A DISSERTATION
UPON
COFFEE IN TRINIDAD
ACCOMPANIED BY A DESCRIPTION
OF THE
COFFEE ON THE COLLEGE FARM.

A thesis presented in part requirement for the Associateship
of the Imperial College of Tropical Agriculture by:

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Session 1929-30.
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PART I.

A BRIEF DISSERTATION UPON COFFEE IN TRINIDAD.

The earliest public mention of coffee in Trinidad is to be found in the works of the Spanish geographer and cartographer, Alonso de Molina, who in 1551, described the cultivation of coffee in the region. Molina wrote that coffee was grown in the mountains of the Guiana region, which includes Trinidad.

The cultivation of coffee in Trinidad was introduced by the Spanish colonists who arrived in the 16th century. The first coffee trees were planted in the 17th century, and by the 18th century, coffee had become an important crop in the region. Coffee production in Trinidad reached its peak in the 19th century, but with the introduction of coffee disease, production declined in the 20th century.

The coffee industry in Trinidad is characterized by a small number of large coffee plantations and a large number of small coffee growers. The coffee industry in Trinidad is export-oriented, with the majority of coffee being exported to Europe and North America.

The coffee industry in Trinidad is facing challenges due to climate change and the threat of coffee rust disease. Efforts are being made to develop new coffee varieties that are resistant to coffee rust, and to implement sustainable farming practices to reduce the impact of climate change on the coffee industry.
INTRODUCTION.

The genus coffea is entirely African in origin. There are in cultivation today several species and a very large number of varieties. These fall roughly into three main groups. They are: coffee arabica, coffee robusta and coffee liberica.

C. arabica is the oldest known species and is as yet the most important coffee commercially. It is the best in cup quality. It usually thrives at a high altitude.

C. robusta is usually grown at medium elevations, but is grown successfully from sea level up. It gives good yields but the cup quality is inferior to that of C. arabica.

C. liberica thrives from sea level up to a fairly high altitude. It is a tall and hardy tree. The berries are large and of a low cup quality.

The Division of Commerce in the Dutch East Indies publish some of their findings upon the most suitable conditions for the growth of the different species. A good deal of experimental work has been done on coffee by the Dutch. Their conclusions are that: C. liberica and C. excelsa prefer clay soils at low regions and that they are drought resistant. C. robusta does best on a loose soil at a height of 1,000 - 2,500 feet above sea level. C. arabica needs a high altitude.

C. arabica was first introduced into the West Indies by a French officer, M. de Clieu, who, in 1723, brought a single plant to Martinique from Amsterdam.

Before the middle of the eighteenth century coffee had been widely distributed throughout the West Indies.

Of the crop in Trinidad it is reported that, in 1875-78, "Mr. Prestoe attempted to draw attention to the desirability of cultivating coffee in Trinidad." At this period C. arabica and C. liberica were grown in the Botanical Gardens, Port of Spain, with great success and distributed to the planters.

An extract from the Trinidad Royal Gazette of the 29th May
to 28th August, 1878, says that: "no more favourable conditions could be desired for coffee planting than exists in the valleys of the northern portion of the island, east of the Maraval valley".

In 1877 the exports of coffee amounted to 74,189 lbs.

Coffee was seldom given any cultural care, being used entirely as a hedgerow around cacao fields and to fill in bare patches during the establishment of a cacao plantation.

About 1920 the higher prices received for coffee caused a renewed interest in the crop and an increase in its cultivation in this colony. The coffee exports from Trinidad in 1922, from the 1st January to the 31st December amounted to 329 lbs. of cleaned coffee, valued at £17. 0. 0. By 1926 the exports had increased so that in that year 497,688 lbs. of coffee valued at over £20,000 were exported and in the year 1929, the amount of coffee exported was 818,593 lbs. valued roughly at £30,000.

Types of commercial importance are:

(a) Bourbon: This type is usually considered to be a mutation of C. arabica. The production of this coffee is very low. The berries are small but the quality of the final product is excellent.

(b) Pediago: A heterogenous variety. The beans is rather large and the quality is said to be good.

(c) Bourbon: The coffee is of good quality, but the plant is said to be very exacting in its requirements.

(d) Estate: A sturdy variety with upright branches.

(e) Columnar: Vigorous but a shy bearer.

(f) Maragogype: First found in 1970 on a plantation in Bahia, Brazil. It is a good bearer and the coffee is of fine quality.
COFFEE SPECIES AND TYPES.

(1) C. arabica: It appears to be fairly certain that the country of origin of C. arabica is Abyssinia, all authorities seem to be agreed upon this point. Coffee came to Europe early in the seventeenth century and was first brought to London by Daniel Edwards, a merchant, in 1652. Towards the end of the seventeenth century a single shrub was sent to the Botanical Gardens at Amsterdam. From the progeny of this single plant developed the plantations of the New World.

There are today a large number of types of coffee arabica. Some of these have arisen from mutations, others as a result of natural crossing and certain types have been produced by artificial hybridisation.

The following mutations sometimes occur in the plantation, they breed true and may be repeated:-

(a) Purpurascens: a red leaved type.
(b) Amerilla: having yellow berries.
(c) Bullata: having bullate leaves and a tendency towards a high percentage of unset seed.

These varieties are undesirable as they are poor yielders. Their effect upon the plantation is detrimental especially if it is desired to use seed from the field for sowing as it is impossible to tell whether the seed has been fertilised with pollen from the mutant.

Types of commercial importance are:-

(a) Mocha: This type is usually considered to be a subspecies of C. arabica. The production of this coffee is very limited. The berries are small but the quality of the final product is excellent.
(b) Padang: A Sumatran variety. The bean is rather large and the quality is said to be good.
(c) Bourbon: The coffee is of good quality but the plant is said to be very exacting in its requirements.
(d) Erecta: A sturdy variety with upright branches.
(e) Columnaris: Vigorous but a shy bearer.
(f) Meragogipe: First found in 1870 on a plantation in Bahia, Brazil. It is a good bearer and the coffee is of fine quality.
(g) San Ramon: A small plant said to be capable of standing considerable exposure to wind.

(h) Murta: A degenerate type; a certain percentage of the seedlings are small dwarfs with many upright branches and tiny leaves. It is said to be capable of standing low temperatures. The yield is low but the quality is good.

(2) Coffea robusta: This species of coffee was discovered in 1898 by Emil Laurent in the Congo where it grows wild. It is a tall hardy plant which grows rapidly. By the fourth year after planting the yields are very large, the chief drawback lies in the fact that the cup quality is not at all good.

Varieties of the species are:

(a) Canephora: Usually placed in the robustoid group although Ukere classes it as a separate species with the following subspecies of its own:—Madagascar, Quillouensis and Stenophylla Paris.

(b) Quillou: Said to be a goodyielder.

(c) Ugandae hybrids.

(d) Congensis hybrids.

(3) Coffea liberica: A West African species grown in that part of the world very successfully at low altitudes. In a wild state it grows 30-40 feet high. Its objectionable characteristics are that harvesting can only be done with the aid of a ladder. It is not of good cup quality and is very susceptible to Sclerotium disease.

Types of the liberica group are:

(a) Excelsa: Discovered in 1905 by Aug. Chevelier in the Chari River region, near Lake Tchad, West Africa. It has a small bean resembling an Arabian coffee bean but the colour of the bean is of the liberica type, being yellow.

(b) Dewevrei: A native of the Congo. It has a smaller cherry than the true liberian but a much larger one than the excelsa.

(c) Abeokutae: An inferior plant of no value commercially.

(d) Dybowski: Though somewhat superior to C. Abeokutae it has not as yet proved to be of any importance.

(4) Coffea stenophylla: Indigenous to Sierra Leone, West
Africa. Sometimes placed in the Liberian group.

It has a slender stem and small leaves. It is a slow grower but a heavy yielder once it reaches maturity. The cup quality is good.

Although coffee is grown fairly successfully on all kinds of soil and at elevations which vary from a few feet above sea level to six thousand feet up, yet the following points should be kept in mind when considering the desirability of growing coffee upon any particular estate.

To begin with, the ideal soil should be deep, well-drained, rich in humus and pulverizing easily.

Secondly, Arabian coffee should not be exposed to very high temperatures and direct sunlight throughout the day. The most suitable mean annual temperature is about 70°F. The most suitable climate is stated by Kers to be a temperate one within the Tropics. McDonald agrees with him.

Thirdly, although coffee must be well drained, it must be well watered. Too much water develops the wood at the expense of the flowers and fruit, especially at low altitudes. About 70 inches of rain annually is the optimum.

It will be noticed here that as far as temperature and rainfall go, Trinidad is very well suited in most parts of the island to the successful growing of coffee.

Fourthly, and lastly, the altitude. As coffee is grown successfully at all altitudes from sea level up to six thousand feet it cannot be said that any particular altitude is the best one for any particular species or variety of coffee. Generally speaking, Arabian coffee grows best between 2,000 and 3,000 feet. Liberica and robusta grow well from sea level up to 8,000 feet above sea level.
THE PLANTING AND CULTIVATION OF COFFEE.

Upon the estates in Trinidad on which coffee is grown, it is not planted as a pure crop and is seldom the chief one. It is usually grown under cacao and, at present, this appears to be the most profitable method of growing it. The yields are not so high as they would be if attention were entirely devoted to the growing of coffee but the cash returns per acre upon those estates are greater than they would be if either coffee or cacao were grown as pure crops.

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Fourthly and lastly the altitude. As coffee is grown successfully at all altitudes from sea level up to six thousand feet it cannot be said that any particular altitude is the best one for any particular species or variety of coffee. Generally speaking C.arabica grows best between 2,000 and 5,000 feet. Liberica and robusta grow well from sea level up to 3,000 feet above sea level.

Seeds & seed beds: If the estate coffee trees are to provide
seed for planting the berries should be picked from mature trees which have proved to be the heaviest yielders. The seed should be large, of good shape and free from any sign of disease. The fresh cherries should be hand pulped and washed in water. During the washing any light seeds which float should be thrown away. After washing the seed should be placed on a hard floor to dry, or, as some authorities recommend, mixed with wood ashes to dry. Care should be taken not to break the parchment in the preparation of seed for sowing. The sooner the coffee seed is sown after picking the better. It soon loses its vitality and coffee which is six months old will not germinate.

The situation selected for the seed bed should be well drained, cool, sheltered from wind and near to a good water supply. Whatever opinion may be held as to the desirability or otherwise of shade in the field there can be no doubt that the seed bed must not be exposed to direct sunlight or hard rain. If artificial shade be used, such as palm leaves on a bamboo framework or a cloth cover on some kind of frame, it has the advantage that it can be easily controlled. On dull days or when hardening off coffee seedlings for the field then shade should be partially removed.

The position of the seedbed once selected then comes the preparation. All weeds and trash should be collected and burned or removed. The soil should be forked over and during this process a dressing of pen manure may be applied. The seed beds should be made three to four feet wide and as long as is desirable or convenient. The beds should be banked to give better drainage and a ditch 18" - 24" wide should be left between them. The ditch will serve as a path when watering and weeding is being done. The method described of seed selection and making of seedbed was practised on the farm of the Imperial College of Tropical Agriculture in 1929-30 and proved to be very satisfactory.

There are two methods of sowing the seeds. They may be sown 3-4" apart in the row with 6" between rows, in which case the seedlings must be pricked out into a nursery bed or potted when 3-6" high. In the second case the seeds are sown six inches apart in
square formation then they can be left in the seed bed until planted out in the field.

Sowing is done by placing the seed, flat side downwards, in their correct positions and pressing them in with the finger to a depth of \( \frac{1}{2} \) inch. Another method is to make shallow grooves six inches apart across the bed, place the seeds in them and rake the soil over them.

After sowing the seed bed must be watered. Watering should be done every day after sowing. The seed will germinate in 7-9 weeks or later depending upon the age of the seed used.

Planting out in the field: There is a great deal of controversy upon the correct time to plant out, but it may be taken that when the seedlings are eighteen inches high or six months old they are about ready for planting out.

Spacing depends partly upon the variety of coffee and partly upon the method of pruning to be followed; the multiple stem systems require greater spacing than the single stem system. In Trinidad spacing is largely controlled by the spacing of the cacao. The spacing may vary from six feet by six feet for a small variety like San Ramon to twelve by twelve for Liberian coffee. The ordinary planting distances in coffee growing countries are 6' 0" x 8' 0" to 8' 0" x 8' 0"

The size of the planting hole depends upon the soil, if the soil is poor and stiff the hole should be larger than if the soil were rich and friable. The size of the hole is usually 18" cubed to 2' 0" cubed.

Windbreaks: Under the present system of coffee planting in the colony, windbreaks for the protection of the crop are unnecessary. Should the system be changed for any reason then the raising of windbreaks may in some cases prove necessary.

A windbreak is not indispensable to a coffee plantation but it is essential upon those estates or portions of estates which are exposed to the prevailing wind.

The effects of direct wind upon coffee are stunting, twisting and, when the coffee is in blossom, the removal of all flowers.

A certain space should be left between the windbreak and the
nearest coffee plants. MacDonald recommends that a space of forty feet between the coffee and the windbreak.

Dracaena fragrans is a good windbreak in Trinidad. Mango has been used very successfully in South America. Galba might be tried.

Shading: The necessity or otherwise of shade trees for coffee depend upon the species of coffee in question and the conditions under which it is grown.

Special shade trees for coffee in Trinidad are, under the present system of cultivation of the crop, quite unnecessary.

Coffee arabica is the most susceptible species to the bad effects of direct sunlight. Direct sunlight for a few hours a day does not have any harmful effect upon the plant. In deep valleys therefore, shade trees may be regarded as unnecessary as such although the growing of other trees among the coffee may prove desirable to prevent soil erosion.

Coffee robusta is far less susceptible to the harmful effects of the direct rays of the sun, although judging from the effect which direct sunlight had upon the robustoid coffee on the College farm shading is necessary for this species in the low country if not in the hill regions. Shade trees should be systematically pruned as thick shade causes tall coffee, a liability to fungus attack and retarded ripening.

Temporary shade may be afforded by such plants as banana, plantain or pigeon pea. For permanent shade the same trees that are used in the shading of cacao may be used, such as species of Erythrina and Gliricidia.

Cultivation and weeding: Intercultivation is not much practised in Trinidad, due to the high cost of labour and the difficulty in many places of using any sort of a cultivating implement. The advantages of intercultivation are the aeration of the
soil and the keeping down of any weeds which may spring up.

Weeds may be used for mulching. Cover crops are grown in some countries with the object of keeping down weeds, being used for the provision of a mulch in the dry weather or as a green manure.

**Catchcrops:** In many coffee growing countries catchcrops are often taken during the establishment of a coffee plantation, and some methods of doing so have been practised. Ukers recommends maize, beans, cotton and peanuts. At the Agricultural College at Laguna, in the Philippines, tobacco, sweet potatoes and maize were tried but found to be too exhausting and provided no shade. In Nyasaland coffee is grown supplementary to tobacco.

**Manuring:** Coffee is said to be a crop which repays manuring, but no experimental work of any importance appears to have been done, as yet, upon this subject. Cost of harvesting is reduced. Secondly, The plant will take up from the soil potassium, nitrogen and phosphoric acid and continuous removal of the fruits will, in time, deplete the soil of these constituents. Therefore manuring of some sort must be done if the soil fertility is to be maintained. McDonald suggests that phosphoric acid is probably the prime manurial need and secondly lime.

Coffee tree and shade tree prunings should be returned to the soil. Coffee pulp and coffee parchment should also be applied to the land if possible. Crop under cacao is desirable upon these estates. Dressings of pen manure are very beneficial, MacMillen says:

"Liberal manuring is indispensable and farmyard manure when available is the best". Wood ashes are strongly recommended by several authorities. Ukers advises the use of the following artificial manures:

Superphosphate of lime, basic slag, sulphate of ammonia, nitrate of lime and sulphate of potash.

The degree of manuring, manures employed and methods of application must all be regarded from the economic standpoint. Pen manure can be applied if there are good farm roads and if the land is not too hilly. When considering the use of artificial manures, the difficulty of transport and the size and situation of the estate must be taken into consideration. For instance it is obvious that no
mechanical method of applying artificial manures can be employed in many parts of the hilly districts of Trinidad and that the cost of applying the manures by hand in those districts would be prohibitive. In hilly districts such as those mentioned green manuring may possibly be practised more intensively than would be the case if the land were flatter. On the plains manuring would not be so costly and some mechanical means of applying the manure might be devised. Some modified form of trenching after the style of that practised on River Estate in Cacao might also be an economic proposition on the lower lands but would again be too costly in the hills.

Pruning: The topping and pruning of coffee has only been practised in Trinidad of recent years.

The advantages of topping and pruning are that picking becomes facilitated and the cost of harvesting is reduced. Secondly better ground cover is formed. Thirdly it is said by some authorities that the pruning concentrates the energy of the tree upon the production of fruit and as the first crop after defoliation of the plant is usually a very large one there seems to be some justification for saying this.

The chief disadvantage of topping and pruning is the expense of the operation.

As it is a common practise upon coffee growing estates in this island to grow the crop under cacao it is desirable upon these estates to prevent the coffee growing up into the cacao. But on certain estates topping and pruning are found to be too costly to be practised profitably.

There are several systems of pruning:—

(a) The Single Stem System: In this system only one main stem is allowed to grow up.

(b) The Multiple Stem System: This usually means that the central shoot is cut out about one foot from the ground and two laterals developed. These laterals are cut out or capped three feet from the ground. When the tree has given its first full crop one of the laterals is cut right back and another stool shoot is developed and treated in the same way. When the new shoot comes into bearing...
the second lateral is cut back and another shoot is developed in its place.

A variation of this system is sometimes practised with three or even four stems.

(c) The Agobiada System: This method of pruning is also a multiple stem system.

When the plant is about a year old it is bent over and pegged down so that the top very nearly touches the ground. The primaries on the lower side of the arc formed by the bent stem are removed. When several young suckers and the original shoot are growing vertically several of the suckers are cut out, leaving three or four stems. These stems form the main stems of the plant.

Systems and methods of pruning are described in detail by several writers. They are particularly well described by McDonald and also by Haarer.

The correct height at which the coffee should be topped is a subject of controversy. Most authorities recommend that coffee be topped at a height of five or six feet.
HARVESTING AND PREPARING FOR MARKET.

Harvesting: In certain districts in some of the coffee growing countries the old method of harvesting by allowing the berries to fall from the tree and then collecting them as soon as possible is still practised. The usual method nowadays is hand picking.

Only fully ripened berries should be picked although this ideal cannot always be attained. Fruit must not be left on varieties of the arabican group after it becomes ripe as this species sheds the berries soon after ripening. The fruits of varieties of the robustoid and liberican groups may be left some time on the tree as these species tend to retain their berries for some time after ripening.

Pulping: There are two methods of pulping coffee berries, the Dry method and secondly the Wet method.

It has been the custom in Trinidad and is still a very common practise to deal with the berries by the former method. This consists in spreading the fresh fruits in a thin layer on drying floors and drying the pulp. This process may take anything up to three months if there is a great deal of wet weather. It is probably quicker in the case of robustoid coffees than in the case of arabian or liberican as the pulp on this species is thinner.

Formerly when the berries were dry the coffee bean was pounded out in a pestle and mortar by hand. Latterly however, the dried berries have been bagged and sent to Port-of-Spain for pulping, Messrs. Alston & Co. having installed pulping machinery for dealing with the dried berry. Payment is made by a certain sum being paid to the producer on delivery of the dried berry followed by a further payment depending upon the number of lbs. of clean coffee bean obtained.

Recently certain estates have installed pulping plants to deal with the fresh berry by the Wet Pulping system. A plentiful supply of water is necessary to deal with the fruit by this method.

The fresh berries are tipped into a large tank, known as the receiving tank. This tank is on a higher level than the pulping machine. The berries are conveyed by running water to the pulper. This machine is worked by hand in Trinidad but may be worked by an engine.
The pulping machine may either be of the "disc" type where a flat metal plate revolves against the berry, rubbing the pulp off or of the "roller" type in which case the pulp is rubbed off between a revolving metal cylinder and a breastpiece. The pulp drops below the machine and may be carried away by a flow of water.

The beans in parchment are carried by water to the fermenting box where they are fermented for 24 hours, being stirred from time to time by long poles or by trampling with the feet.

After fermentation the beans are washed and spread out on a floor to dry. Drying takes from seven to ten days.

The product which is the bean in the parchment is known as "washed" coffee.

The washed coffee is not hulled on the estate but is sent to Port-of-Spain in the parchment.

The advantages of the Wet method over the Dry are as follows:
Firstly the drying floors are occupied for a shorter period of time.
Secondly the cost of transport from the estate to the market is reduced.
Thirdly the pulp may be fed as a stockfood or applied to the land direct.
Fourthly and lastly a higher price is received for washed coffee than for coffee prepared by the dry pulping method. Washed coffee fetched a penny per pound more than dried berry coffee last year.

To offset these advantages the purchase price of the machine and the cost of laying down the plant are considerations.

The cost upon one estate in Trinidad of buying and setting up the machine, making a receiving tank to take eighty baskets of fresh cherries and of making two fermenting boxes, each of them more than big enough to contain one day's pulped coffee, or about 4,000 lbs. of pulped coffee, was approximately £100. The cost of labour employed to work the pulper and stir the fermenting coffee is probably far less than the labour needed to deal with coffee by the Dry method.

**Hulling**
This operation consists of the removal of the parchment. It is not usually an estate operation in any country being often done by the merchant or dealer before export or in some
cases it is done upon arrival in London. It may even be done by the retailer.

There seems to be no good reason why coffee should not be grown successfully and profitably in Trinidad. We have seen that and is consequently cheaper to transport. Coffee so treated should be bagged in clean, well aired sacks as it is easily contaminated by a foreign odour.

Hulled coffee is 20% less by weight than the parchment coffee grown in this colony and is grown profitably under shade on several estates. On the more open and lower areas C. robusta has been grown quite successfully.

At present the method adopted for the preparation of coffee for sale are not, in most cases, calculated to produce the best final cleaned coffee.

As early as 1888 it was stated in a Letter to Granting the Colonial Office from D. Carroll of the Royal Gardens, K.C., that: “Mr. Hart sought to improve the quality of Trinidad coffee by curing according to the methods so well pursued in regard to the Blue Mountain coffee of Jamaica. The result of his experiments according to the broker has improved the value of Trinidad coffee by 30%.”

The recent adoption in certain estates, of the Hart pulping method followed by fermentation for twenty-four hours has improved the value of their coffee. Not only has a higher price been received per lb. of cleaned coffee but the extra price combined with the reduced cost of transport has more than paid for the cost of laying down the plants and the running of them. This means that the few growers who have adopted this method of preparing their coffee have actually obtained an extra profit.

Cacao is not as profitable a crop as was formerly the case in Trinidad. This is due to the increased cost of labour and the competition of cheaply-produced West African cacao. Something may also be due to a waning in its popularity as a beverage. Although Blackleg disease has not as yet affected the cacao production of Trinidad it appears to be quite possible that the disease may affect
There seems to be no good reason why coffee should not be grown successfully and profitably in Trinidad. We have seen that Coffea arabica and Coffea liberica have been grown in this colony without difficulty since 1876. From that date until 1920 the crop was an unpopular one due to the high prices which were being realised for cacao and the low price of coffee. During the last ten years, since better prices have been realised for coffee, C. arabica has been grown profitably under cacao on several estates. On the more open and lower areas C. robusta has been grown quite successfully.

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The recent adoption on certain estates, of the Wet pulping method followed by fermentation for twenty-four hours has improved the value of their coffee. Not only has a higher price been received per lb. of cleaned coffee but the extra price combined with the reduced cost of transport has more than paid for the cost of laying down the plants and the running of them. This means that the few growers who have adopted this method of preparing their coffee have actually obtained an extra profit.

Cacao is not so profitable a crop as was formerly the case in Trinidad. This is due to the increased cost of labour and the competition of cheaply-produced West African cacao. Something may also be due to a waning in its popularity as a beverage. Although Witchbroom disease has not as yet affected the cacao production of Trinidad it appears to be quite possible that the disease may affect
production in the future. Provided, therefore, that a good price continues to be received for Trinidad coffee it may become an important estate crop. Coffee may indeed come to hold the position previously occupied by cacao in this colony.

PART II:

A DESCRIPTION OF THE COFFEE CROP

UPON THE COLLEGE FARM.
PART II.

A DESCRIPTION OF THE COFFEE GROWN UPON THE COLLEGE FARM.

INTRODUCTION

A small area of the College farm is under coffee. Varieties of Arabica, Robusta and Liberica being grown in different places.

The soil is detrital, transported from the Northern Range. The colour is red to reddish brown and the texture coarse and sandy, tending to become coarser towards the north-western corner of the farm. It dries out quickly and is slightly acid. Plot H in Field C (orchard) is on the site of an old river bed and the soil is gravel.

Little is known as to the suitability of the environment for the successful growth of different species and varieties of coffee. This is due to the fact that only about half-a-dozen trees on the farm are over two years old. A few particular plants have been left unmoved and practically unattended altogether. They have grown up into large, healthy looking bushes.

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Little is known as to the suitability of the environment for the successful growth of different species and varieties of coffee. This is due to the fact that only about half-a-dozen trees on the farm are over two years old. These particular plants have been left unpruned and practically unattended altogether. They have grown up into large, healthy looking bushes.

In December a few pounds of erecta coffee were harvested, even dried and powdered and plain. Later on, of course, a fairly good quantity was harvested.

In February the coffee plant gave a small exhibition and plucked.

In June 6th 1935 the sapling seedlings and all the larger plants which had not set berries were cut down. Coffina, Robusta, Watagina, Patung, Norte and Erecta were left as it appeared likely that a fair harvest could be obtained from them in a few weeks time.

When the plants in Field C (orchard) are established it is intended that the coffee in this area shall be cut out.
THE OLD NURSERY.

This area which now belongs to the Entomological Department is situated to the north of the Biological Building, between the College road to the north of the Entomological Laboratory and the road to the Sugar Factory.

Rough Plan of the Area as it was on the 27th October 1929:

In the afternoon on the same date six varieties of coffee were sown. Five of these varieties belong to the arabica group and one variety of the robusta group. At a later date, Monday, January 30th 1929, one other variety of coffee in the arabica group was sown in the same bed. Each variety was unhulled seed sown in rows of eleven seeds to the row. The distance between seeds in the row was three inches, the distance between rows the same variety was six inches and the distance between different varieties was twelve inches.

After sowing the area was well watered and watered a day thereafter.

Plan of Seed Bed.

In December a few pounds of Erecta coffee were harvested. When dried and pounded out 2lbs. 183/4ozs. of clean coffee were obtained.

In February the Coffee Quillou gave a small crop which was harvested.

On June 6th 1930 the small seedlings and all the larger plants which had not set berries were cut down.

Quillou, Robusta, Maragogipe, Padang, Murta and Erecta were left as it appeared likely that a fair harvest would be obtained from them in a few weeks time.

When the plots in Field C (orchard) are established it is intended that the coffee in this area shall be cut out.

Description of seed:

[1] Seed donated: Some cleaned and dried seed of this variety of arabica was obtained from Mr. Cornell, Venidant Vale Estate, on the 17th December 1928. This seed was sown in Field K on the 20th December 1928, and gave a 75% germination by the 23rd April, 1929. All the plants except...
On Friday, December 13th 1929, a seed bed measuring 10' 0" in length by 4' 0" in width was made in Field N (nursery). Preparation consisted of: handforking, during which operation a plentiful supply of organic material, consisting of vegetable refuse, weeds, etc., was forked in, following which the bed was banked with a hand-hoe, and lastly, a fine tilth was obtained by hand-raking.

In the afternoon of the same date six varieties of coffee were sown, five of these varieties being of the arabica group and one variety of the robustoid group. At a later date, Monday, January 20th 1930, one other variety of coffee of the arabica group was sown in the seed bed. All the seed used was unhulled seed sown in rows of eleven seeds to the row, the distance between seeds in the row was three inches, the distance between rows of the same variety was six inches and the distance between rows of different varieties was twelve inches.

After sowing the seed bed was well watered and watered twice a day thereafter.

Description of seed:

1. San Ramon: Some cleaned and dried seed of this variety of arabica was obtained from Mr. Connell, Verdant Vale Estate, on the 17th December 1928. This seed was sown in Field N on the 20th December 1928, and gave a 75% germination by the 22nd April, 1929. All the plants except...
one were planted out in Field C (orchard), Plot H, and later died probably from drought and sun scorch. The remaining plant was planted out in Field N (nursery) on Friday, February 21st 1930.

Four ozs. of seed in clean condition were left unused from this sowing. Three rows, each of eleven seeds, were sown in the coffee seed bed in Field N (nursery) on Friday, December 13th 1929. No germination resulted from this sowing as the seed was too old and had lost its vitality.

(2) Padang: The seed was harvested from the Padang coffee growing on the College farm on Wednesday, December 4th 1929. The plant from which the seed was obtained is situated in the old nursery to the north of the Biological Building. The fresh berries were hand pulped, washed carefully and the seed dried. Two rows each of eleven seeds were sown in the coffee seed bed in Field N (nursery) on Friday, December 13th 1929.

Of the twenty-two seeds sown eighteen seeds germinated by March 29th 1930. Germination started on February on February 17th 1930, 56 days from the date of sowing the seed. By the 20th February 1930, 69 days from sowing 27.27% of the seed had germinated. On February 28th 1930, 77 days from sowing 50% of the seed had germinated. By the 18th March, 1930, the 95th day from sowing 90.90% of the seed had germinated and by the 106th day from sowing, March 29th 1930, 81.81% or eighteen of the seeds had germinated.

(3) Erecta: Berries of this variety were harvested on Wednesday, December 4th 1929, from the tree growing in the old nursery to the north of the Biological Building. These berries were hand pulped on Saturday, December 7th 1929, washed carefully and dried. On Friday, December 13th 1929, two rows each row of eleven seeds were sown in the coffee seed bed in Field N. (nursery). Germination began on the fifty-sixth day from sowing. On the fifty-eighth day from sowing, 9th February 1930, 45.45% of the seed had germinated. On February 14th 1930, the sixty-third day from sowing 50% of the seed had germinated. By March 10th 1930, the eighty-seventh day from sowing 90.90% of seed had germinated. On April 10th eleven seeds was sown in the coffee seed bed in Field N (nursery).
1930, the one hundred and eighteenth day from sowing 95.45% of the seed had germinated or 21 seeds out of the total of 22 seeds.

(4) Maragomipe: The berries were harvested on Wednesday, December 4th 1929, from Field C (orchard) Plot F. The berries were hand pulped, washed and laid out to dry on Saturday, December 7th 1929. On Friday, December 13th 1929, one row of eleven seeds was sown in the nursery bed in Field N (nursery).

The first germination occurred on February 9th 1930, the 58th day from sowing. By the 20th February 1930, the sixty-ninth day from sowing 27.27% of seed had germinated. On February 27th 1930 seventy-six days from sowing the percentage of germination was 54.54%. By March 6th 1930, eighty-three days from sowing 72.72% of the seed had germinated and on March 20th 1930, the ninety-seventh day from sowing, 10 seeds or 90.90% of the total had germinated.

(5) Murta: Fresh berries were harvested on Wednesday, December 4th 1929, being obtained from the Murta coffee tree growing in the old nursery to the north of the Biological Building. This tree is of the degenerate small leaved type. The berries were hand pulped, washed and dried on Saturday, December 7th, 1929. One row of eleven seeds were sown in the coffee seed bed in Field N (nursery) on Friday, December 13th 1929.

Germination started on February 7th 1930, the fifty-sixth day from sowing. On February 15th 1930, the sixty-fourth day from sowing 27.27% had germinated. On February 27th 1930, the seventy-sixth day from sowing, 54.54% of the seed bed had germinated. By March 26th 1930, the one hundred and fifth day from sowing 63.63% of the seed had germinated or 7 seeds out of a total of 11.

(6) Quillou: Berries were harvested on 16th February 1929, from the tree in the old nursery to the north of the Biological Building. The green weight of the berries was 13 lbs. The berries were dried. Weight of dried berries on November 27th 1929 was 12 1/2 ozs. The berries were placed in water and soaked for ten days. On 7th December 1929 the skins and dried pulp were removed by hand. The seeds in parchment were washed and dried. On Friday, 13th December 1929, one row of eleven seeds was sown in the coffee seed bed in Field N (nursery).
The seed was too old, had lost its vitality and failed to germinate.

(7) **Columnaris:** Fresh berries were harvested from the tree in the old nursery to the north of the Biological Building, on Saturday, January 18th 1930. The berries were hand pulped washed and set out to dry on the same date. On Monday, January 20th 1930 one row of eleven seeds were sown in the coffee seed bed in Field N (nursery).

The first germination occurred on March 8th, forty-seven days from sowing. On March 21st 60 days from sowing 45.45% of the seed had germinated. On March 28th 1930, sixty-seven days from sowing, 72.72% of the seed had germinated. On April 3rd 1930, seventy-three days from sowing all the seeds, or 100 per cent had germinated.

As the primary object of making a seedbed in Field N was to raise seedlings to be used as supplies in the coffee plots in Field C (orchard) only small numbers of seeds were sown. This makes the above graph of limited value.

Seeds of San Ramon and Guillou had lost their vitality and
failed to germinate, seed of the former variety was over a year old and the latter variety was over eleven months old.

Padang, Erecta, Maragogipe and Murta were all harvested on the 4th December 1929 and sown nine days later.

Columnaris was harvested on January 18th 1930 and sown two days afterwards. The germination of this variety was much more rapid than any of the other varieties.

The conclusion to be drawn from this is that the sooner coffee seed is sown after it is harvested the better germination will result.

Upon comparing this germination chart with the weather record it was noted that between the 70th and 75th days the hours of sunshine were short and that heavy rain had occurred at this time. From the 75th to the 80th day the hours of sunshine were even less but after the 75th day no more rain fell until the 104th - 107th days. After the 80th day the hours of sunshine increased.

There may be some correlation between these facts and the curves of the four varieties Padang, Erecta, Maragogipe and Murta. The Columnaris would not be affected as the seed was sown much later and started germination after the date of the 80th day of the other four varieties.

On Wednesday, 24th April 1930, the healthiest and strongest seedlings were transferred from the seedbed to bamboo pots. They were at this time 3" - 6" high.

The numbers of the different varieties selected and potted were as follows:-

<table>
<thead>
<tr>
<th>Variety</th>
<th>Number of Seedlings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Padang</td>
<td>16</td>
</tr>
<tr>
<td>Erecta</td>
<td>16</td>
</tr>
<tr>
<td>Maragogipe</td>
<td>8</td>
</tr>
<tr>
<td>Murta</td>
<td>2</td>
</tr>
<tr>
<td>Columnaris</td>
<td>6</td>
</tr>
</tbody>
</table>

The seedlings were transplanted to Field C (orchard) early in June 1930, filling in, as far as possible, the blanks in the plots.
On Friday, April 11th 1930 a seedbed was prepared in the nursery for the purpose of raising Liberica coffee plants.

Two hundred (200) seeds were sown the spacing being 6" between the rows and 4½" in the row.

One hundred of the seeds formed part of the consignment of parchment coffee received from Palmiste Estate, San Fernando, on January 16th 1930.

The other half of the seed sown was part of the Liberica berry coffee received from Palmiste Estate on February 26th 1930.

The seed for sowing was hand pulped and selected for size, shape and healthy appearance.

Sowing was done in the afternoon of April 11th 1930.

At the same time the established plants were sprayed with

Germination started on May 31st the fiftieth day after sowing. Up to June 8th the older seed, received in the parchment on January 16th, had not germinated; it is possible that it has lost its power of germination.

It is intended that the seedlings shall be supplied to Field 0 direct and not transplanted to a nursery bed or bamboo pots.

Ninety plants are needed to complete the planting in 0.
Arabian and Robustoid coffee varieties are planted in plots which are situated along the north-eastern boundary of the orchard. There are nine triangular plots each measuring 55' 0" x 50' 0" x 25' 0" approximately.

The first planting was made in February 1928 of the following Arabian varieties: Columnaris, Erecta, Murta, Bourbon, Padang and Maragogipe. The Robustoid varieties planted at the same time were Canephora and Quillou. The planting distance was 8' 0" x 8' 0".

In June 1930 the plots were rearranged and the blanks supplied as far as possible with seedlings from Field N (nursery).

At the same time the established plants were manured with ½ lb of fish meal each, applied in a circle round the plant.

The plots were handforked and a light sowing of pigeon pea (cajanus indicus) was broadcast by hand to provide light shade during the establishment of the young plants.

Starting from the west:

Plot A: Has not as yet been planted with coffee.

Plot B: First planting nine Columnaris and five Erecta. November 1929 the Erecta was cut out and the blanks filled with five Columnaris seedlings from the nursery in June 1930.

Plot C: Murta. June 1930, five established plants and two seedlings.

Plot D: Planted with Bourbon. June 1930 five established plants. No supplies available.

Plot E: Planted with Padang in 1928. June 1930 eight established trees and four seedlings.

Plot F: 1928 planting consisted of six Maragogipe and six Canephora. The Maragogipe was cut out in June 1930. No supplies of Canephora were available.


Plot H. Planted in 1929 with San Ramon, an Arabian variety. This planting failed. June 1930 eight Maragogipe seedlings from the nursery were supplied, leaving four blanks.
Plot I: Planted in June 1930 with twelve Erecta seedlings obtained from the nursery.

During the dry season of 1930 the coffee in Field C (orchard) was attacked by species of the following fungi: Cercospora, Pestalozzia, Cladosporium and Helminthosporium. This attack was a secondary condition brought about by over exposure to sun and wind, drying the soil and scorching the foliage.

It is therefore recommended that all coffee on the College Farm be mulched during the dry season. The ill effects of over exposure will probably be greatly reduced by this practise.
Coffee Plots in Field C (orchard) June 1930.

Scale 1" = 50'

1928 Planting
- June 1930 Planting
- Blanks

Plots:
- Plot B: Column
- Plot C: Mina
- Plot E: Padang
- Plot F: Canephora
- Plot G: Quillao
- Plot H: Parageyna
- Plot I: Erecta

PLAN OF COFFEE PLOTS IN FIELD C (ORCHARD)
Along the north-eastern border of Field 0 Liberica coffee was planted eight feet apart in 1928.

In November 1929, only thirty-nine of these plants had survived.

In January 1930, parchment seed of coffee liberica was received from Sir Norman Lenont of Palmiste Estate. The blanks in field 0 were supplied at the rate of three seeds to the hole. There was no germination.

At the beginning of the wet season, June 1930, there were only thirty plants alive. These were manured with $\frac{1}{2}$ lb. each of a 3-2-1 Mixture:

- Fish Meal 7.5 lbs.
- Super phosphate 5 lbs.
- Sulphate of Potash 2.5 lbs.

This work was carried out under the direction of the Professor of Agriculture, Mr. R. C. Wood, to whom thanks are due for his assistance and advice.

Division of Commerce, Dept. of Agriculture, Industry & Commerce.
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1. David, Pedro A., Practical Directions for Coffee Planting. Philippine Agriculturist, Vol.XVII. Series A. No.2


8.


11. Trinidad Almanack. 1884. p.93


14. Chapter XV.

15. Chapter XX.

APPENDIX I.

Seed in Store at the Field Office:

(1) Liberica in the parchment. Received from Sir Norman Lamont, Palmiste Estate, San Fernando, on the 16th January 1930:-

3 lbs. 2 ozs.

(2) Liberica in the berry. Received from Sir Norman Lamont, Palmiste Estate, on the 26th February 1930:

1 lb. 9 ozs.

(3) Murta in the parchment. Obtained from Field C (orchard) Plot C, on the 8th June 1930:

10 seeds.