioned in the report of the fiscal year of 1924, were continued and extended. A few were abandoned or at least restricted as it appeared that the need for their continuance was too small to warrant the corresponding expenditure of time and money. The plant collections have grown remarkably fast, and now comprise more than 1,000 distinct species, the botanical gardens of the institution bidding fair to become of a very decided scientific value.

The additions to the plant collections were secured through various sources. In January and February of 1925, the writer made a trip through Ecuador and part of Colombia, and collected a large number of seeds and plants, likewise brought a large collection to the Canal Zone from a trip through Cuba and Jamaica in October-November, 1925. Seed exchange with a number of foreign botanical gardens and Agricultural Experiment Stations has also resulted in large additions to the botanical collections. Of very great importance has been the cooperation of the Department of Agriculture, Washington, D. C., which has sent us a very large number of highly interesting plants. Lately much material has been received, collected by the Armour Expedition, now in the East Indies, and headed by Dr. David Fairchild. Accompanying this report is a catalog of the plants now found in the gardens, it is arranged by botanical relationship, and each plant bears a permanent index number. Aluminized zinc labels were placed by the plants in the field bearing index numbers. This labeling will be continued as the plantings are extended. It will be possible in the future to systematize the plantings much better than has hitherto been the case, because of the roads which have been built during the dry season of 1925-1926. About 3,000 feet of these roads have been hard surfaced, while the subgrading was completed on about 7,000 feet ready for the surfacing material. The road system makes the southern portion of the Summit farm, hitherto almost inaccessible, available for extension of the plantings, dividing it up in definite plots, whereby it becomes possible to make classified plantings, also to obtain desirable landscape effects. A complete map was made of the gardens, showing all roads and buildings. All the work of subgrading and placing the crushed rock was done by prison labor.

Most of the land traversed by the new roads was drained, plowed, and harrowed. This will be of appreciable assistance in tiding over the dry seasons, which are quite hard on permanent plantings. More particularly was such the case during the dry season of 1925-1926, which was unusually long and severe. Many trees suffered somewhat and practically stopped growing, although very few of them were lost.

A very large number of fruit trees, ornamental and economic trees were distributed. With the beginning of 1926 the policy governing the mode of distribution was slightly changed. Hitherto all plants were distributed entirely free. There were indications that this created a tendency on the part of recipients of plants to give these an insufficient amount of care. A small charge is therefore now made on all plants leaving the gardens—not as an attempt to cover all expenses in connection with the growing of the plants but rather as a measure of a certain moral value, which will help to ensure that a more careful attention is given the plants after they

have left the gardens. As far as possible records are kept of plants distributed, and an effort is made to have the plant owners report on growth and behavior of the plants. The demand for plants has increased very rapidly during the last two years, by inhabitants of the Canal Zone as well as of Panama. The gardens have, however, at practically all times been able to take care of the demand, raising young plants in very large numbers, dedicating four greenhouses beside several acres in the field to nursery work. Numerous difficulties have had to be overcome or worked against, mainly that of lack of really efficient and sufficient rapid labor to perform the detailed work of plant propagation and caring for young plants.

In propagating plants for distribution, particular attention has been given to the importance of growing better and more fruit. The Canal Zone should be essentially a fruit-growing region rather than one of field crops on a large scale. The local market for fruit is sufficiently attractive; and growing fruit for export has to be no prime consideration, is even in most cases for several reasons not feasible, bananas constituting the only exception. The plant introductions of the gardens, therefore, have to a considerable extent been along the line of fruit-bearing trees, attempting to establish better varieties of already known kinds as well as introducing for test and possible future distribution kinds hitherto unknown in the Canal Zone.

Besides introducing and propagating plants valuable for their edible fruits, the gardens have also given much attention to a large number of plants of other economic value, as well as to new ornamentals. It is in this connection of interest to mention that the palm collection of the gardens now contains more than 50 species.

BANANAS.

The Panama disease has during the last two years made still further inroads on the existing plantations, in a number of cases to such an extent that production has become unprofitable and the land has been abandoned and allowed to grow up into jungle. It would seem that the only solution of the problem is the planting of disease-resistant varieties of bananas. While several such exist, it unfortunately happens that none of them for one reason or another is able to compete in the northern markets with the *Gross Michel* banana. The best among them for export is probably the Philippine *Lackatan* banana. Largely through the courtesy of the United Fruit Co., the gardens were able to obtain a number of bulbs of this variety. These were planted out and propagated as rapidly as possible until the gardens now possess about one acre planted with *Lackatan* banana. A number of shoots were furthermore distributed

among banana farmers on Gatun Lake, and many of these now have plants enough for a fair start. A few of the oldest plants at the gardens fruited and bore bunches which in size compared very favorably with the *Gross Michel*, and in general appearance much resembled this variety. The bunches were cut green but "full" and hung under the roof in a cool and ventilated building. The coloring process was slow, after three weeks all fruits on the stem were still green when they all became yellow within two days. The *Congo* banana, and the *Cavendish* (Chinese) banana, both, and particularly the latter, quite resistant to banana wilt, were planted in a 10-acre plot at the gardens, from which it should be possible to obtain a large number of shoots for distribution within a year.

These two latter bananas have so far proved to be of but little value for export and were planted mainly in order to supply the farms growing bananas for the local market. They are both excellent table fruits, and might be just what the small native farmer will need in order to keep his fields productive, and maintain his position in the local market, which he now has difficulty in doing as his fields of *Gross Michel* are giving out.

PINEAPPLES.

Several varieties have been grown, two of them in commercial plots, namely the pine from Taboga, sometimes called *Chocoena*, and another obtained in local plantings near Monte Lirio. The planting of Monte Lirio pineapples was made at the gardens in October, 1923; a few fruits ripened in November, 1925, while the main crop was harvested from January to April, 1926. While the time from planting till fruit production, seems rather a long one, practically all the plants were productive. The fruit is slightly tapering, very large, measuring 25 inches in circumference, 10 inches long from crown to butt and averaging a weight of 8 pounds. It is white fleshed, practically stringless, with a small core and very juicy. While not as sweet as some might like, it is a particularly desirable table fruit. It would probably be too watery for export and too large for canning. A very large amount of slips is produced around each fruit, a point in its favor in so far as propagation is concerned.

The field of Taboga pineapples was planted in June, 1924, and ripened its main crop April-May, 1926. The fruit is considerably smaller than that of the Monte Lirio pineapple, averaging a measure of 16 inches in circumference, 8 inches in length and a weight of $4\frac{3}{4}$ pounds. It tapers decidedly toward the top, is somewhat stringy, less juicy, but sweeter than the Monte Lirio pine. It might be suited for export or canning, but is not of a very attractive appearance as a table fruit. The growth of the plants where planted at the Summit Gardens was not satisfactory except in the

highest spots of the field. Apparently they are very susceptible to an excess of moisture. Besides the two varieties mentioned a few other local ones were planted but again discarded as they did not seem to have anything to recommend them. Three introduced varieties are under test, namely the *Red Spanish*, the export pine of Porto Rico and Cuba, the *Smooth Chayenne*, the canning pine of Hawaii; and a pineapple brought in from Ecuador. The latter was found by the writer near the small town of Milagro, near Guayaquil. It there produced an unusually large fruit of exceptionally delicious qualities, very juicy, with but few fibers and slightly yellowish flesh. The planting of this pine was made at the gardens in May, 1925, the growth so far has been slow and retarded. The *Red Spanish* and the *Smooth Chayenne* were both planted in November, 1924, and at the present time of writing are showing the first signs of fruiting. While the work with pineapples will be continued, both in new plantings and in ratoon crops of the old fields, the results so far obtained would hardly warrant the recommendation of large commercial plantings for the Canal Zone, although plantings for local use without doubt could be extended to good advantage. The gardens have with this object in view been distributing all available plant slips, particularly of the Monte Lirio pine.

PAPAYAS.

The work with this fruit has mainly been confined to the planting of seed of desirable varieties. Monthly plantings have been commenced and these will be continued in order to test out the range of time for fruit-production throughout the year. The notes on this project, however, are as yet not sufficiently advanced to make definite conclusions.

AVOCADOS.

It seems at most time difficult to obtain really good avocados on the Isthmus. All of the fruit on the market is the product of seedling trees, is in most cases of a very inferior quality and in no case approaching anything like a standard, due to the uncertain and variable habits of trees raised from seed. In a number of instances reports have reached the gardens that thrifty seedling trees refused to bear, a condition likely to obtain where no security is at hand for proper pollination of the flowers. By growing standard varieties of known flower behavior in judiciously arranged plantings the likelihood of a satisfactory fruit setting is greatly enhanced. The gardens have with the object in view of remedying the faulty condition of avocado production on the Isthmus taken up the project of introducing and propagating a number of varieties of avocados. This project has taken two distinct forms, namely the growing of budded nursery stock for distribution and the establishing of variety

orchards which will remain under the direct control of the gardens for future observation and also serve as a source of supply for propagation material. Some difficulties have been experienced in getting this work underway. Good avocado seeds from which satisfactory and vigorous seedling plants for budding can be raised are at all times hard to get in sufficient quantities. Furthermore, a considerable time had to be spent in ascertaining through experiments which mode of propagation procedure is the most satisfactory under the local conditions. The time-honored way of propagating by means of inarching is too slow and expensive, and it soon became obvious that other measures had to be adopted. Dry season budding on mature seedlings proved very unsatisfactory, the percentage of buds taking being very low. Recently the method of shield-budding on tender seedlings from 6 to 8 weeks old has been adopted, and results have been very encouraging, both in field nursery beds and with seeds planted singly in 6-inch drain tiles. In the latter case the addi-



Young budded avocados.

tional advantage is gained of easy transportation and transplanting of the young tree. A large number of young budded trees were consequently distributed to interested parties, a move which within a few years should show tangible results in the way of better fruit production.

In July–August of 1924, an avocado orchard was planted at the gardens, covering $1\frac{1}{2}$ acres and consisting of about 25 varieties, including West Indian and Guatemalan types as well as several local selections. At the present time of writing none of the varieties have yet fruited. The growth has in most varieties been quite satisfactory. In May, 1926, the orchard was increased with an additional $1\frac{1}{2}$ acre, a few new varieties secured since the original planting were included in the new one. The avocado orchard at Pedro Miguel, commenced by the district quartermaster of that town in 1923, and now worked in cooperation with the Summit Gardens has made a very rapid progress and results so far obtained are very promising. The trees of the Simmonds variety have done particularly well and bore an abundant crop of fruit averaging a weight of 28 ounces each. This orchard, comprising about 2 acres, was in May, 1926, increased with another acre where were planted young budded trees raised at the Summit Gardens nurseries.

The following is a list of the principal varieties besides local selections now being tested and to be included in the orchard plantings: *Egos*, *Pueblo*, *Gottfried*, *Dade*, *Fuente*, *Merida*, *Capac*, *Itzamna*, *Simmonds*, *Winslowson*, *Moanalua*, *Collinson*, *Nimlioh*, *Pollack*, *San Clemente*, *Kayab*, *Lamat*, *Kanola*, *Trapp*, No. 10.

It will of course not be possible to make definite recommendations as to which of these varieties are best adapted to local conditions for a number of years to come, or at least not until they have come into normal bearing. Recommendations from other localities of any given variety where it has been producing can not be relied upon to hold good for everywhere, and one can be guided safely only by experience gained through close observations of each variety under local conditions.

MANGOES.

From the initial start made three years ago in introducing better mangoes into the Canal Zone and Panama, this part of the activities of the Gardens has gradually grown to be of a considerable importance. It is satisfactory to note that at this moment the results commence to make themselves noted through the first appearance here and there over the Isthmus of good mangoes, both on old top-worked trees and on young, budded trees distributed by the gardens. Distributions were commenced in earnest around July, 1924, and have been continued and increased ever since until several thousands of young trees have left the gardens. While it is to be expected that a comparatively high number of these young trees did not live in their new environments, having perhaps been planted under adverse conditions, given inferior care or made subject to various other causes contributing to their failure to live, a sufficiently

high percentage of the distributed trees are now on their way to production to make the whole of the enterprise a factor of prime importance in the outlook for production of better fruit in the future. In the mango nurseries of the gardens, which at all times contain a large stock of fine young trees, propagation methods have been very successful from the start, thanks to the almost exclusive adaptation of bark grafting. Shield budding, so widely used under subtropical conditions of Florida, was soon found here to give but unsatisfactory results, and inarching simultaneously to be as superfluous as it is slow and cumbersome. Native seedlings, when kept in vigorous growing condition in the nursery rows, proved to be in good condition for use as stocks when about eight months old. When in full flush, they were cut down to stumps and side-grafted with dormant tips. No other tying material but raffia has been found necessary, if the scion is immediately covered with a cap of waterproof paper. A similar procedure has with equal success been used in top-working old native seedling trees. All the main branches are cut down to stubs and the issuing renews when large enough handled in the same way as are young seedlings. Fruit has this present season been gathered from trees top-worked in the fall of 1923 and the spring of 1924.

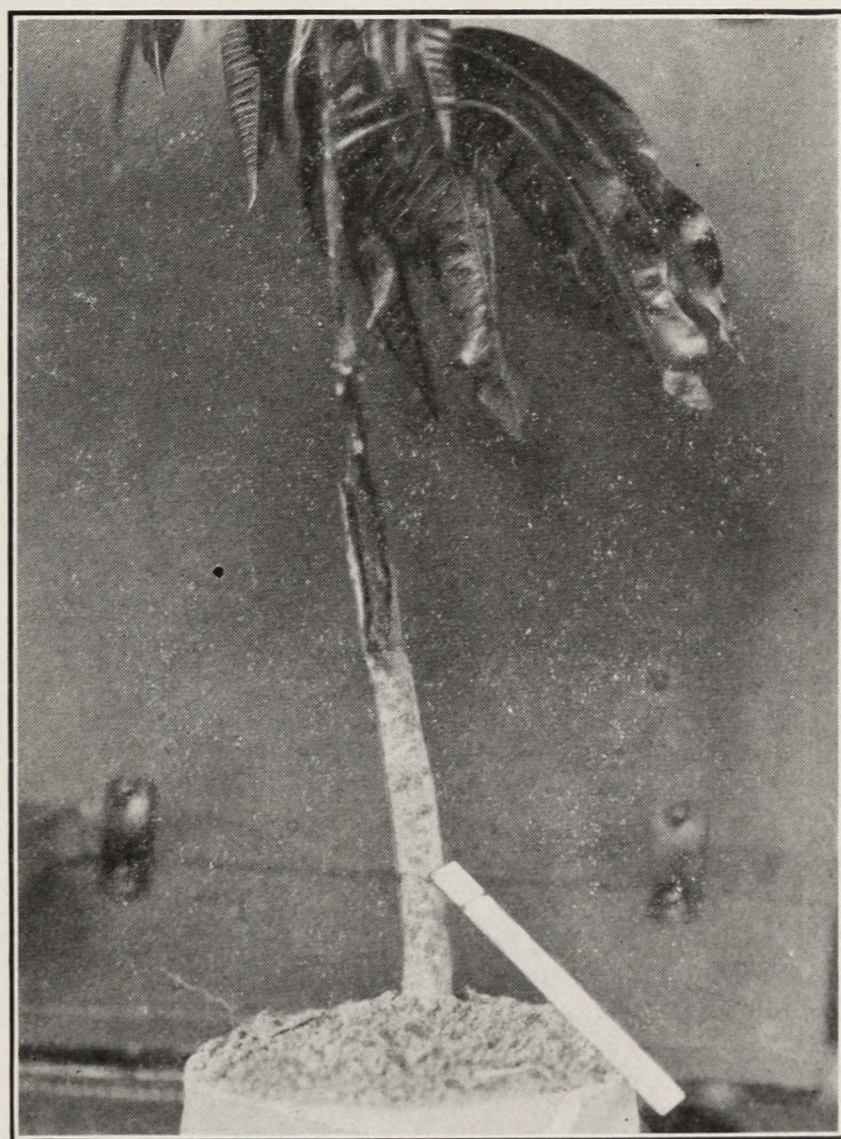
The small varietal mango orchard commenced at the gardens in May, 1924, was in September of that year extended with about four additional acres and again in May, 1926, with three more. The more than 30 varieties of which the variety collection now consists are included in the orchard, which therefore will constitute a splendid means of comparison and afford valuable notes as to the varieties which are best suited to the local conditions. Following is a list of the varieties under observation: *Malda, Mulgoba, Julie, Singapore, Emni, Gopalbhog, Strawberry, Bombay, Fernandez, Arbuthnot, Paheri, Lathrop, Peter's Bombay, Ancon, Philippine, Borsha, Kala Alphonse, Amini, Baboony, Hayden, Bombay Yellow, Ohlson, Governor, Bulbulchasm, Totafari, Sandersha, Saigon, Barnasee, Gola, No. 11, Kavas ji Patil, Cambodiana, Stahlkart, Fuzli, White Alphonse, Mango de Rosa, Fajri Round.*

The trees in the older parts of the orchard now average a height of 10 feet and are in fine growing condition. Several varieties blossomed in the spring of 1926, and a few fruits are expected. Although too early yet to make definite statements from the behavior of the trees this season, *Sandersha, Saigon, Julie, and Mango de Rosa*, are among the earliest.

CITRUS.

The nursery work commenced in 1924, has during the last two years been continued and very considerably extended, now covering a 2-acre plot where many thousands of budded trees are grown on sour orange.

The demand for young citrus trees is considerable, and most of the nursery stock now on hand will be used to take care of requests for young trees. A 3-acre varietal citrus orchard was planted at the gardens in May, 1925, gradually to be enlarged. The following oranges are planted in the orchard: *Parson Brown*, *Tempel*, *Hamlin*, *Ruby Blood*, *Valencia*, *Pineapple*, *Norris Early*, *King*. The collection of grapefruits consists of *March Seedless*, *Duncan*, *Foster*, *Triumph*, *McCarthy*. Several varieties of lemons and limes are also under test.



Bark grafting the mango. Union effected about two weeks after grafting.

CITRUS RELATIVES AND HYBRIDS.

Most of the plants in this valuable collection have done remarkably well, and several of them should soon be fruiting. This orchard which covers one acre of ground will undoubtedly prove to be a source of some new and interesting fruits for the Canal Zone. It will in subsequent reports be possible to give more detailed information on the results of this planting.

MANGOSTEENS.

Considerable progress has been made in the attempts to establish this rare and delicious fruit on the Canal Zone which now possesses more than

100 young trees against two up until less than 3 years ago, and they are practically all in vigorous and healthy condition. Most of the plants are seedlings sent to the Canal Zone by the Department of Agriculture. Several were raised by the Summit Gardens by inarching from the two

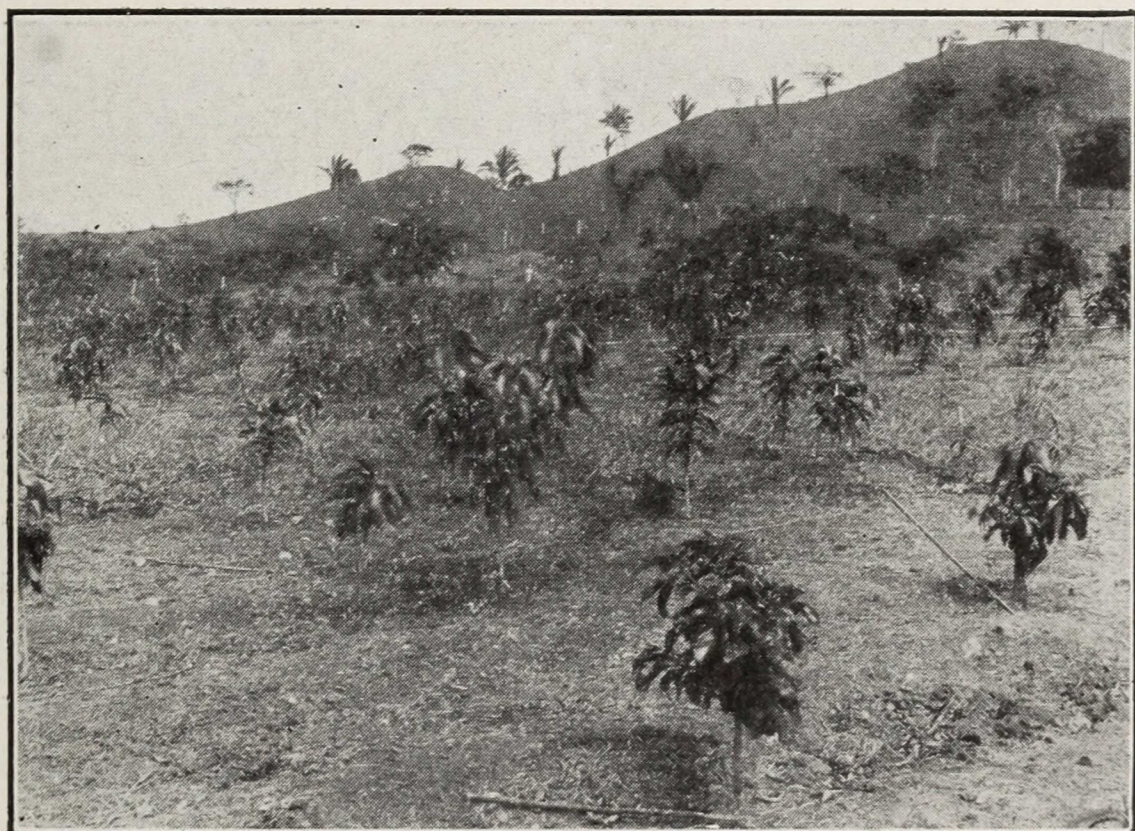


Top-worked native mango, bearing 2½ years after grafting.

oldest trees on *Garcinia tinctoria* stock. This, however, has not been as successful as at first hoped; the union made by the grafts has proved rather inefficient, and the growth of the scion has in most cases been somewhat unsatisfactory. A number of attempts to grow the mango-

steen from cuttings have so far rendered but negative results, further experiments along this line, however, should bring about the desired success, mainly through applying bottom heat in a propagation chamber.

The plantings of mangosteens have been made in various places on the Canal Zone. At Summit the young orchard contains 60 trees, now about 4 feet tall, at Frijoles are 30 trees, at Juan Mina, 10 trees, at Pedro Miguel, 10, and at Corozal, 4. At this latter place one of the two oldest trees, now 4 years old, is bearing a few fruits. As a rule the mangosteen does not commence to bear until 10 or 12 years old, and the behavior of this particular tree therefore is quite remarkable.



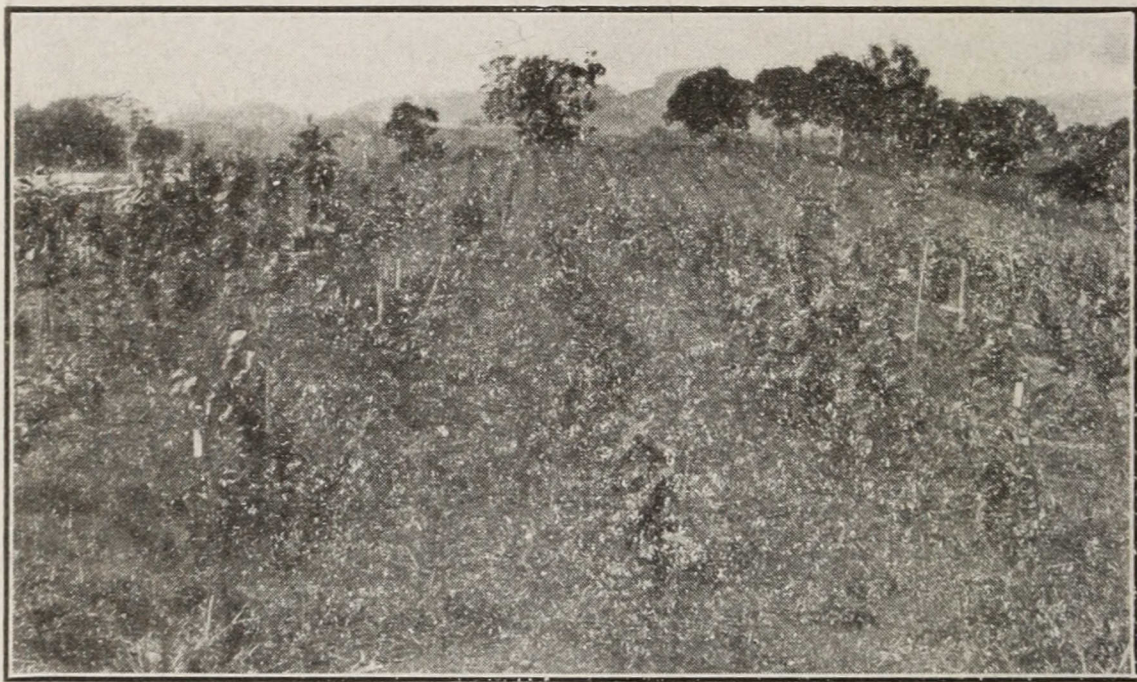
Mango nurseries.

ABACÁ.

Work with this project has been continued and confined to Philippine varieties. The Central American material has been discarded as offering but little promise of yielding a fiber, which could favorably compare with Abacá.

From the Pula seeds which reached the gardens from the Philippines in 1924, was raised about 300 seedlings. They varied considerably in vigor and general growth and were set in the field in June, 1925. While a number of them shortly after made a good growth, suckered and increased in size, the majority of them succumbed to the very severe dry season of 1925-1926. It might well be considered that the planting afforded a natural selection for resistancy to drought as about 100 plants, when the plot was examined in May, 1926, just after the commencement

of the rains, were found to sprout vigorously from the roots and apparently had suffered no injury from the long period of dormancy. The best of these plants were lifted and transplanted to a new location where they will be observed for another season. In October, 1925, a number of corms of abacá plants of *Bungulanon* and *Maguindanao* were received on the Isthmus through the Department of Agriculture as well as seeds of these two varieties. It was decided to send the majority of the corms to the Bocas district on the Atlantic coast of Panama, where the rainfall is heavier, and the conditions more favorable to the growth of abacá than on the Canal Zone. About 50 corms, however, were planted in the



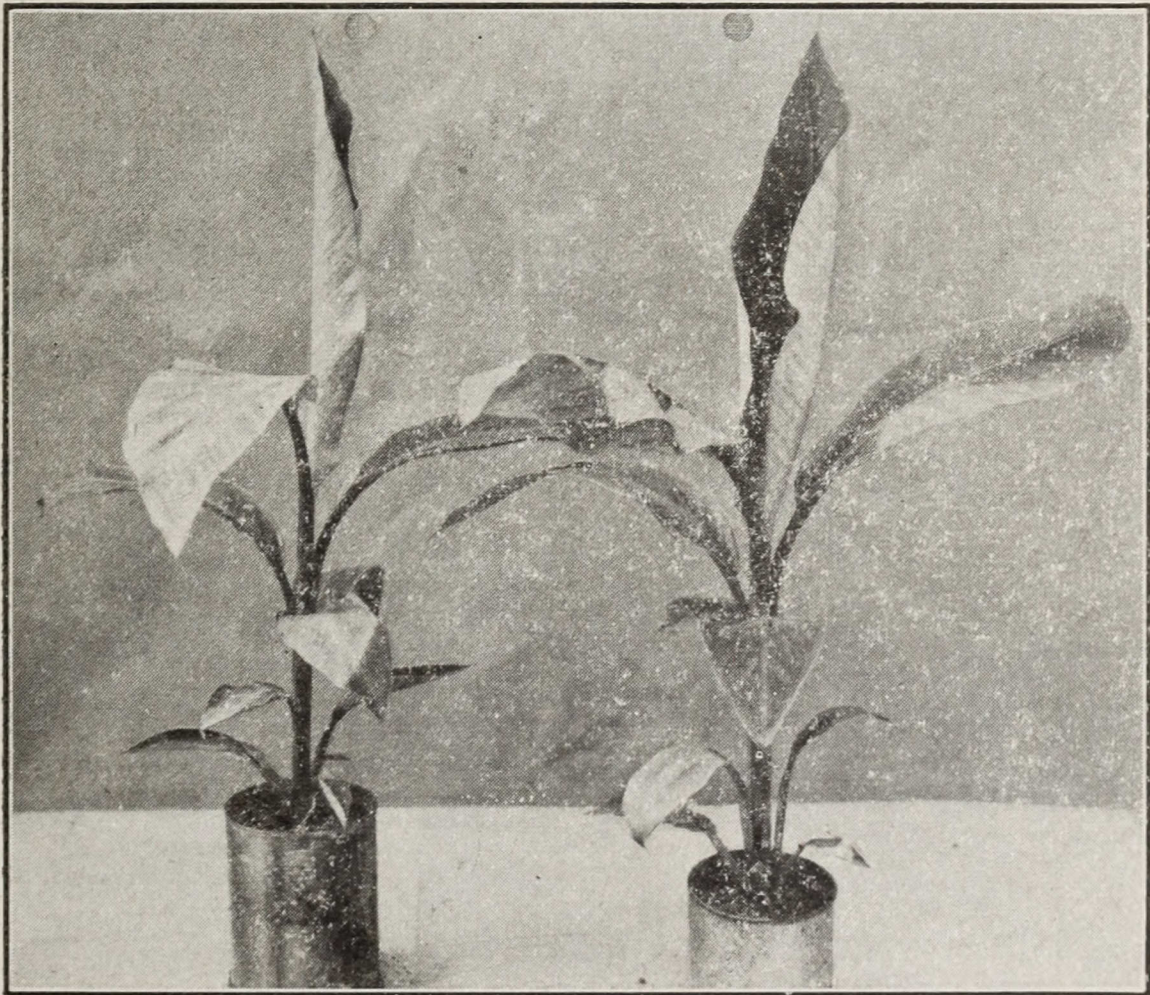
Citrus nurseries.

greenhouses of the Summit Gardens and from there moved to the field in December, 1925. They are now suckering freely, and the pseudostems have attained a height of five to six feet. The seeds received were at once planted in flats, where the variety *Bungulanon* showed practically no germination while *Maguindanao* germinated well, giving rise to several hundred seedlings. These were potted at the age of two months. For a time after this operation the young plants grew but very slowly, and almost stagnated for about two months, whereafter they resumed growth and made so rapid progress that the majority of them will be large enough for field planting during the present rainy season.

RUBBER.

The plantings of seeds of Para rubber has been extended in cooperation with the Bureau of Plant Industry of the Department of Agriculture. Seed beds have been established at the gardens and in a number of other localities. In most cases the young plants have done well, and at Summit several hundred of them were set in regular field planting. The trees

planted in 1924, in Summit, Monte Lirio, and Cristobal average a height of 15 feet, with a circumference of 9 inches three feet from the base. Unfortunately most of the Cristobal trees were destroyed when a pipe-line was being constructed in the vicinity and building material was placed right on top of the trees. Considerable interest is evidenced by prospective investors in the possibilities of rubber growing in Panama. No definite statements, however, can yet be made in this respect. While the growth of the trees so far leaves nothing to be desired we can as yet say nothing about yield of latex, future behavior of the trees, nor about numerous other conditions which may or may not have an influence upon results. The observations which in years to come will be gathered



Abacá. Maguindanao seedlings.

from the experiments now underway will be the only safe guide. In the meantime a number of trees will be growing toward maturity and form a seed supply, should it later be deemed advisable to extend the plantings, either for direct rubber marketing or merely as a rubber reserve.

CHAULMOOGRA TREES.

The 10-acre plantation of *Taraktogena Kurzii* has been maintained and the trees given constant care and cultivation. They are now two years old and average a height of 5 feet. A little fear was at first entertained that



View in Summit Arboretum showing collection of rubbers and timber trees. The tall tree in the left foreground is a *Hevea* tree 2½ years old. In right foreground *Eugenia Dombey*; in the left back ground *Manihot Glaziovii* and *Landolphia*; in center background *Terminalia myriocarpa* and *Mimusops Elengii*; and in the right background *Fontumia elastica*.

they should suffer during the dry season of 1924-1925. While still very small they made but little growth, but were in no way injured, and are now so well established, that their future existence seems assured. They hardly stopped growing during the long dry season of 1925-1926. The interplanted bananas afford just the right kind of shade and protection from the direct rays of the sun, and the long, uniform rows of trees now form a very pleasing sight.



Taraktogena Kurzii (Chaulmoogra Oil tree) at Flat Rock Plantation, 2 years old.

The African shrub, *Oncoba echinata*, planted at the Summit Gardens suffered somewhat from last season's prolonged drought but have with the advent of the rains, fully recovered. Several of them are now 9 feet tall with a luxurious spread, and the first blossoms are appearing with a few fruits set. Seed of *Oncoba spinosa*, an allied species, were received from which numerous plants were raised. In the nurseries are also a considerable number of plants of *Hydnocarpus anthelminthica*.

FORAGE CROPS.

While a number of grasses have been introduced for testing, most of them do not seem to a sufficient extent to possess the essential qualities of being resistant to prolonged periods of dry weather and to be able

to cope with the rank growth of native grasses during the rainy season.

The *Napier* grass has proved itself to fill these requirements and is particularly valuable during the dry seasons. Many cattlemen, realizing this, are extending their original plantings of *Napier* grass, or making requests on the Summit Gardens for planting material.

The *Japanese* fodder cane is somewhat coarser than the *Napier* grass, but equally drought resistant and rapid growing.

The *Guatemala* grass somewhat lacks in the good qualities of the two former. While it may contain more fodder per acre than either of them when planted in a humid location, it is apt to suffer considerably when exposed to drought and can not be relied upon to furnish a steady supply of green stalks for cutting.

The *Faragua* grass has rather come up to its first promises as a pasture grass. It is quite hardy to drought, a rapid grower, and deserving of further planting for use as a hay and pasture grass.

The *Java* grass is being extended at the Summit Gardens as a lawn grass with good results. It is liked by cattle and should make a good low fodder for grazing.

The velvet bean has made a rapid and rank growth wherever planted at the gardens and should be of value to the cattlemen as a protein-supplying fodder.

Of the several other grasses tried most proved to be of so slow a growth or possess other undesirable qualities that their planting has not been extended.

COTTON.

While there does not seem to be much probability of the long-stapled, annual cottons becoming of any importance as a commercial crop in the Canal Zone on account of the hilly nature of the lands and the difficulty of their clean cultivation, the growing of the local more or less perennial cottons of better grade may develop into a small remunerative industry. In order to test such cottons and through selections attempt to develop a desirable strain, a number of seeds were collected in different localities of Panama and the west coast of South America. For the sake of identification they were given the name of the locality, where they were collected. Seed received from California of the Acalá cotton, and from Egypt of a long-stapled cotton likewise was included in the selection. The seeds were all planted at the gardens on May 30, 1925, in separate plots. It seems indispensable that cotton should be planted at such a time that the growing period occurs during the wet months while the crop should not be ready for harvest until after the rains have ceased. Notes were therefore taken on the time each cotton consumed to bring

its crop to maturity. *Egyptian* and *Summit III* showed up as the earliest and ripened most of their bolls in November while the rains were still frequent. The other kinds had their bolls ready for picking in the period between December and February *Savannah* being the latest. The following is the order of ripening time:

<i>Egyptian.</i>	<i>Anton.</i>	<i>Manta.</i>
<i>Summit III.</i>	<i>Ecuador.</i>	<i>Acala.</i>
<i>Peru.</i>	<i>Summit II.</i>	<i>Savannah.</i>

In accordance with these observations the plantings of the present season have been commenced with *Savannah* which was planted on June 1, the others to follow up with an interval of a week, closing the list with *Egyptian*, which will be planted about August 1. Selections will be made in these successive plantings for manner of growth and later on for yield and quality of cotton. A small hand gin was secured, whereby it will be possible to obtain separate notes on lint and seed.

SUGAR-CANE.

For comparative tests as to growth, a number of varieties of sugar-cane were secured in December, 1925, through the Department of Agriculture, in addition to a few which previously had been grown at the gardens and secured through other sources. Of these latter *H-109*, *D-74*, *E. K. 28*, and *P. O. J. 2725* small extension plantings have been made, while the material is yet too scant of the following to allow the propagation this year: *P. O. J. 2727*, *B. H. 10*, *M-36*, *Merthi*, *P. O. J. 213*, *P. O. J. 979*, *P. O. J. 2714*, *Kavangire*, *Teckcha*, *Oshima*, *B. H. 1012*, and *Ubah*.

MISCELLANEOUS CROPS.

The work commenced with rice varieties in 1924 suffered a setback on account of extremely poor germination of the seed in the 1925 plantings. It will, however, with previous observations as a base, be gradually reassumed and seeds of several varieties were again planted in the early part of the season of 1926.

The collection of the following sweet potatoes was kept up: *Costa Rica*, *Key West*, *Golden Beauty*, *P. R. 21406*, *Madeira*, and in June, 1925, replanted to another plot, from where extensions will be made during the present season in order to obtain notes on yield.

Three varieties of *Dasheens* were retained for further tests; although the heavy lands of the gardens do not seem particularly well adapted to this crop.

In May, 1926, a plot of corn was planted from native seeds, where selections may be conducted should the growth of the plants appear to afford sufficient material.

The plot planted to coffee varieties was maintained in shade of bananas. The *San Ramon* made a fair growth, while the others developed but little. Young plants of a *Liberian* coffee, collected in Ecuador, will be added to the varieties of the plot, as well as three other varieties recently received.

GENERAL

In May, 1925, an illustrated handbook of the trees of Ancon and Balboa was published giving short descriptive notes of the principal trees.

Metal labels, affixed to the trees, are, besides the names, bearing numbers corresponding to numbers in the handbook. Considerable difficulty, however, has been experienced in getting a really satisfactory and permanent label. Price lists of plants available for distribution also were given to the public. A great number of people visited the gardens from the Canal Zone, Panama, and the neighboring Republics of Central and South America, in search of plants or advice, which circumstance may well be taken as an evidence that the Summit Gardens are gradually assuming an important position as a means of assistance to the agricultural interests of the American tropics, even though completion is yet a long way off. Improvements and extensions are needed along many lines, such as installation of a better water system, continued road construction, and the erection of efficient buildings for greenhouses and offices.

Respectfully,

HOLGER JOHANSEN,
Agronomist.

CATALOG OF PRINCIPAL PLANTS AT CANAL ZONE BOTANIC GARDENS.

ACANTHACEAE.

- 1841 *Daedalacanthus nervosus*
 2121 *Eranthemum variegatum*
 2941 *Justicia picta*
 5050 *Thunbergia erecta*
 5050-a *Thunbergia grandiflora*
 5050-b *Thunbergia mysorensis*

AMARYLLIDACEAE.

- 190 *Agave americana*
 191 *Agave sisalana*
 1790 *Curculigo* sp.
 2361 *Furcroya* sp.
 5281 *Zephyranthus carinata*
 5282 *Zephyranthus texensis*

ANACARDIACEAE.

- 310 *Anacardium excelsum*
 311 *Anacardium occidentale*
 861 *Bouea oppositifolia*. SPI 55046
 2021 *Dracontomelon sinense*. SPI 54655
 3291 *Mangifera indica*

var:

- | | |
|----------------|----------------|
| Malda | Hayden |
| Mulgoba | Bombay yellow |
| Julie | Ohlson |
| Singapore | Governor |
| Emni | Fajri Round |
| Gopalbhog | Bulbulchasm |
| Strawberry | Totafari |
| Bombay | Sandersha |
| Fernandez | Saigon |
| Arbuthnot | Barnassee |
| Paheri | Gola |
| Lathrop | Kavas ji Patil |
| Peter's Bombay | Cambodiana |
| Philippine | Stahlkart |
| Borsha | Fuzli |
| Ancon | No. 11 |
| Kala Alphonse | White Alphonse |
| Amini | Mango de Rosa |
| Baboony | |
- 3731 *Nectandra glabrescens*. SPI 50685
 3736 *Nectandra* sp. (Aceite de Caparrapi)
 4241 *Pleiogynium solandri*. SPI 52897
 4621 *Schinus molle*
 4641 *Schinus terebinthifolius*
 4771 *Spondias dulcis*
 4773 *Spondias* sp.

ANNONACEAE.

- 331 *Annona diversifolia*. SPI 55709
 335 *Annona cherimoya*
 344 *Annona muricata*
 342 *Annona Salzmanni*
 343 *Annona* sp.
 345 *Annona squamosa*
 1011 *Canarium odoratum*

APOCYNACEAE.

- 241 *Allamanda cathartica*
 243 *Allamanda violacea*
 251 *Alyxia zeylanica*
 683 *Beaumontia grandiflora*
 1111 *Carissa carandas*. SPI 54043
 1121 *Carissa grandiflora*
 2351 *Funtumia elastica*
 3001 *Kopsia arborea*. SPI 54549
 3041 *Landolphia* sp.
 3745 *Nerium oleander*
 4251 *Plumeria alba*
 4841 *Strophanthus* sp.
 4911 *Tabernaemontana citrifolia*
 5036 *Thevetia nerifolia*

AQUIFOLIACEAE.

- 2791 *Ilex paraguarensis*

ARACEAE.

- 196 *Aglaonema* sp.
 1936 *Dieffenbachia* sp.
 3531 *Monstera deliciosa*

ARALIACEAE.

- 381 *Aralia* sp.
 2581 *Hedera Helix*
 3951 *Panax* sp.

ARISTOLOCHIACEAE.

- 431 *Aristolochia elegans*
 436 *Aristolochia ridicula*

ASCLEPIDIACEAE.

- 1781 *Cryptostegia grandiflora*
 1782 *Cryptostegia madagascariensis*
 2716 *Hoya carnos*
 4791 *Stephanotis floribunda*

BIGNONIACEAE.

- 751 *Bignonia magnifica*
 761 *Bignonia paniculata*
 776 *Bignonia venusta*
 1761 *Crescentia cucurbitina*
 1764 *Crescentia cujete*
 1893 *Delostoma roseum*. SPI 52608
 2621 *Heterophragma adenophyllum*. SPI 59679
 2861 *Jacaranda mimosaeifolia*
 2961 *Kigelia pinnata*
 3362 *Markhamia* sp. SPI 58593.
 3746 *Newboldia pentandra*
 3916 *Oroxylon indicum*. SPI 66255
 4001 *Parmentiera cerifera*
 4761 *Spathodea campanulata*
 4762 *Spathodea nilotica*
 4979 *Tecoma pentandra*
 4980 *Tecoma radicans*
 4981 *Tecoma stans*
 4982 *Tecoma* sp.

BIXACEAE.

- 800 *Bixa orellana*
 801 *Bixa* sp.

BOMBACACEAE.

- 120 *Adansonia digitata*. SPI 59673
 1291 *Cavanillesia platanifolia*
 3931 *Pachira aquatica*

BORRAGINACEAE.

- 1631 *Cordia alba*
 1631-a *Cordia alliadora*
 1633 *Cordia sericicalyx*

BROMELIACEAE.

- 321 *Annanassa sativa* (Red Spanish, Smooth Chayenne).

BURSERACEAE.

- 1020 *Canarium bengalense*. SPI 66206
 1021 *Canarium commune*
 1026 *Canarium indicum*. SPI 66207
 1030 *Canarium pinnata*
 1036 *Canarium zeylanicum*. SPI 66208

CACTACEAE.

- 1331 *Cereus* sp.
4071 *Peireskia aculeata*
4073 *Peireskia Bleo*
4075 *Peireskia grandifolia*

CANNACEAE.

- 1061 *Canna flavida*
1065 *Canna indica*

CAPRIFOLIACEAE.

- 3171 *Lonicera* sp.

CARICACEAE.

- 1093 *Carica papaya*
1098 *Carica quercifolia*. SPI 57282
1091 *Carica* sp. SPI 64212
1091-a *Carica* sp. SPI 65902

CASUARINACEAE.

- 1243 *Casuarina equestifolia*

COMBRETACEAE.

- 4401 *Quisqualis indica*
5012 *Terminalia catappa*
5013 *Terminalia myriocarpa*. SPI 53470

COMPOSITAE.

- 4821 *Stevia Rebaudiana*. SPI 53918

CONIFERAE.

- 1831 *Cypressus Benthani*
1832 *Cypressus thurifera*
4532 *Sabina carinalis*. SPI 57078
4931 *Taiwania cryptomerioides*
4976 *Taxodium distichum*
5051 *Thuya orientalis*

CONVOLCULACEAE.

- 2822 *Ipomaea batatas*

CUCURBITACEAE.

- 711 *Benincana cerifera*
3021 *Lagenaria vulgaris*
3191 *Luffa cylindrica*
4675 *Sechium edule*
5111 *Tricosanthes anguina*

CYCADACEAE.

- 1801 *Cycas revoluta*
3231 *Macrozamia* sp.
5262 *Zamia pumila*

CYCLANTHACEAE.

- 1126 *Carludovica palmata*

DILLENACEAE.

- 1942 *Dillenia indica*. SPI 56791
5231 *Wormia Burbigui*

EBENACEAE.

- 1960 *Diospyros discolor*
1961 *Diospyros laurifolia*
1962 *Diospyros* sp.
1963 *Diospyros texana*

ELAEOCARPACEAE.

- 2090 *Elaeocarpus serratus*. SPI 66214
2091 *Elaeocarpus siamensis*. SPI 52437
2091-a *Elaeocarpus sphaericus*. SPI 66264
2096 *Elaeocarpus* sp. SPI 66215

ERICACEAE.

- 551 *Azalea* sp.

EUPHORBIACEAE.

- 40 *Acalypha Wilkensis*
211 *Aleurites moluccana*. SPI 59301
214 *Aleurites montana*. SPI 62513
215 *Aleurites montana*. SPI 62514
216 *Aleurites montana*. SPI 62516
218 *Aleurites montana*. SPI 62517
219 *Aleurites montana*. SPI 62518
220 *Aleurites pentaphylla*
221 *Aleurites triloba*
222 *Aleurites trisperma*. SPI 65297
361 *Antidesma nitida*
780 *Bischofia javanica*
781 *Bischofia* sp. SPI 63789
891 *Bridelia moniaca*. SPI 63791
1561 *Codiaeum* sp.
2625 *Hevea braziliensis* (Nicaragua, Haiti, Trinidad, Acre, Costa Rica).
2720 *Hura crepitans*
2891 *Jatropha multifida*
2892 *Jatropha podagraca*
3341 *Manihot Glazivii*
3791 *Omphalia triandra*
4061 *Pedilanthus padifolia*
4141 *Phyllanthus disticha*
4142 *Phyllanthus emblica*
4265 *Poinsettia pulcherrima* (double, pink, white, red)
4831 *Stillingia sebifera*

FAGACEAE.

- 4391 *Quercus fenestrata*. SPI 52444
4392 *Quercus lindleyana*. SPI 52393
4395 *Quercus polystachia*. SPI 52443
4396 *Quercus* sp. SPI 52448
4397 *Quercus Thompsoni*. SPI 52397

FLACOURTIACEAE.

- 1980 *Doryalis gardnerii*
1981 *Doryalis kaffra*
2301 *Flacourtia inermis*
2311 *Flacourtia Romanchi*
2313 *Flacourtia yucca*. SPI 63711
2721 *Hydnocarpus anthelminthica*. SPI 54726
2726 *Hydnocarpus wightiana*
3811 *Oncoba echinata*. SPI 55465
3812 *Oncoba spinosa*. SPI 63498
4962 *Taraktogena kurzii*. SPI 56633

GRAMINAE.

- 326 *Andropogon Rufus*
550 *Axonopus scoparius*
583 *Bambos balcoa*. SPI 51361
584 *Bambos polymorpha*. SPI 61373
581 *Bambos* sps. (Costa Rica, Trinidad, Ecuador, Canal Zone)
2501 *Cynodon plectostachya*. SPI 52904
3405 *Melinus minutiflora*
3970 *Panicum fasciculatum*
2497 *Pennisetum latifolium*
2492 *Pennisetum longistylum*
2495 *Pennisetum purpureum*. SPI 46890
4162 *Phyllostachys bambusoides*. SPI 12180
4272 *Polytria praemorsa*
4541 *Sacharum officinarum* (P. O. J. 2727, B. H. 10, M-36, Merthi, P. O. J. 213, P. O. J. 979, P. O. J. 2714, P. O. J. 2725, Kavan-gire, Teckcha, Oshima, B. H. 1012, J. K. 28, D-74, H-109, Ubah)
2506 *Stenotaphrum secundatum*
2505 *Stenotaphrum secundatum* var.
5140 *Tripsacum laxum*
5311 *Zoysia tenuifolia*

GUTTIFERAE.

- 960 *Calophyllum calaba*
 961 *Calophyllum kunstlerii*
 2371 *Garcinia cochinchinensis*
 2372 *Garcinia Livingstonei*. SPI 32704
 2374 *Garcinia mangostana*
 2383 *Garcinia morella*. SPI 58589
 2386 *Garcinia oblongifolia*. SPI 36497
 2387 *Garcinia spicata*. SPI 54470
 2390 *Garcinia* sp. SPI 54656
 2393 *Garcinia tinctoria*. SPI 40103
 3281 *Mammea americana*
 3441 *Mesua ferrea*
 4423 *Rhedia madruno*

HERNANDIACEAE.

- 2606 *Hernandia sonora*. SPI 66051

HIPPOCRATACEAE.

- 2691 *Hippocratia obtusifolia*. SPI 49253

HYPERICACEAE.

- 2761 *Hypericum canariensis*. SPI 55754

JUGLANDACEAE.

- 2911 *Juglans insularis*
 2912 *Juglans* sp.

LABIATAE.

- 5071 *Tinnia aethiopica*

LAURACEAE.

- 1431 *Cinnamomum camphora*
 1432 *Cinnamomum zeylanicum*
 4814 *Persea gratissima*. (Egos, Pueblo Gottfried, Dade, Fuerte, Red fruited hybrid, Merida, Waldin, Copac, Itzamna, Simmonds, Winslowson, Moanalua, Collinson, Nimlioh, Pollock, San Clemente, Kayab, Lamat, Bohio, Kanola, Trapp, No. 10, Haiti, Trinidad, Porto Rico, Nicaragua, Tumaco.

LECYTHIDACEAE.

- 621 *Barringtonia racemosa*
 740 *Bertholletia excelsa*
 1711 *Couroupita guianensis*
 741 *Lecythis sapocaya*
 3721 *Napoleona imperialis*

LEGUMINOSAE.

- 21 *Acacia arabica*
 22 *Acacia auriculaeformis*. SPI 59672
 27 *Acacia calamifolia*
 23 *Acacia farnesiana*
 28 *Acacia eburnea*
 32 *Acacia hispida*
 24 *Acacia lebbek*
 29 *Acacia moniliformis*
 30 *Acacia retinoides*
 26 *Acacia scorpioides*. SPI 58379
 31 *Acacia visco*
 129 *Adenanthera microcarpa*
 130 *Adenanthera pavonina*
 200 *Albizzia adianthifolia*. SPI 63759
 201 *Albizzia lapantha*. SPI 52895
 202 *Albizzia procera*
 281 *Amerimnon sisso*. SPI 55411
 641 *Bauhinia kappleri*
 643 *Bauhinia purpurea*
 925 *Brownea* sp.
 932 *Caesalpinia coriaria*
 933 *Caesalpinia pulcherrima*
 934 *Caesalpinia sappan*
 935 *Caesalpinia* sp. ("Guachapuli")

- 981 *Camoensia maxima*
 1170 *Cassia alata*
 1171 *Cassia baeriana*. SPI 35910
 1172 *Cassia didymobotrya*
 1174 *Cassia fistula*
 1175 *Cassia grandis*
 1177 *Cassia javanica*
 1178 *Cassia moschata*
 1179 *Cassia multiglandula*
 1180 *Cassia multijuga*
 1181 *Cassia nodosa*. SPI 54923
 1183 *Cassia siamea*. SPI 54463
 1184 *Cassia* sp.
 1185 *Cassia* sp.
 1186 *Cassia* sp. (Quito, Ecuador)
 1187 *Cassia* sp. (Balboa)
 1211 *Castanospermum australe*
 1502 *Clitoria ternatea*
 1871 *Dalbergia sericia*. SPI 61606
 4261 *Delonix regia*
 2111 *Enterolobium cyclocarpum*
 2143 *Erythrina corallodendron*
 2141 *Erythrina Crista galli*
 2143-a *Erythrina* sp. SPI 66217
 2144 *Erythrina variegata*. SPI 54898
 1611-a *Colvillea racemosa*. SPI 66151
 1921 *Dialium laurinum*. SPI 51770
 2416 *Gleditschia triacantha*
 2420 *Glyricidia sepium*
 2741 *Hymenaea courbaril*
 2801 *Inga* sp.
 3101 *Leucaena glauca*
 3481 *Milletia mannii*. SPI 62912
 3991 *Parkinsonia aculeata*
 631 *Peltophorum africanum*. SPI 54988
 4083 *Peltophorum braziliensis*
 4081 *Peltophorum ferrugineum*
 4151 *Ptylocarpus septentrionalis*. SPI 56906
 4201 *Pithecolobium discolor*
 4205 *Pithecolobium dulce*
 4211 *Pithecolobium saman*
 4198 *Piptadenia excelsa*
 4197 *Piptadenia rigida*
 4281 *Ponganum pinnatum*. SPI 27570
 4359 *Pterocarpus erinaceus*. SPI 66236
 4601 *Saraca indica*
 4651 *Schizolobium paraphyllum*. SPI 61502
 4680 *Sesbania grandiflora*
 4681 *Sesbania punica*
 4941 *Tamarindus indicus*
 5021 *Tetrapleura tetraptera*. SPI 62918
 5076 *Toluidra pereira*. SPI 66245
 5081 *Trachylobium verrucosum*. SPI 60323

LILIACEAE.

- 481 *Asparagus plumosa*
 482 *Asparagus springerii*
 1991 *Cordyline* sps. (Annerleyensis, Mrs. E. André, Baptistii, Superba, de Smetiana, M. Story, Harmony, Warnekii, Terminalis, S. Grandis, Lord Wolseley, Tricolor, Imperialis, Youngii, Thaloides, Lindenii, Massangena.
 1994 *Dracaena concinna*
 4721 *Smilax Sandwichiensis*
 5260 *Yucca elephantipes*

LOGANIACEAE.

- 4851 *Strychnos gilletii*. SPI 58020

LYTHRACEAE.

- 3026 *Lagerstromia flos-reginae*
 3031 *Lagerstromia indica*
 3032 *Lagerstromia parviflora*. SPI 60648
 3033 *Lagerstromia speciosa*
 3081 *Lawsonia inermis*

MAGNOLIACEAE.

- 3251 *Magnolia grandiflora*
 3451 *Michelia champaca*

MALPIGIACEAE.

- 926 *Byrsonima biflora*
 3260 *Malpigia cordata*
 3261 *Malpigia glabrata*
 3265 *Malpigia punicifolia*

MALVACEAE.

- 2471 *Gossypium* sp. sp.
 2669 *Hibiscus sabdariffa*
 2670 *Hibiscus schizopetalus*
 2671 *Hibiscus sinensis*

MELIACEAE.

- 1302 *Cedrela fissilis*
 1300 *Cedrela mexicana*
 1301 *Cedrela odorata*
 3051 *Lansium domesticum*. SPI 45616
 3381 *Melia azedarach*
 4571 *Sandericum keetjape*
 4891 *Swietenia macrophylla*
 4892 *Swietenia mahogany*

MELOSTOMACEAE.

- 886 *Bredia hirsuta*
 1386 *Chloroxylon swietenia*
 3406 *Melostoma moehlenbergia*

MORACEAE.

- 471 *Artocarpus incisifolia*
 473 *Artocarpus integra*
 475 *Artocarpus lakoocha*
 474 *Artocarpus odoratissima*. SPI 58025
 822 *Boehmeria nivea*
 910 *Brosimum alicastrum*
 1066 *Cannabis sativa*
 1224 *Castilla panamensis*
 2282 *Ficus benjamini*
 2283 *Ficus bussei*. SPI 62806
 2295 *Ficus carica*
 2284 *Ficus crassiuscula*
 2285 *Ficus ehretoides*. SPI 54891
 2280 *Ficus elastica*
 2286 *Ficus glomerata*. SPI 52496
 2287 *Ficus lacora*. SPI 59677
 2288 *Ficus lucida*
 2281 *Ficus macrophora*
 2289 *Ficus mysorensis*. SPI 58587
 2289-a *Ficus nitida*
 2290 *Ficus repens*
 2293 *Ficus* sp. SPI 52406
 2294 *Ficus* sp. SPI 61010
 3226 *Maclura aurantiaca*
 3542 *Morus multicaulis*

MUSACEAE.

- 2605 *Heliconia* sp.
 3558 *Musa cavendishii*
 3559 *Musa paradisiaca*
 3560 *Musa sapientum* (Lackatan, Congo, Gros Michel, Robusta, Red)
 3562 *Musa textilis* (Pula, Maguindanao)
 4412 *Ravenala madagascariensis*

MYRISTICACEAE.

- 3691 *Myristica fragrans*

MYRSINACEAE.

- 3241 *Maesa chisa*. SPI 47711

MYRTACEAE.

- 951 *Callistemon lanceolatum*
 1136 *Caryophyllus aromaticus*
 1131 *Caryophyllus malaccensis*
 2172 *Eucalyptus botryoides*
 2172-1 *Eucalyptus citriodora*

- 2173 *Eucalyptus globulus*
 2174 *Eucalyptus robusta*
 2175 *Eucalyptus* sp.
 2192 *Eugenia dombeyi*. SPI 54777
 2196 *Eugenia jambos*
 2201 *Eugenia uniflora*
 2198 *Eugenia* sp. SPI 51625
 2199 *Eugenia* sp.
 3371 *Melaleuca leucadendron*. SPI 24166
 3681 *Myrciaria cauliflora*
 4181 *Pimenta acris*
 4351 *Psidium friedrichsthalianum*
 4352 *Psidium guajava*
 4354 *Psidium* sp. SPI 55103
 4355 *Psidium* sp.
 5141 *Tristania conferti*
 5321 *Zyzygium cumini* SPI 32072

NYCTOGINACEAE.

- 871 *Bougainvillea lateritia*
 872-a *Bougainvillea spectabilis*. SPI 43471
 3551 *Muehlenbeckia platycaulis*

NYMPHAEACEAE.

- 3776 *Nymphaea dentata* x *rubra*
 3776-f *Nymphaea ovalifolia*
 3777 *Nymphaea zanzibariensis azulea*
 3778 *Nymphaea zanzibariensis rosea*
 5181 *Victoria regia*

OLEACEAE.

- 2341 *Fraxinus chinensis*. SPI 63792
 2881 *Jassimum* sp.

ORCHIDACEAE.

- 3862 *Anectochilus dawsoniana*
 3863 *Aspasia epidendroides*
 3864 *Aspasia Rousseauae*
 3866 *Brassia longissima*
 3867 *Camaridium affine*
 3869 *Catasetum viridiflavum*
 3870 *Catasetum warscewiczia*
 3871 *Cattleya dowiana*
 3872 *Cattleya skinnerii*
 3873 *Dendrobium nobile*
 3873-a *Dendrobium sulcatum*
 3875 *Epidendrum atropurpureum*
 3876 *Epidendrum fragrans*
 3877 *Epidendrum imanthophyllum*
 3878 *Epidendrum nocturnum*
 3880 *Epidendrum radicans*
 3881 *Epidendrum stamfordianum*
 3883 *Lockhartia macrantha*
 3885 *Maxilaria pubilabia*
 3886 *Oncidium ampliatus*
 3887 *Oncidium Orstedii*
 3888 *Oncidium panamensis*
 3889 *Oncidium stipitatum*
 4086 *Peristeria elata*
 4246 *Pleurothallis panamensis*
 4466 *Rodriguezia secunda*
 4730 *Sobralia panamensis*
 4931 *Sobralia* sp.
 5086 *Trichophilia Powellii*
 5091 *Trichophilia suavis*
 5116 *Trigonidium seamandii*
 5171 *Vanilla planifolia*
 5256 *Xylobium stachyobiorum*
 3016 *Laelia domingensis*

OXALIDACEAE.

- 511 *Averhoa carambola*

PALMACEAE.

- 60 *Acanthorhiza aculaeta*
 61 *Acanthorhiza* sp.
 62 *Acanthorhiza warscewiczia*
 110 *Acrocomia sclerocarpa*. SPI 53487

PALMACEAE—Con.

- 400 Areca alicae
- 404 Areca catechu
- 411 Areca Englerii
- 412 Areca glandiformis
- 413 Areca sp.
- 421 Areca triandra
- 414 Areca triandra alba
- 426 Arenga Wightii
- 486 Astrocaryum sp.
- 496 Attalea gomphococcus
- 721 Bentinckia nicobarica
- 840 Borassus flabellifera
- 976 Calyptrocalyx spicatus
- 1141 Caryota mitis
- 1151 Caryota urens
- 1361 Chamaedorea sp.
- 1362 Chamaedorea sp.
- 1391 Chrysalidocarpus lutescens
- 1542 Cocos botryphora
- 1543 Cocos eriospatha
- 1545 Cocos plumosa
- 1532 Cocos romanzoffiana
- 1546 Cocos schizophylla
- 1671 Corypha umbraculifera
- 1916 Desmoncus oxyacanthas
- 1931 Dictyosperma album
- 1932 Dictyosperma rubrum
- 2081 Elaeis guineensis
- 2083 Elaeis melanococcus
- 2231 Euterpe edulis
- 2061 Dypsis madagascariensis
- 2561 Gulielma utilis
- 2631 Heterospatha elata
- 2731 Hydriastele wendlandi
- 2751 Hyophorbe amaricaulis
- 2775 Hyphaena thebaica. SPI 66656
- 2831 Iriarte sp.
- 2901 Jubaea chilensis
- 3112 Licuala elegans
- 3111 Licuala grandis
- 3115 Licuala Rumphii
- 3116 Licuala spinosa
- 3162 Livistona chinensis
- 3165 Livistona olivaeformis
- 3331 Manicaria saccifera
- 3363 Martinezia caryotaefolia
- 3366 Martinezia corallina
- 3775 Normanbya sp.
- 3815 Oncosperma fasciculatum
- 3816 Oncosperma filamentosa
- 3821 Opsianra mayo. SPI 33501
- 3911 Oreodoxa sp.
- 4131 Phoenix acaulis
- 4133 Phoenix dactylifera
- 4134 Phoenix ouseleyana. SPI 54767
- 4135 Phoenix sp. SPI 55613
- 4171 Phytalephas macrocarpa
- 4332 Pritchardia thurstoni
- 4361 Ptychosperma angustifolia
- 4360 Ptychosperma cumminghami
- 4362 Ptychosperma elegans
- 4363 Ptychosperma Macarthurii
- 4386 Pyrenoglyphis sp.
- 4481 Roystonea oleracea
- 4491 Roystonea regia
- 4521 Sabal mexicana
- 4523 Sabal sp.
- 4525 Sabal umbraculifera
- 4811 Stevensonia sp.
- 4331 Styloma pacifica
- 5041 Thrinax barbadensis
- 5042 Thrinax floridana
- 5044 Thrinax parviflora
- 5045 Thrinax Wendlandi
- 5215 Washingtonia robusta
- 5216 Washingtonia sonorae

PANDANACEAE.

- 3961 Pandanus tectorius. SPI 57730
- 3963 Pandanus utilis
- 3964 Pandanus weitchi

PASSIFLORACEAE.

- 4021 Passiflora herbertiana. SPI 62029
- 4022 Passiflora laurifolia
- 4025 Passiflora quadrangularis
- 4027 Passiflora sp. SPI 60354
- 4028 Passiflora suberosa. SPI 60311
- 4030 Passiflora vitifolia. SPI 60356

PLUMBAGINACEAE.

- 4090 Plumbago sp.

POLYGANACEAE.

- 376 Antigonon leptopus
- 5131 Triplaris cumingiana
- 5136 Triplaris surinamensis

PROTEACEAE.

- 2531 Grevillea robusta
- 3221 Macadamia ternifolia. SPI 47918

PUNICACEAE.

- 4381 Punica granatum
- 4382 Punica granatum var. nana.

RHAMNACEAE.

- 2922 Zizyphus mauritiana. SPI 22686

ROSACEAE.

- 1401 Chrysobalanus icaco
- 1701 Couepia sp. SPI 53929
- 2133 Eryobotrya japonica
- 4506 Rubus sp. sp.
- 4508 Rubus rosaefolius x ellipticus. SPI 23748

RUBIACEAE.

- 975 Calycophyllum candidissimum
- 1570 Coffea arabica
- 1573 Coffea excelsa
- 1574 Coffea laurina
- 1576 Coffea liberica
- 1578 Coffea robusta
- 1580 Coffea stenophylla
- 2400 Gardenia sp.
- 2411 Genipa americana
- 2851 Ixora coccinea
- 2852 Ixora flava
- 2853 Ixora fraserii
- 3182 Lucuma mammosa
- 3531 Morinda citrifolia
- 3570 Mussaenda lutea
- 4301 Posoqueria latifolia
- 5161 Vangueria edulis
- 5162 Vangueria infausta. SPI 35576
- 5163 Vangueria madagascariensis
- 5221 Warscewiczia coccinea. SPI 54297

RUTACEAE.

- 170 Aeglopsis Chevalierii
- 491 Atalanta citrioides
- 571 Balsamocitrus cabonensis
- 572 Balsamocitrus paniculata
- 701 Belou Marmelos. SPI 46500
- 1371 Chaetospermum glutinosa
- 1381 Chalcas exotica
- 1386-a Chloroxylon swietenia. SPI 66210
- 1461 Citropsis Schweinfurthii
- 1470 Citrus aurantifolia. (Lime, spineless lime, Tahiti Lime)
- 1471 Citrus aurantium
- 1473 Citrus decumana (March seedless, grapefruit, Duncan grapefruit, Foster grapefruit, Triumph grapefruit, McCarthy grapefruit, Siamese Pomelo, Cuban shaddock, Davis seedless grapefruit.)

- 1474 *Citrus limetta*
 1475 *Citrus limonica* (Rough Lemon, Villa Fran-
 ca lemon, Ponderosa lemon, Dwarf lemon,
 Sweet lemon)
 1477 *Citrus mitis*
 1478 *Citrus nobilis* (King, Dancy Tangerine)
 1479 *Citrus sinensis* (Parson Brown, Temple,
 Hamlin, Ruby Blood, Valencia late,
 Pineapple, Norris early)
 1491 *Clausena Lansium*
 2161 *Esenbeckia leiocarpa*. SPI 60201
 2262 *Feronella oblata*
 2321 *Fortunella crassifolia*
 2322 *Fortunella Hindsii*
 2323 *Fortunella japonica*, (Marumi Kumquat)
 2324 *Fortunella margarita* (Nagami Kumquat)
 2421 *Glycosmis pentaphylla*
 2611 *Hesperethusa crenulata*
 3411 *Merrillia caloxylon*
 3461 *Microcitrus australasica*
 3462 *Microcitrus australe*
 3463 *Microcitrus vergata*
 4701 *Severina buxifolia*
 5122 *Triphasia trifoliata*

SALICACEAE.

- 4550 *Salix babylonica*
 4551 *Salix chilensis*
 4552 *Salix* sp.

SAPINDACEAE.

- 811 *Blighia sapida*
 2571 *Harpulia cupanoides*
 2981 *Kohlrenteria formosa*. SPI 62345
 3154 *Litchi chinensis*. SPI 46568
 3155 *Litchi chinensis*. SPI 46569
 3401 *Melococcus bijuga*
 3741 *Nephelium mutabile*. SPI 60171
 4591 *Sapindus saponaria*
 4676 *Serjania exarata*

SAPOTACEAE.

- 91 *Achras Sapote*
 92 *Achras Sapote*
 93 *Achras Sapote*
 1421 *Chrysophyllum cainito*
 3182 *Lucuma mammosa*
 3502 *Mimusops Balata*
 4036 *Payena leerii*. SPI 66233
 4716 *Sideroxylon* sp. SPI 66239

SCROPHULARIACEAE.

- 4511 *Russelia juncea*

SOLANACEAE.

- 1341 *Cestrum nocturnum*
 4741 *Solanum macranthum*
 4742 *Solanum mammosum*
 4743 *Solanum peruanum*

STERCULIACEAE.

- 1601 *Cola acuminata*
 1971 *Dombeya natalensis*
 1972 *Dombeya wallichii*
 4800 *Sterculia apetala*
 4802 *Sterculia* sp.
 5031 *Theobroma cacao*

STYRACEAE.

- 4866-a *Styrax benzoin*. SPI 66240

VERBENACEAE.

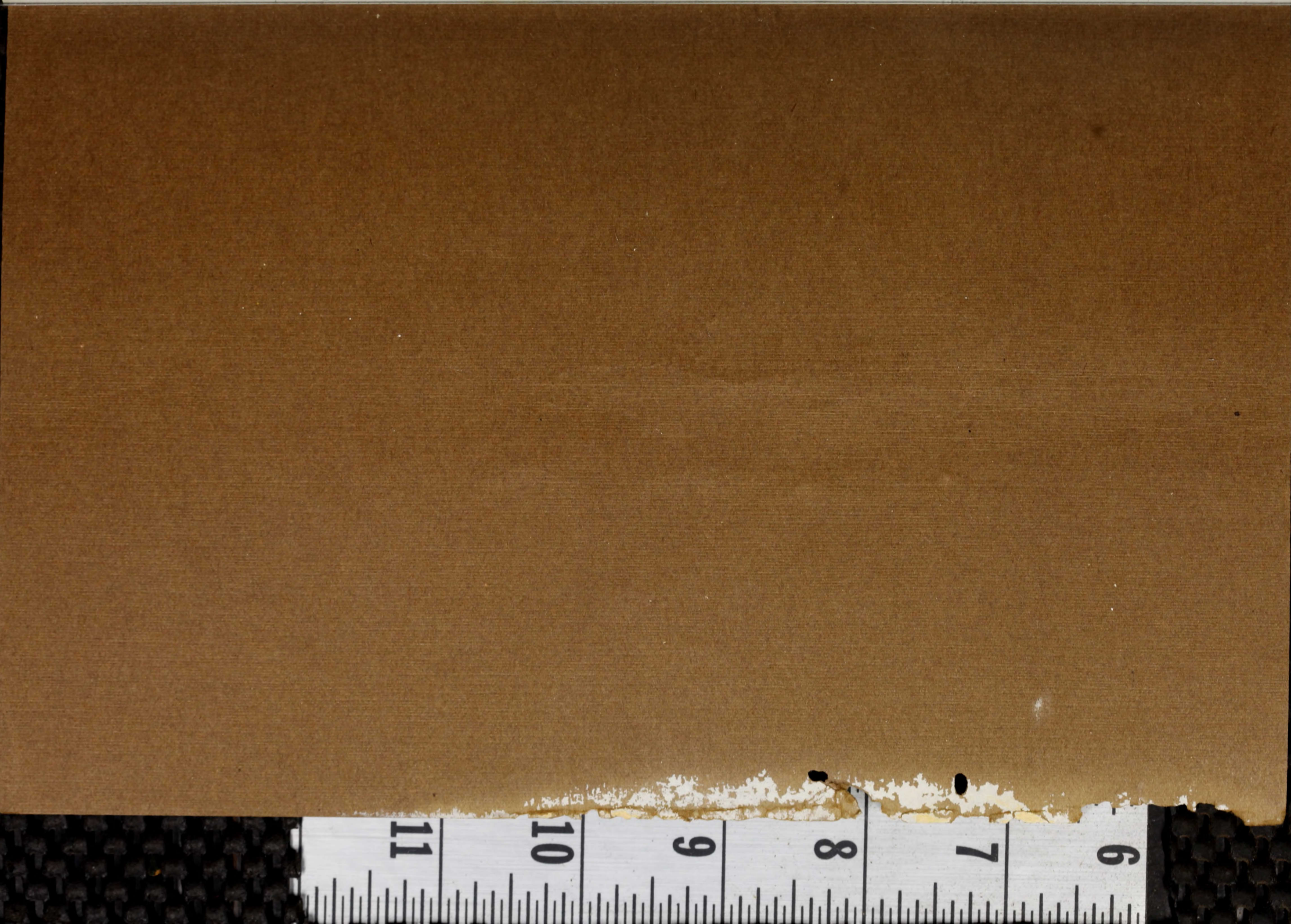
- 1496 *Clerodendron Balfourii*
 1626 *Congia tomentosa*
 2041 *Duranta plumierii*
 4121 *Petreaea volubilis*
 4991 *Tectona grandis*
 5191 *Vitex eylosii*. SPI 60427
 5201 *Vitex gigantea*

VITACEAE.

- 301 *Ampelocissus martinii*. SPI 58670
 5026 *Tetrastigma hermandii*

ZINGIBERACEAE.

- 296 *Amomum hemispharicum*
 1791 *Curcuma longa*
 2100 *Elettaria cardamomum*
 2591 *Hedychium gardneriana*
 5291 *Zingiber officinale*. SPI 38180



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