SURVEY OF BANANA VARIETIES
AND THEIR USES IN TRINIDAD

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D.T.A. REPORT
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I. INTRODUCTION.

Bananas in Trinidad are important as a shade for and a catch crop between young and old cacao, as a fruit and vegetable in peasant gardens and to a very slight extent as an export crop to North America.

This survey was made in 1950-51 mainly in the Northern and Central parts of the island. Information was drawn from observations in the field, discussions with local people, discussions with members of the staff of the Imperial College of Tropical Agriculture and the Department of Agriculture and the literature from the College Library.
### II. VARIETIES.

#### KEY TO BANANA AND PLANTAIN VARIETIES.

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### Key to Banana and Plantain Varieties

1. **Male Bud deciduous** (when present, spear shaped with no male flowers)

   - **1.** Male Bud deciduous
   - **2.** Male Bud persistent

2. **Bracts to the male bud persistent**

   - **3.** Bracts to the male bud deciduous

3. **Male flowers have white tepals, borne on relatively short pedicels**

   - **4.** Male flowers have white tepals
   - **5.** Male flowers have yellow tepals

4. **Usually the plant is under 5 ft. tall**

   - **6.** Usually the plant is under 5 ft. tall
   - **7.** Usually the plant is over 5½ ft. tall

5. **Cubeb oxide coalescing patches on stem petiole and midrib**

6. **Distinct Red flush at base of Pseudostem**

   - **7.** Distinct Red flush at base of Pseudostem
   - **8.** Only suspicion of red flush at base of Pseudostem

7. **Stem and midribs coloured in deep red pigment**

   - **9.** Stem and midribs coloured in deep red pigment
   - **10.** Stem and midribs not coloured in deep red pigment

8. **Male bud imbricate, bracts crimson within, flowers pigmented red**

9. **Male bud convolute, bracts pale within, flowers not pigmented**

10. **Male flower only faintly pigmented on compound and free tepal**

   - **11.** Male flower only faintly pigmented
   - **12.** Male flower strongly pigmented

11. **Male flower strongly pigmented at base, style twisted, plant pigmented red**

12. **Male flower strongly pigmented and plant of yellowish green colour**

13. **Male flowers pigmented red, plant red**

14. **Male flowers not pigmented, plant green**

15. **Plant with waxless stems and petioles**

16. **Plant with waxy stems and petioles**

17. **Bunches pendulous or nearly so; symmetrical**

18. **Bunches horizontal or oblique; asymmetrical**

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**Note:** The key above provides a structured approach to identifying banana and plantain varieties based on specific characteristics described in the text.
KEY TO BANANA AND PLANTAIN VARIETIES, (Cont'd).

13. Bunch with few hands (5-6). Fingers fat and semi-erect ... ... Green Red
13. Bunch with many hands (7-12). Fingers long and fairly erect ... ... 14

14. Plant bears strong flush at base. Petioles not pigmented red ... ... 15
14. Plant bears weak flush at base. Petioles pigmented red ... ... 16

15. Plant semi-tall to tall 9-12 ft. ... ... ... Giant fig
15. Plant tall 12 ft. ... ... ... Highgrade

16. Fruits blunt ended; pollen on male flower ... ... I C-2
16. Fruits 'bottlenecked'; no pollen on male flower ... ... Gros Michel
1. VEGETATIVE PLANT.

The plant is a diploid possessing an erect habit of growth. The pseudostem is deep green with only a suspicion of red pigment more or less hidden beneath dead leaf-sheath at the base. Extensive black patches at the leaf bases give the appearance of conspicuous 'tar brush' markings up the stem. The wings of the petiole are spreading and have a faint red tinge along their edges.

2. MALE BUD.

The bud is convolute, with a lack of red pigment on the undersides of the bracts. The male flowers are unpigmented and the bud is of the Musa Acuminata group.

3. BUNCH.

Bunches are usually carried obliquely, the fingers appearing rather ugly until full. In some cases they have been confused with those of Gros Michel but are really rather different. The fruits ripen green, the flesh is hard and the flavour is rather acrid.

4. USES.

Unripe fruit can be cooked and eaten as a vegetable but although they are pleasant their consistency is hard and tough. Because of their comparative rarity they are only eaten as a dessert banana very locally.

Used as shade for cacao but probably often only because planting material has been mistaken for that of Gros Michel which it resembles closely.

5. DISTRIBUTION.

Mainly in the Northern and Central Ranges amongst cacao, quite rare in peasants' backyards.

6. DISEASES.

Leaf Spot attack is not quite as severe as on Gros Michel. Moko Disease has been recorded on this variety in Rio Claro. It is highly resistant to Panama Disease but occasional cases have been reported.
7. LOCAL NAMES.

Bande is a French word meaning taut or stretched, applied because the fruit often appear straight.

Balisea Fig - has an obscure connection with Balisier, the local name for Heliconia. Hard or Durit Fig so named because of the hard nature of the ripe fruit.
CAVENDISH GROUP.

In the field Giant Fig shows a remarkably close resemblance to Gros Michel and guided by morphological similarities alone we would indeed regard the two as being related closely, yet the physiological differences between these two are many and are even more striking when fully appreciated than the superficial resemblances. Furthermore the physiological characteristics of Giant Fig seem in every case to be identical with those of Dwarf Chinese, and primarily on a physiological basis Professor Cheeseman (4) suggests a close relationship between the two. In the field they exhibit high resistance to Panama Disease and show susceptibility to Black-tip. Their fruit bunches in tropical air temperatures ripen to a greenish yellow in marked contrast to a golden yellow in the case of Gros Michels.

The Dwarf banana has more than once in its history thrown bud sports which in the most interesting cases are intermediate in stature between Dwarf and tall varieties, e.g. Giant Chinese. In the case of Giant Fig the shedding of the bracts modifies the whole appearance of the plant in the field, yet it can after all be only regarded as a minor genetic character.

Thus Professor Cheeseman (4) says "the morphological features taken as a whole show nothing to contradict the hypothesis of relationship based on physiological characters" and he places them all in the Cavendish group.

1. VEGETATIVE PLANTS.

All members of the group are triploid and while the taller members exhibit a characteristic habit of growth the shorter types are more compact and do not exhibit the character so markedly. The stout pseudostem is a dull green colour with a strong red flush at the base. The plant is waxy, especially the petioles and leaf sheaths. Dark brown blotches are present at the leaf bases, the wings of the petiole are spreading and on the adult plant devoid of red pigment; instead a band of brown to black pigment runs along the edge.

2. MALE BUD.

This group belongs to the Musa Acuminata, and as such exhibits its features, however great variation exists. In the Dwarf types the male bud appears imbricate and in the tall types convolute but really both are convolute and it is
the persistence of the bracts in the former which give it the imbricate appearance.

3. BUNCH.

Bunches are large and heavy but compared with Gros Michel they are less compact with a tendency to be straggling and the hands do not overlap quite so much. The fingers are more curved and when ripe are set obliquely to the rachis.

DWARF AND GIANT GOVERNOR

1. VEGETATIVE PLANT.

These two varieties differ from other members of the group in stature, the Dwarf Governor rarely exceeding 4 to 5 ft. and the Giant Governor 5 to 6 ft. as compared with 9 to 14 ft. of the taller members. This shortening of the pseudostem gives a bunchy topped appearance.

2. MALE BUD.

Bud is originally convoluted but becomes imbricate as the bracts persist on the rachis.

3. BUNCH.

A large heavy bunch less compact than Gros Michel with fingers incurving towards the rachis, when immature, and tending to sag when mature. Hands tend to be spirally splayed with less overlapping, a feature more marked in the Dwarf variety. The fruits are blunt tipped and ripen to a greenish yellow colour. The skin is thick and soft with the Dwarf appearing more liable to damage by bruising than the Giant Governor.

4. USES.

These varieties are grown very locally, each family producing for their own table and any surplus is sold in the local markets. It is held that a better flavoured fruit comes from the hills; (this is probably due to a better type of soil). Nowadays these varieties are totally consumed in the island, but some years ago attempts were made to export them. Reasons for their abandonment as an export crop were the need for special packing and transport techniques to prevent them ripening before their destination was reached.
5. DISTRIBUTION.

These varieties, being less exacting in their soil requirements, probably tolerating a higher water table than other varieties, not suffering unduly from wind damage, and not requiring much cultivation, are found growing virtually alone on the poorer alluvial flats of Eastern and Central Trinidad. It is found solely as a backyard crop growing on the leeward side of habitations where it obtains protection from winds. Large bunches produced may be attributed to household waste which is thrown around them. These varieties occur in the valleys and hilly parts of Trinidad but not to any great extent.

6. DISEASES.

These varieties are resistant to Panama Disease but susceptible to Leaf Spot and Moko Disease. Black tip has been observed in the field affecting the fruit but not to any economic extent.

7. LOCAL NAMES.

Many local names exist - Dwarf and Giant Governor, Dwarf and Giant Cavendish and Dwarf and Giant Chinese. Governor appears to be the most widely used. Canary banana is often heard for the Dwarf as this variety came to the West Indies from the Canary Islands.

GIANT FIG AND EXPERIMENT FIG

1. VEGETATIVE PLANT.

These two varieties are distinguished purely on vegetative vigour when grown together; the Giant Fig is a semi-tall to tall mutant standing from 9 to 12 ft. high and the Experiment Fig is very tall - 13 to 16 ft. high. It does appear that in the field the Giant Fig may itself be a group of varieties of varying stature but confusion exists between the two mentioned varieties and to carry it further would only complicate the issue.

2. MALE BUD.

The bud is convolute with deciduous bracts.

3. BUNCH.

Bunches show minor differences from Dwarf Governor in the fruits being
larger, fuller, not so curved and having a rounded tip. The hands are more erect, less spiralled, and more neatly packed with a greater overlapping of the fingers. In the ripe bunch the angle of repose of the hands is approximately 60° to the rachis; Gros Michel is more and Dwarf Governor less.

4. USES. (a) Giant Fig.

This variety is not favoured as a shade for cacao but is grown as a catch crop in cacao plantations to be sold locally. It is a good eating banana, second only to the Gros Michel. It is also resistant to Panama disease and for these reasons it has been considered as a substitute for the Gros Michel on diseased lands but however, trials show that in spite of the resemblance of its bunches, its many defects render it unsuitable for export. Firstly the ripening of vigorous bunches in fairly even but the majority produced are not sufficiently vigorous and show unevenness of ripening. At the same time the immature symmetry of the bunch is lost and a distorted semi-erect sagging ripey bunch results. Secondly the fruit skins are thin and show bruising rather badly. With careful handling and special transport the Giant Fig could be exported to the not too far distant markets.

(b) Experiment Fig.

This very tall variety may be of use in cacao but as yet it is only grown on a very few estates and little is known about it.

5. DISTRIBUTION.

Giant Fig is more widespread occurring in the Northern and Central Ranges mainly amongst cacao but also in peasant gardens. The Experiment Fig occurs only on two or three estates (Ortinola and River Estate) and is of recent introduction in all cases.

6. DISEASES.

These varieties are resistant to Panama Disease but susceptible to Neco Disease and very susceptible to Leaf Spot. Symptoms of Black tip have been seen on Giant Fig in the field.

7. LOCAL NAMES.

Giant Fig is the Trinidad name for the Jamaican variety Lacatan which reached Jamaica from the Phillipines via Central America.
Experimental fig is the name used in Maracas Valley for what is called Highgrade at River Estate where it was originally introduced.

Boil Rong, meaning 'round end' is applied to the Giant Fig because of its round tipped fruit.

**GROS MICHEL.**

1. **VEGETATIVE PLANT.**

This triploid variety is tall growing and on good soils attains a height of 10-14 ft. The pseudostem is green with a very weak red pigmentation beneath the dead leaf-sheaths at its base. Leaf sheaths bear characteristic patches of black pigment at the base of the petiole. Waxy bloom is abundant, covering leaf sheaths and petioles, the latter bears a red pigmentation along the open wings and this may be accentuated under poor soil conditions.

2. **MALE BUD.**

Bud is convolute, male flowers are unpigmented and bracts are pale on undersurfaces. It is a member of Musa acuminata.

3. **BUNCH.**

Bunches are large and symmetrical, the fingers turn up at their pedicel to give straight erect fruit closely packed and closely overlapping and growing towards the rachis as opposed to the outward sag of the Cavendish bunch. The fruit ripens to a golden yellow hue, possesses a fairly thick skin and is distinguished from other varieties by its bottlenecked finger-tip. Bunches of 6-10 hands are the usual range to be expected but on rare occasions up to 13 hands (100 lbs.) have been recorded.

4. **USES.**

Locally it is an important dessert banana or while still immature makes a good vegetable either boiled or boiled and fried. Locally it has been used for ice cream making.
As shade to cacao this variety has no significance but as a catch crop in cacao it is of supreme importance, for it is upon this source the exportation of the variety is dependent. Mr. Beausoleil (3) estimates that 20% of the island's Gros Michels leave the island. Before exportation it is quite rigorously graded on number of hands and size and fullness of the fruit.

There are three main export grades; firstly the 'count' grade or those bunches of nine or more hands; these command top price of $2.40. Secondly eight-hand bunches or 'three-quarter count' grade receive a price of $1.40, and thirdly seven-hand bunches or 'half count' grade receive 80¢. Below these grades bunches are rejected and sold in the local markets. Within these grades bunches should show no signs of premature ripening or bruising, and fingers should be 'full three-quarters' and six or more inches long.

Many factors make the Gros Michel superior for export to other varieties. 1. The bunches are perfectly symmetrical, fingers are upright and converging back to the main axis and therefore are good for packing into small rooms without undue strain on any one finger or hand.

2. The finger-to-stem connection is sufficiently fibred to hold the fingers erect until they reach an over-ripe stage.

3. The skin is thick and allows fairly rough handling without excessive mechanical damage.

4. Physiologically it is suited to refrigeration to temperate markets.

5. It ripens very uniformly to an excellent deep yellow hue, attractive to a consumer.

6. The flavour is sweet and appetising and texture is good.

For all these reasons it is a nearly perfect commercial banana but unfortunately it is very susceptible to Panama Disease and Leaf Spot, and therefore cannot be grown in pure stands. Scattered amongst cacao however, it may escape serious diseases for many years and affords a useful catch crop, given the right care and cultivation. Recently the Trinidad Guardian published the views of growers, stating "Lusty Gros Michels, Bananas of long large fingers, required by the Marketing Board for the exportation to the United States cannot be readily produced on a large scale in Eastern Trinidad", and also declaring that in future they may be in a difficult position to cope in supplying amounts hitherto delivered. Growers expressed satisfaction for the favourable prices for the grades but felt it was too much asking them to supply 'over full' bunches, pointing out choice bananas required virgin soils or land heavily
manured and shaded. It was assessed that only 20% of such choice bananas could be produced in the area of Eastern Trinidad and that even though many bunches are sound and mature they appear 'meagre'. The reason for this was poor soil conditions and serious attacks of Leaf Spot.

In reply to these views it must be pointed out that unless growers are prepared to put something into the soil they cannot expect to reap something from it. Better cultivation, manuring, fertilizing etc. of healthy stems is the only way of curtailing or improving future trends.

5. DISTRIBUTION.

Gros Michel are ubiquitous in cacao throughout the island, tending to do better on heavier rather than lighter, well-drained soils, and better on calcareous than non-calcareous. Tamina and Toco are noted for their superior bunches for these reasons.

6. DISEASES.

This variety is severely attacked by diseases and may appear so altered as to be mistaken for Bande. Panama Disease and Leaf Spot attacks are very destructive, whilst it shows slight resistance to Noké Disease and Borers. Panama Disease blocks up the vascular tissue, slowly cutting off water and nutrient supply to the upper tissue. This results in a slow-growing, yellowish green plant which only attains a certain height before it dries out and dies. The organism is known to exist 20 to 30 years in the soil so that the Gros Michel is further becoming restricted as new lands are infected. In cercospora the foliage is severely attacked and may be completely stripped off. The loss of carbohydrate assimulating leaf surface causes a progressively smaller fruit bunches to be produced.

7. LOCAL NAMES.

Gros Michel mainly. Occasionally Martinique Fig.
1. VEGETATIVE PLANT.

Vegetatively I.C.-2 and Gros Michel are very difficult to distinguish; both have green pseudostems with black patches on their leaf sheaths, both have strong petioles with red pigmented open wings; the I.C.-2 may be a little more deeply pigmented. However there are several diagnostic features in habit and disease incidence. (1) I.C.-2 is a tetraploid whilst Gros Michel is a triploid and as such the former exhibits a more drooping general appearance. (2) I.C.-2 is resistant to Leaf Spot whilst Gros Michel is often defoliated by this fungus. (3) I.C.-2 is resistant to Panama Disease and Gros Michel is very susceptible.

2. MALE BUD.

It possesses Musa acuminata characters. The rachis and the male bud appear larger and longer in proportion to those of Gros Michel. The male flower of I.C.-2 carries pollen on its anthers whilst Gros Michel does not.

3. BUNCH.

Bunches are not quite so large or so uniformly and symmetrically packed around the rachis as in Gros Michel. Fingers are shorter, appearing fatter than Gros Michel and their tips are blunt-ended. The fullness of the fruit leads to a distortion of the bunch. The skin of the fruit is tough and resistant to mechanical injury, whilst the pulp is sticky and bitter, and is of no exportable value.

4. USES.

Because of its resistance to Leaf Spot and Panama Disease, its hardiness and apparently less exacting soil requirements, its tall and vigorous growth, I.C.-2 is a popular shade crop for the establishment of cacao and for filling temporary gaps in cacao fields, more especially in the Sangre Grande District, River Estate and parts of the Northern and Central Ranges. Its large disease-free leaves afford valuable shade and provide good mats for the shelling of cacao pods. The fruits are not exportable and even for local use they are not favoured. Local people cook them occasionally, and eat them as a vegetable. Some estates sell them in bulk for stockfeed.
5. DISTRIBUTION.

Originating at the College, this variety has spread to the Sangre Grande Area, Maracas Valley, and the Central Range.

6. DISEASES.

On the whole it is free from serious disease being resistant to Leaf Spot and Panama Disease, and slightly susceptible to Moko Disease. The College (5) testing I.C. - 2 for Leaf Spot established a stand close to a severely attacked plot of Gros Michel. It was observed that the rate of appearance of spots was slow and that the total extent of the infection was relatively unimportant.

7. ORIGIN.

This variety was produced by the College by crossing a wild seedling species of Musa Acuminata as male parent with a Gros Michel as female parent.

RED AND GREEN RED.

These varieties are very closely related and Green Red is considered to be a mutation of the Red. In general habit they are almost identical, but have the most striking difference in colour. Red, as its name implies, is covered in a red pigment while Green Red, a green mutant of Red, is almost devoid of red and is deep green.

1. VEGETATIVE PLANT. (a) Green Red.

The stem is a deep olive green, slightly waxy and bearing black patches on the leaf sheaths. Red pigmentation occurs quite markedly under the dead dried out leaf sheaths at the base of the pseudostem, and also as a narrow band along the edges of the petiole wings.

(b) Red.

The pseudostem, petiole, midribs, undersurfaces of the leaves, all parts in fact are covered in a dull to bright red pigment. Both varieties are triploid and possess incurved wings to the petioles.

2. MALE BUD.

Green Red conforms with the general Musa Acuminata characters of non-pigmented male flowers, pale inner surfaces of the bracts, whilst Red has these characters masked by the intense pigmentation of the plant and both bracts and male
flowers are deeply pigmented.

3. BUNCH.

The vertically hanging bunches bear few hands (six or less) fairly symmetrically arranged around the rachis. Fingers are relatively short and fat (5 ¾" x 2") curved upwards from a short pedicel and being fairly neatly packed in a semi-erect position. The tips of the fruit are blunt to round ended with no sign of a bottle neck. The skin is moderately thick and shows no marked tendency to mechanical injury. The flavour is insipis and the texture coarse, soapy and sticky. The essential difference of these varieties is in colour of fruit; in Red the immature fruits are red and reddish yellow when ripe, whilst in Green Red unripe fruits are green and ripe fruits yellow. Bunches of both ripen uniformly and fingers are not shed until over-ripe.

4. USES.

Both being of a poor flavour and texture, they are not particularly palatable, and local people do not favour them. However in Sangre Grande the Green Red is cooked when 'three-quarter full', mashed and taken as a vegetable. Green Red on this area is much used for cacao shade for it is tall and fairly resistant to soil conditions. One grower claimed that in adjacent plots of Green Red and Sucrier for the reestablishment of clonal cacao in 1947 the Green Red, although checked by severe drought, recovered with the rains whilst the Sucrier succumbed throughout. Apart from its ornamental value Red has no economic significance.

5. DISTRIBUTION.

Both varieties are relatively scarce but widely spread throughout the island where cacao is cultivated. Red appears on waste land and uncultivated cacao estates.

6. DISEASES.

Both are only slightly susceptible to Panama Disease. Severe attacks of Borers on these varieties have been observed.

7. LOCAL NAMES.

(a) 'White Fig' or 'Green Red' as opposed to 'Red Fig' are names used around Sangre Grande.
(b) 'Green Donkey Fig' and 'Red Donkey Fig'.
(c) Red and Green Mataburro Fig (Matta: - coarse, dull; burro: - ass, donkey).
(d) Green and Red John, a West Indian name.
(e) 'Gros Juan' for Green Red and 'Mankiller' for Red are other terms used.

1. VEGETATIVE PLANT.

This triploid variety is semi-tall, growing to about 10 feet; its pseudostem is slender and frequently breaks under the weight of its bunches, although these rarely exceed 25 pounds. The pseudostem is bright green with a faint pinky tinge and a few black patches. The leaf sheaths do not dry out and therefore give it a clean tidy appearance. The presence of red pigment on the closed petiole wings, the midrib and sheath bases, is variable and dependent on the habitat.

2. MALE BUD.

A member of the Acuminata-Balbisiana hybrid group, it possesses an imbricate bud, deeply pigmented inner surfaces to the bracts and pigmented male flowers.

3. BUNCH.

The bunches hang obliquely to vertically and somewhat resemble Mysore bunches. The hands are not closely packed and the rachis can be seen between them; the fingers are large, curving upwards in a semi-erect fashion; the fruit tips are blunt and bear reflex styles giving the unripe fruit tip a hooked appearance. Fruits appear lumpy and bumpy when immature, as the skin and pulp are separate in places; fingers are borne on long pedicels which are deficient in fibre, and when the fruit ripens the fingers easily break off under their own weight. The skins are thin, the white flesh is of good texture and of slight acrid flavour.

4. USES.

It is esteemed as one of the best local dessert varieties because of its 'apple-like' flavour, and is sold in all markets for 2$ to 4$ per pound. It is also sold green for cooking and eating as a vegetable. In supplying shade to cacao it is of little use because it is severely attacked by Panama Disease but as a catch crop in established plantations it has great local importance.
5. DISTRIBUTION.
This variety is cultivated and grown in nearly all parts of Trinidad, both in cacao plantations and peasants' backyards. It is said that this variety does better on the heavier rather than on the lighter types of soil.

6. DISEASES.
Panama Disease attacks it severely, Cercospora slightly, and on good soils it shows resistance to weevil damage.

7. LOCAL NAMES.
(i) Silk Fig; (ii) Rack Fig (French word that may mean arrack); perhaps this word is derived from Arrack, an Arab word meaning 'sweet juice', used in Mohammedan Countries. (iii) Apple Fig is a Jamaican name rather than a Trinidad name given because of its apple-like flavour.

1. VEGETATIVE PLANT.
Habit of growth is triploid, the olive green pseudostem growing to a height of 10 to 15 feet, and bearing brownish-black patches at its petiole bases. Pseudostem, midribs, petioles and undersides of the leaves are overmasked by a dull bronze-red colour giving the whole plant a wine coloured appearance. The petioles carry incurving wings over a deep midrib channel. Plant suckers are tall and strong and the new leaves unfolding have bronzed undersurfaces which gradually dullen as the leaves develop.

3. MALE BUD.
The bud is imbricate, the male flowers pigmented, and the undersurfaces of the bracts deeply coloured, and it belongs to the Acuminata-Balbisiana hybrid group. A peculiar feature of this variety is the style in the male flower is twisted or Z-shaped.

3. BUNCH.
Bunches hang vertically, carrying 11 to 16 hands of very closely packed fingers, so close in fact as to cover up completely the rachis bearing them. The fingers are very slightly curved upwards, but in the main project almost straight out to the side, their tips are bottle-necked with flat ends. The bunch when immature is dark green and ripens very irregularly, starting at the top or centre and spreading downwards or upwards respectively to give bright yellow coloured fruit.
are short and fat (4 3/4" long by 1 1/2" broad). The skins are thin and the flesh is coloured yellow to buff with an unpleasant flavour and a soapy, cottony consistency. On the whole it is very unpalatable.

4. USES.

Only when dead ripe is this variety consumed, and only in certain localities where people have become accustomed to the rather unpalatable and acrid flavour. It is sold cheaply to peasants for feeding livestock, e.g. goats, cows, pigs etc. The fruit is fed ripe or nearly ripe, boiled or fresh in the skins; medicinal value is claimed by feeding very limited amounts of the unripe fruits to pigs. Its main use is as a shade to cacao and as much it is one of the best. It is tall, rank and vigorous, giving a very good canopy which is resistant to Leaf Spot attack. Even on low fertility soil it grows well but however, very wet conditions make it slightly susceptible to Moke Disease and even Leaf Spot. It has a drawback on good soils, for it requires constant checking and pruning to prevent it overshadowing the young cacao.

5. DISTRIBUTION.

Because of its recent introduction, Mysore is not very widespread in the island and occurs on certain estates dotted about and little where else. It has however tended to spread from points of introduction. In the main it occurs at and around River Estate, El Reposo, La Pastora, Arima Valley, Talpare, Merper and the Montserrat Hills.

6. DISEASES.

A strong, vigorous and healthy variety, resistant to all diseases, but under bad soil conditions it becomes susceptible to Moke and Leaf Spot.

7. LOCAL NAMES.

(i) 'Mysore' probably originated from that State in India; (ii) 'Fillbasket' because of the large bunches and very high number of fruits, enough to fill a basket; (iii) 'Manicou Fig' and 'Oppossum Fig' both local names for a wild animal, but with unknown connections.
SUGRIER.

1. VEGETATIVE PLANT.

Most distinctive feature of this variety is the complete absence of wax on any part of the growing or adult plant, giving it a shiny deep hellowish-green colour with very distinctive sepia to brown patches to the leaf sheaths. In general habit it is a diploid of medium stature being 8 to 12 feet tall usually with a relatively thin pseudostem and an absence of red pigmentation. The petioles are of a yellowish-green colour and bear closed wings.

2. MALE BUD.

The male bud possesses Musa Acuminata characteristics in having a convoluted bud, pale undersurfaces to the bracts and unpigmented male flowers.

3. BUNCH.

Bunches are usually small, borne in a vertical to oblique position according to the size and weight of the bunch. Hands spread out horizontally giving the bunch an asymmetrical appearance. The fingers themselves are almost perfectly symmetrical and short and fat (3" to 4" long and 1" to 1 1/2" broad). Being of a bright green colour whilst immature, they ripen to a deep yellow colour and at the same time round off to their symmetrical shape. Over-ripe fruits easily become spotted and tend to break off at its base. The pulp is sweet tasting and of good texture; the skins are very thin.

4. USES.

As a dessert and cooking variety they are locally held in high repute because of their good texture and sweet flavour. The ripe fruit, besides being used for dessert, is also fried and eaten as a vegetable. Half-ripe or unripe fruit is firstly boiled in its skin to soften the pulp, then the skins are removed and the pulp is fried and eaten in vegetable form. In the past Sucrier was extensively used as cacao shade but since the introduction of Leaf Spot into the island it has become less and less reliable owing to its high susceptibility to this disease. So severely is it attacked in some places that it is completely defoliated and rendered useless. However there are still small parts of the Northern Range where the ravages of this disease have not penetrated and Sucrier is still used successfully. Many growers complain that this variety suffers rather badly from severe dry seasons. In the severe dry season of 1947 cases of complete failure of the Sucrier variety are
not uncommon amongst those growers who used it for cacao shade.

5. DISTRIBUTION.

Probable the most widespread variety in Trinidad, ubiquitous in cacao and found widely in peasant backyards throughout the island.

6. DISEASES.

Sucrier is immune to Panama Disease, highly susceptible to Leaf Spot and attacked by borers and Moko Disease. Throughout the island planters are complaining that their varieties are failing to throw bunches. It appears that this may be the result of physiological failure, a new disease or a mutation. We find in Arima Valley, Santa Cruz, Manzanilla and Maracas Valley bunches failing to sheet properly and finally bursting through the stem with very twisted peduncle and congested, twisted and useless hands. In Blanchesseuse Valley added to this is a jellification of the twisted stem and failure of emerged fingers to fill. This malady is rather mystifying but may be the result of bad cultivation and neglect.

7. LOCAL NAMES.

Sucré Fig or Sucrier because of its sweet flavour; Ladies' Fingers because of the pettiness and daintiness of the fingers.

COMMON AND SILVER BLUGGOR.

1. VEGETATIVE PLANT.

This triploid variety grows to a height of from 10 to 14 feet, and has a bright yellowish-green coloured pseudostem which is completely devoid of black patches, red pigmentation or dead leaf sheaths on its surface. The leaf sheaths do not dry out below the petioles clasping the pseudostem and therefore give it a clean tidy appearance. The petioles are yellowish-green and carry incurved wings which roof over a fairly rectangular-shaped channel.

2. MALE BUD.

The bud is strongly imbricate, the male flowers are deeply pigmented, and the undersurfaces of the bracts are deeply coloured. It belongs to the Acuminata-Balbisiana hybrid group.

3. BUNCH.

The vertically hanging bunches bear only a few (5 to 6) horizontally
spreading hands. Fingers are large and fat (6 to 8" long; 2" bread) very angular, and are borne on long pedules. Fruits ripen to a yellow colour, the Silver bluggee having a silvery or shiny surface, and the Common bluggee a dull one. Although the fruit is thick-skinned it shows bruising rather badly and therefore packing and keeping qualities are poor. The flesh is starchy and requires cooking before it can be eaten.

4. USES.

Once it was extensively grown as cacao shade but owing to the checks it received in the drought dry seasons it has been displaced by a more reliable shade varieties. It is a cooking variety and is prepared in several ways. When ripe it is usually fried and eaten as a vegetable, or when unripe it is boiled and then fried and eaten in the same way. Many local people boil it green and pound it in a mortar either to be consumed warm at the table or taken into the field and eaten cold as a snack. Before boiling the skins must be removed or the pulp becomes discoloured. After cooking the pulp tends to be of a soft constituency unlike plantain which is hard and this may be the reason why Bluggee has never been as popular as plantain amongst local people.

5. DISTRIBUTION.

Very extensively grown in Trinidad but it only occurs in single clumps either in cacao or peasant backyards, more especially in the Montserrat Hills and Central Range.

6. DISEASES.

A bacterial wilt was first observed on this variety at the beginning of the century and named after the variety, i.e. 'Moko' Disease. It shows resistance to Panama Disease and Leaf Spot.

7. LOCAL NAMES.

'Bokbok' is probably derived from the East African word 'Boke Boke' which refers to a banana which when cooked is very soft. 'Bluggee' or 'Moko' are of unknown origin.
PLANTAINS.

DESCRIPTION (1) HORN PLANTAINS.

1. VEGETATIVE PLANT.

This plantain grows fairly tall but rather slowly with few suckers being formed, and on the whole is not a very vigorously growing variety. The pseudostem is a pinkish yellowish green colour with a waxy bloom on the young parts but on elder parts this is lost to give a shiny cuticle. There are no black patches on the stem.

2. MALE PUD.

The bud is shed very shortly after being produced and although it possesses no male flowers, it belongs to the Musa Acuminata group.

3. BUNCH.

The vertically hanging bunches carry few hands (5 to 6) with few fingers per hand (2 to 5) but the fruits are very long (10 to 12"), thin and bow-shaped, slightly curving upwards as they project in a horizontal direction. Each finger is borne on a long (1") pedicel and bears strong ribs along its length, a very characteristic feature of all plantains. It ripens to a golden yellow but the flesh is in the unchanged starchy state and must be cooked.

4. LOCAL NAMES.

Horn Plantain is so called because the fruits project outwards and upwards like a large cow's horn. 'Horse Plantain' is another name used.

(11) GIANT PLANTAIN.

1. VEGETATIVE PLANT.

Records state that this variety attains heights of up to 18 feet, but nowhere in Trinidad have I seen it above 10 to 11 feet. Its pseudostem is coloured yellowish-green with a pinkish bronze colour at the base and brown patches on the leaf bases. Young parts carry a waxy bloom but this is soon lost as the part matures to give a shiny cuticle. The petioles carry incurving wings which bear a bright pink fringe along their edges.
2. **MALE BUD.**

Below the bunch there is a mass of large equi-length horizontally projecting neuter flowers covering 1\(\frac{1}{2}\) to 2 feet of rachis down to the male bud. The bud is convolute but owing to the bracts being persistent it appears imbricate. The male flowers carry a yellow colouration to their tepals and in general **Musa Acuminata.**

3. **BUNCH.**

Bunches are very large, and unlike other plantains they have many hands (usually 7 to 8 but up to 12), each with many fingers (12 to 14). The hands are less spreading than Horn Plantain and tend to take on a more semi-erect position; more neatly packed. The fingers are long, thin, strongly ribbed, and borne on long pedicels; the bunches ripen very slowly and the stem is usually too weak to carry them and must be propped before the bunches are 'half-full'. Large bunches of 90 to 100 pounds taking a year and a half to mature can be found in the records.

4. **LOCAL NAMES.**

Giant Plantain.

(iii) **FRENCH PLANTAINS.**

In this Group of plantains there appears to be three distinctly differently coloured strains.

1. **VEGETATIVE PLANT.**

(a) Green French Plantain - a fairly tall variety with a yellowish-green pseudostem showing relatively few black patches on the leaf bases and showing only a suspicion of red colouration at the base. Waxy bloom occurs on the very young parts only. The midrib and petiole are greenish-yellow with incurring wings.

(b) Black French Plantain - the same as the Green variety except that the pseudostem is covered in deep purple to ox-blood coloured patches which coalesce and almost completely cover the whole stem, petioles and midrib.

(c) Wine Plantain - same as the Green Plantain except that the black patches on the pseudostem are more marked and the plant is overmasked in a deep wine-coloured pigment on midribs, petioles etc.
2. MALE BUD.

Male bud is the same as that in Giant Plantain; the essential difference here is that the neuter flowers are fewer in number taking up about 3 to 5 inches of the rachis as opposed to 18 to 20 inches.

3. BUNCH.

Bunches are not large, usually consisting of a few hands (5 to 6) with few fingers per hand (2 to 5) borne in a semi-erect position and curving upwards. Fingers are long (10 to 12") thin and angular, borne on long pedicels and ripen much quicker than those of Giant Plantain.

4. USES.

The ripe fruits are often fried and eaten in a strip form as a vegetable. The green fruits are first boiled and then either fried and eaten as before or else they are pounded, mashed and eaten as a mashed vegetable or allowed to cool when they set very hard and taken to the field for a snack. Because the pulp sets hard they are more popular than Bluggoe.

5. DISTRIBUTION.

The most common variety is the Horn Plantain and this is followed by the French Plantains, mainly the Green and Black whilst the Wine is very rare. Even so all plantains are rare when compared to the frequency and populations of bananas. Giant Plantain is very rare. These plants occur mainly in cacao of the Northern and Central Ranges. Single mats occur throughout the island in peasant gardens, usually in well protected places.

6. DISEASES.

In general the plantains are not vigorously growing plants and probably for this reason borer attacks show up with such devastating results. Few suckers are produced and therefore an attacked plant is a doomed one because its suckers fail to grow away before they are invaded themselves. Because plantains are so susceptible to attack, special cultivation methods must be adopted, and removing and replanting annually prevents a weevil population building up before it is uprooted. A method of soaking suckers in water for two days has also been used to destroy larvae that may be in the planting material. It is perceivable that if it were not for such favourable prices paid for plantains these methods would not be used and the plants would eventually be annihilated from the island. As far as other diseases go it is immune to Panama Disease but may be attacked by Moke on poor soils.
1. CLIMATIC FACTORS.

(a) Rainfall - There appears to be no correlation with rainfall amounts for bananas grow equally well in the 60, 80 and 100° zones. Distribution of rainfall is probably more important, for growers do say that certain varieties are checked by a dry dry season and may even be destroyed. In the severe dry season of 1947 growers reported that many of their then recent plantings were destroyed by the drought especially Sucreri and Bluggoe varieties.

(b) Temperature - The range of temperature is quite suited to banana growing, for it rarely falls below 65° F. and never below 60° F. and rarely exceeds 90° F.

(c) Wind - The banana produces more fruit per area occupied than many of our staple crops but this is only so if its large leaves remain intact. So many bananas have their leaves lacerated by high winds that it is not surprising that their yields are low. Trinidad is relatively free from high winds but even so the normal winds clearly demarcate areas suited and unsuited to banana cultivation. For example Eastern and Central Trinidad which are low lying areas are totally unsuitable unless windbreaks are provided. However the Dwarf Cavendish, a fairly wind-resisting variety grows quite well in these areas but only when behind the protection of a hedge or house. Even in the Northern and Central Ranges growers find protection for certain varieties is very necessary. Mysore and I.C.-2 are two varieties very resistant to wind and are very useful for using in moderately exposed positions to protect other bananas or cacao.

(d) Sunlight - Exposure to the sun does not appear to affect the banana in Trinidad.

2. EDAPHIC FACTORS.

Before the soil can be considered it is important that the type of rooting system should be mentioned. This consists of a large underground stem or 'store house' of the plant, anchored to the soil by vertical roots penetrating to a depth of 3 to 4 feet. To allow their full development the soil needs to be of good crumb structure and free draining to a depth below the roots, yet with a water table within range of the hydrotropic roots. The feeding horizontal roots ramify in the surface soil and to allow full development the soil needs to be of good texture and high humus content.
Soils with gravel layers near the surface are quite unfit for banana cultivation but clayey soils if well manured and of good structure and drainage can be made very productive. In Trinidad there are quite a variety of soil types, many of which are quite unsuited because of their poor structure, bad aeration and water-logged condition. The vegas and hillsides of the Northern Range produce the best bananas in the island for here the soil is quite fertile, relatively free draining and with many of the physical attributes so essential to successful banana cultivation. In the Central Range there is a great variety of soil types, some good, some bad and others indifferent. Certain areas, e.g. Tamana, Gran Couva grow bananas equally as good as the best from the Northern Range, but there are other parts notably on the very heavy clays and in the water-logged alluvial valleys where banana growth is very limited. Around Sangre Grande and Manzanilla pockets where the soil is fertile well drained etc. are shown up by a better growth of bananas than surrounding conditions. In Western Trinidad and the Caroni basin, soil conditions are poor for here there is a high water table, low fertility soils, and frequent water-logging, and banana growth and cultivation is very restricted. It is in this area we find the Dwarf Governor is the dominant variety because it can tolerate such conditions better than any other variety.

3. TOPOGRAPHY.

This factor has little influence on banana growth except that it affords protection to many sights in both the Northern and Central Ranges, but apart from this it has no great influence. Bananas are seen growing as well at 2000 feet in the Arima and Lopinot Valleys as they are in the valley bottoms at 200 feet.
1. INTRODUCTION.

The first impression one gets of banana cultivation in Trinidad is that it is non-existent and to a certain extent this impression is correct, for in peasant gardens the crop grows quite unattended and unchecked. Peasants do not appear to know much about the crop and only seem concerned about when the next bunch is to be thrown. On estates only Gros Michel and Plantain receive attention and cultivation, and other varieties only receive attention when that attention is likely to benefit the cacao.

It may well be asked "what is the reason for such neglect?" Once banana growing was a flourishing industry but it received a setback in the early nineteen hundreds when Panama Disease assumed great importance and wiped out large areas of exportable fruit. In 1912 weevils were identified and since then they have carried on an insidious invasion and destruction of bananas and plantains. These maladies radically changed the industry from a main enterprise to a subsidiary one, for it was no longer possible to grow them in pure stands and mixed cropping under cacao was adopted. A slump in cacao came in 1930 and many growers thought fit to extend banana cultivations but this met with disaster. About this time Leaf Spot was first noticed and for four to five years it caused little alarm but in 1938 and onwards it assumed alarming importance and greatly affected the export trade.

All these diseases together with other factors have made banana cultivation so precarious as to dishearten and discourage growers from taking much interest in the crop. Resistant types exist but they are quite unsuited for exportation and only of use to meet local demands. However it is evident in the near future that a resistant variety of commercial importance will appear on the market.

2. PROPAGATING MATERIAL.

There are three types of planting material available to the planter. Firstly there is the underground stem called the 'Head' or 'Eye' which can be cut into several pieces and provided each carries a bud it will give a plant. This type of planting material is probably the best, for it has been observed to outgrow all others and to be the most reliable for dry season plantings. Secondly we have the sword sucker derived from a deep seated bud of the underground stem which is allowed to grow six or seven months before it is taken for planting. In the wet season this material does best planted as it is, but for the dry season it is best to
decapitate the plant so as to leave corm and about two feet of stem for planting. The third is a sucker derived from a surface bud which takes on individuality after its formation so that it develops very slowly. This type is usually discarded, but can be used if the other types are not available. Planting in the dry season is precarious unless the dry season is a wet one. The usual practice in Trinidad is to plant when or just before the rains come in June. Before planting the material should be trimmed so as to ascertain if the corm is harbouring Borers or Panama Disease. To control the former planters occasionally submerge their suckers in water for 4-8 hours prior to planting. Planting usually involves digging a hole of 18 to 24 inches cube, placing a mixture of soil and manure in the bottom and planting the sucker or corm over it. In the case of plantains replanting is often done yearly, giving the plants a new site to avoid weevil attack. Spacing depends largely on purpose of plantings, soil types and growers own personal views. For the reestablishment of cacao 6 x 6 to 11 x 11 spacings are used. All plantings in peasant gardens and holdings and between existing cacao follow no spacing pattern.

3. FERTILIZERS AND MANURES.

Growers recently stated that the 'choice banana' required by the Banana Marketing Board for exportation could only be grown on Virgin or well-manured soils and they grumbled at the penalty they suffered because they could not produce such a banana. It is true that Trinidad has no virgin soils left, but it is not beyond the scope of growers to produce a well-fertilized and manured soil. Yet they still adopt the method of utilizing native fertility of the soil with minimum treatments and when the soil deteriorates or disease incidence is so high as to reduce the crop to a certain point the plantation is abandoned. However, at planting, the banana sucker is usually provided with a basket full of pen manure to facilitate its establishment but beyond that further manuring or fertilizing is exceedingly rarely if ever carried out. Chopped up stems and trash are often placed at the base of the banana mats as a form of manure but recent work in the Canaries (2) classes this as having little significance because of the high solubility of the nutrients and subsequent leaching. The use of manures and mulches for cacao, the fall of cacao leaves, and the fall of immortelle leaves with a building up of a humus layer in the soil may well be sufficient to meet the needs of the banana. Similarly for peasant grown bananas household waste thrown into the garden may well indirectly supply nutrients. Weighing all these against each other we come to the conclusion that once the initial pen manure is used up a
tendency exists between plant success and failure so that the 'choice banana' is rarely produced. We must not be too hard on the grower because the crop is so riddled with disease that successful cultivation is a doubtful proposition but where it is possible to produce disease-free plants, Gros Michel and Plantains certainly warrant the expenditure of a few cents on a little fertilizer or manure.

4. DRAINAGE.

Soil drainage is probably the most important factor in determining success or failure of banana growth and cultivation in Trinidad. The literature (8) states that 3 to 3 1/2 feet of freely drained soil is required to enable banana roots to develop to their full and give successful cultivation. If the water table rises above this level root rots and physiological upsets are encountered. Moko disease is said to be one of these maladies encountered with high water table or waterlogged conditions. Soils of Trinidad are of a variety of types — well drained, badly drained and waterlogged. The Northern Range and the better soil types of the Central Range come into the first class, for they exhibit free drainage and present few difficulties to banana production. In the Central Range there are many soils that are impermeable but owing to their topography could be drained to give the attributes of a good soil. In Western and Eastern Trinidad where the topography is flat and fluctuating water table is encountered which may come dangerously close to the surface and even cause waterlogging. Here banana cultivation is restricted and plants growing on these soils suffer from 'Moko' Disease or plant failure. On the rather better sites Governor bananas grow quite well and predominate the area but to introduce taller growing varieties would necessitate extensive drainage of the soil.

5. SHADE.

The shade under discussion is that from cacao, immortelle tree and other bananas. From reports (9) based on Mr. Beausoleil's observations we learn that where an overhead canopy is provided bananas suffer from less Leaf Spot than they do growing in open situations. Here in Trinidad banana varieties fall into two groups, one that is susceptible to Leaf Spot and one that is highly resistant. As far as the former group is concerned this is a very important discovery and it has an important application, because this group consists of the bulk of the most edible varieties grown.
The latter group because they are resistant to this disease are of enormous value in supplying shade to cacao. Therefore we have two groups of banana varieties each having a special purpose for its cultivation; we have the edible varieties which are grown as a cash and catch crop filling in gaps of an established cacao plantation; and we have the resistant varieties that are used in pure stands for the reestablishment of new clonal cacao plants. To quote a few examples Gros Michel, Cavendish group, Sucrè, belong to the first group and Mysore, I.C.-2 and Green Red to the second. Too dense an overhead canopy causes adverse effects and reduces the rate of growth of the fruit as to give a miserable bunch or what is called "Shaded fruit". If the canopy and the banana shade are too sparse on the ground serious competition with undergrowth may also result in reduced bunches being formed. In order to strike an equilibrium pruning of the banana is carried out. This involves controlling the number of plants per unit area as to give maximum results.

6. HARVESTING AND MARKETING.

Bananas are harvested in two separate ways to meet two types of demand, namely the local and the export demands. For local demand fruit is sold green or ripe; the exactness of ripeness or grade is not necessary and therefore taken on a rather unskilled haphazard method. Local sales take place on street corners, from barrows or from stalls in the Government markets, e.g. Curepe, Tunapuna, Port-of-Spain.

In harvesting for the export market, skill and precision of the cutting time is paramount and calls for much knowledge and experience of the crop. The stage of ripeness and fullness are important in order that the fruit will meet the requirements laid down by the export grading board. The general method of harvesting especially adopted for export bunches requires two persons, one who cuts the stem high up whilst the other catches the falling bunches preventing them hitting the ground. The bunch is cut away, trimmed and stacked with trash so that no bunch is resting on or damaging another bunch. A truck from the Banana Marketing Board collects these bananas, taking care to minimize damage and transports them to the banana depot in Port-of-Spain where they are stored and weekly graded for shipment to the States.
1. DESSERT.

The pulp of the unripe banana and plantain (11) consists of much starch and tannins and whilst in the banana these principal constituents diminish progressively and simultaneously as to be only a trace when ripe, in the plantain they disappear very slowly and are quite appreciable even when the fruit is ripe. For this reason plantains are unpalatable and are not eaten as dessert.

Dessert bananas vary considerably in their palatability. This is a function of the composition of the pulp and we find a whole range of different tastes and flavours from very sweet in the Cavendish group to very acid in the Mysore. Texture also varies from a soft flour-like consistency to a hard sticky, cottony one. These different characters give us a range of local preferences reflected in the marketable price for each variety. At the head comes the Gros Michel and Giant Fig, followed by Governor, Sucrer, Silk and Bande, and then a drop to I.C.-2 and Green Red, with Mysore and Red bordering on unpalatability.

2. COOKING.

All bananas can be used in making soup; the fingers are cut into small chunks and boiled to give a quite delicious soup. The unripe banana and the ripe and unripe plantain are of a starchy composition and require cooking to make them edible. The unripe banana and plantain are usually boiled to make them soft, then either fried in strip form or mashed, to be eaten in both cases as a vegetable. Boiling in their skins is the usual procedure but in the case of Bluggoe, such a procedure would discolor the pulp so that skins are first removed. The ripe plantain and half-ripe or ripe bananas are usually fried without first being boiled and again used as a vegetable. Sucrer, Silk, Gros Michel and the Cavendish Group are all well liked and used generally throughout the island. Bande, I.C.-2 and White Fig are also well liked, but owing to their small distribution are only found in certain localities. Red and Mysore are rarely if ever cooked.

All plantains must be cooked before eating and a favourite dish is to boil and pound the plantain in a mortar for eating as a snack in the field. The ordinary plantains are favoured over the Bluggoe because the former sets quite hard whilst the latter remains relatively soft and jelly-like. In an effort to use soft rotting bananas local people mix them with eggs, milk, flour and a little spice, cook in a frying pan until well browned, sprinkle with sugar and eat them at tea as fritters.
Besides the fruit, the leaves find their uses in cookery for they take the place of the ordinary greased cooking tin. For example, cakes and puddings are placed in the oven wrapped in, or upon a piece of banana leaf for cooking or baking. Payme, a favourite pudding is cooked tightly wrapped in the banana or 'fig' leaf. Banana fibres are also used usually for tying wrappers around puddings etc. In general the banana is a very useful plant to the peasants and hence the reason for growing it in their backgardens.

2. STOCKFEED.

Surplus bananas are used for feeding to livestock, mainly pigs, but also to cows, sheep and goats. The fruits are fed in their skins, raw or cooked, when full green or ripe. Feeding raw when still green causes scouring of the stock, although a small dosage is said to have medicinal value in the case of pigs. Better milk yields from cows and goats and quicker fattening in pigs are claimed by using this crop. It is said that feeding a little salt especially when the fruit is still green improves palatability. Green Red, Red, Mysore and I.C.-2 are the main varieties used.

4. USES IN THE CACAO FIELD.

The most important uses made of the banana in cacao are concerned with shading and protecting young rehabilitated clonal cacao and filling in the blanks and producing saleable fruits. These two purposes are quite distinct and are dealt with separately.

(1) To fulfill the job of supplying temporary shade under which cacao can be reestablished calls for a variety that can be grown in pure stands without being decimated by disease. Therefore it must be highly resistant to Panama Disease and Cercospora Leaf Spot and at the same time be a rank vigorously growing banana which can stand fairly windy and drought conditions. These desired characters are to be found in the Mysore, I.C.-2 and Green Red, and we therefore find these varieties widely used for this job. Sucrier has been used from time to time but with disastrous results for it is both susceptible to Leaf Spot and very dry conditions.

The procedure adopted in establishing a pure stand of temporary shade is to plant healthy sword suckers in the wet season with a basket full of pen manure at spacings according to the soil and the planter of 6 x 6 to 11 x 11. The field is allowed to grow for 9 to 12 months, the bananas are pruned and cleaned up and the young cacao is planted between the rows of shade plants.
A regular pruning and thinning of the bananas is carried out as the cacao develops to maturity. At the age of 6 to 7 years the permanent overhead shade of immortelle takes over and the bananas are thinned out into small pockets where spaces or blanks occur.

(2) As the age of the cacao increases, the number of gaps and blanks also increase, and to prevent insect damage, control undergrowth and reduce the scorching rays of the sun on the cacao, these spaces must be filled. Bananas are widely used for this job and as well as militating against these factors they act as a catch crop producing saleable fruit. Good edible varieties susceptible to the major disease can be used because these small blocks are so isolated and well shaded as to reduce greatly Panama Disease and Leaf Spot attack. From these areas come the majority of the exportable and marketable varieties and it is on these sources continued supplies rest...

(3) Many growers utilise the leaves of the banana for forming large mats (14 to 20 leaves/mat) between the cacao trees onto which they shell their cacao beans. Leaves are also used to line sweat boxes and in general they are useful for lining or covering floors, boxes, baskets, heaps of coffee and cacao etc.

(4) The fibre from the midrib and leaf sheath is a source of string for tying up bundles, cacao plants, etc.

(5) Young banana shoots (3" to 4" diameter) are cut into 2' to 3' lengths dried and 6 to 8 are tied together to form a mule or donkey pad on which quite heavy baskets and loads can be carried.

(6) Fallen stems, dead leaves and banana wastage are used for mulching around the base of the cacao trees. It supplies a certain amount of nutrient and prevents excess leaching and drying out of the soil. One planter goes as far as to say that the banana is a safeguard against drought on cacao plantations, for in a very dry season the banana can be stripped of its leaves and chopped down and the whole laid over the surface of the ground to prevent excess evaporation and dessication of the surface layers.

5. EXPORT.

Exportation of bananas from this colony started about the beginning of this century and by 1907 there was built up a young export trade of Gros Michels and the beginnings of an export trade in Dwarf Governor. However the latter required a special technique of crating before shipment and although it reached a figure of 10,770 crates
in 1908, by 1910 it had vanished.

Meanwhile Gros Michel exports increased rapidly but in 1911 it began to decline and in 1914 a shipment of 63,563 bunches saw the end of the trade for several years. Probably this was the combined effects of war, difficulties in marketing and Panama Disease. Feeble attempts of exportation between 1925 and 1928 amounted to 223 bunches leaving the colony. In 1934 the production of bananas for exportation received encouragement through the constitution of the Banana Board which contracted with the Canadian Banana Company for the sale of all marketable Gros Michel bunches at a fixed price. Consequently there was a great increase in banana acreage partly due to the clearing of cacao and immortel tree but this was disastrous and the pure stands succumbed to a new disease, Leaf Spot. Exports had risen from 2,096 bunches in 1932 to 157,076 bunches in 1937, and up to this time Leaf Spot had been building up but had not made its effects known. However in 1938 and onwards exports dropped as the disease took on epidemic form.

War came in 1939 and banana exports were down very low and later the colony turned over to importing them from other West Indian colonies and Venezuela. After the war (1945) exports began to climb again and they have risen from 499 cwt to 7,942 cwt in 1949.

The future of the industry is very unstable and until the College produces a banana that is both resistant to Cercospora Leaf Spot and Panama Disease, the industry will remain a very haphazard affair and will make no great advances.
6. PESTS AND DISEASES.

1. FUNGAL DISEASES.

(a) PANAMA DISEASE.

This disease is caused by Fusarium oxysporium cubense. A typical plant first shows a yellowing of the lower and outer leaf blades and petioles. The change from green to yellow is usually sudden and startling. The leaves begin to wither and within a day or two the fleshy leaf buckles at a point 3 to 4 inches from the pseudostem. The withered leaves brown and finally the plant, weakened by disease, falls to the ground. Where bunches are formed these remain small and often become arrested after only a few hands have been formed. In some instances there is a dwarfing or stunting of the entire plant and all subsequent stems, so that it never reaches the bunch stage before it topples over.

This disease has been a menace to the banana industry in Trinidad for over half a century and is probably as bad if not worse than it was in the earlier years of this century. In 1912 Rorer reported that bananas were so susceptible to the disease that they were not planted to any extent save as a catch crop and shade for young cacao. This statement holds for the present day.

In 1914 Panama Disease was stated to be a limiting factor to Gros Michel exports and growers were urged to use healthy suckers and avoid using infected mulches and soils. Today nearly 40 years later the disease is still uncontrolled and rampant, existing in all Trinidad soil. There are many resistant varieties but none have the desired attributes of Gros Michel to replace it as an export crop. Of locally important varieties only silk is attacked and therefore this disease does not constitute a serious menace to local supply.

(b) LEAF SPOT.

According to Dr. Wardlaw (13) the first indications of Mycosphaerella musicola infection is the appearance of light brown-green indistinct linear markings from one-eighth to three-eighths of an inch long, lying parallel to the veins of the leaf. The spots subsequently increase slightly in size and dry out somewhat, forming dark muddy brown to black linear oblong to elliptic areas (up to \( \frac{1}{2} \) inch in length and one-third of an inch wide). When the spots remain small, little damage is done, but more frequently the tissue around the spots begins to enlarge and die rapidly. Coalescing dead patches are formed so that the leaf is more or less completely destroyed and
this rapid destruction renders the disease very serious. The effects on the fruit are indirect. Mature bunches fail to ripen properly whilst immature bunches remain undersized and although their flavour is normal, their small size tends to make them unmarketable.

Dr. Wardlaw (14) first noticed this disease in the Maqueripe District in 1933 where it was occurring on Giant and Dwarf Governor, apparently causing no ill effects. Plants were chopped down and burned in an effort to eradicate the fungus but these precautionary measures did not halt the disease and by the end of 1934 it became evident that adjacent plots were infected. From this time onwards it became apparent that Leaf Spot was generally distributed throughout the island, having presumably spread from several foci of infection.

By 1936 its effects were being felt for it was observed that the older stands of plants had a greater intensity of infection causing much premature ripening. In 1938 exports dropped and by 1939 a general distribution through the colony in epidemic form put exports right down.

Today the effects of this disease are serious and besides Gros Michel being seriously attacked, so are most of the best local varieties; however it has been observed that whilst pure stands of bananas in the open suffer greatly from the disease, bananas grown where the amount of sunlight is reduced either by topographical features or by overhead canopy or natural shade, the incidence is less and so we find flourishing Gros Michels and local varieties growing in cacao. So long as bananas remain a catch crop between cacao, the disease can be reasonably controlled and loss need not be high, and pure stands can be completely written off unless a resistant variety be introduced or an expensive spraying technique evolved.

N.B. Cordona musae also causes a Leaf Spot on bananas but it differs in that it never coalesces and it takes on a silvery appearance and is of no economic importance.

(c) FRUIT ROTS. (12)

There are many rather important fruit rots present on bananas in Trinidad. (a) 'Diplodia' caused by Bolryodiplodia theobromae. This causes the rachis to rot, the fingers to drop off, the fruit to become spotted and the finger tip to rot. The pulp is rendered soft and pulpy and semi-liquid, while the skin goes a dark colour and wrinkles. This disease is common in the local markets and on stored bunches.
(b) ‘Cigar end’ (Stachylidium theobromae) causes the pulp to dry out and become hard. Found on stored and marketed fruit.

(c) ‘Antracnose’ (Gloeosporium theobromae) causes a blackening and rotting of the fruit in the market or in storage. Its incidence is proportional to the handling and bruising of the fruit and for this reason exportable Gros Michels are handled with care.

(d) ‘Black Tip Disease’ (Helmetosporium torulosum) has been observed on the Cavendish Group of bananas in many parts of the island, causing a gradual blackening of the finger. Fortunately it is very rare and does no serious damage to the pulp.

(e) Pitting and spotting caused by multiple of organisms (Fusarium, Pericicularia, Cephalosporium) occurring in the field on Dwarf Cavendish and Gros Michel. The disease has no economic importance.

From the export angle and local marketing these fruit rots are quite important, for they are the result of careless handling, overripeness etc. In the field they are of no significance.

2. BACTERIAL DISEASE.

MOKO DISEASE.

In 1890 this disease was supposed to have almost wiped out the Moko plantain as shade to cacao in the Central Range. Rorer(1) in 1910 described the disease as a successive wilting, yellowing and breaking down of leaves until none remained standing. The organism Bacterium solaniierum (1) enters the root system either by a root rot or through a pore, by transpiration suction it is drawn into the corm and thence to the stem and fruit. It causes a discoloration or brown freckling of the tissues especially the vessels from roots to fruit. Cutting across such an area of discolouration causes a dirty white to brown bacterial slime to ooze out.

The disease is associated with poor drainage, high water table and also low nutrient status and poor soil aeration. Such conditions are found around Sangre Grande and valleys of the Central Range and that is where Moko exists. All varieties are attacked, although some show resistance and do not suffer quite so badly. In all the fruit if formed is completely ruined. On the whole it is not a disease of major importance and rather indicates bad husbandry or unsuitable soils.
3. INSECT PESTS.

(a) WEEVILS OR BORERS (COSMOPOLITES SORDIDUS) (7)

This pest was first noticed in Trinidad by Rorer in 1912 when he found it attacking all banana varieties and being particularly destructive to plantains which it wiped out in many localities 12 to 13 years later.

The damage is done by the larvae making irregular tunnels inside the corm, interfering with the translocation of nutrients to the upper parts and weakening the support of the plant so that it is more liable to be blown over. First signs of such an attack are seen by the leaves withering and yellowing. As the generations and populations increase water and nutrient supply becomes severed and the plant dries out, rots and topples over.

The adult is a typical weevil about 11 mm. long and of a dull brown to black colour. In habit it is very sluggish, with the consequence it spreads slowly and tends to be found in pockets which insidiously increase concentrically. Symptoms resemble Panama Disease and probably because of this it has been ignored and allowed to spread when it could have been controlled.

This insect is a major pest in neglected or semi-neglected cultivations especially in old cacao plantations but under high cultivations, even an attack does not prevent the banana bearing fruit. The plantain is a less vigorously growing plant and suffers severely under all conditions if attacked; for this reason a special technique of transplanting to a new part of the cacao plantation has been evolved. Good sanitation and common sense methods are sufficient to control the pest; for example, chopping up old fallen stems, removing attacked ones and using unattacked planting material. Some growers claim that immersing suckers in water for 48 hours destroys the weevils. However in Fiji (10) it appears that the weevil larvae can survive 4 days immersion, at which stage the sucker itself is destroyed. By having the necks of the suckers projecting out of the water the sucker will survive for 21 days by which time all larvae perish. Traps may be made from slices of banana corms placed under a small shelter. These must be changed very regularly and weevils found in them, killed and the old pieces of corm which are likely to contain eggs must be destroyed or chopped into very small pieces so that they dry out. If not regularly inspected traps constitute a danger as they provide breeding places for the insect.

Recently a Historical Beetle (Phaesius javanus) was introduced to Trinidad in an attempt to establish a biological control of the weevil but the beetle has only
been able to hold the weevil in check, but together with cultural methods the weevil can be controlled.

(b) LESSER IMPORTANT INSECTS. (7)

A species of thrips (Franklinella spp.) causes a spotting of fruit by laying its eggs in the outer tissue but apart from lowering the exportable value of the fruit, this insect is of little significance in Trinidad.

A stingless bee (Melipona spp.) very occasionally damages the appearance of the fruit by piercing and sucking it, but it is of negligible importance.

Large Sugar-cane Moth larvae (Castnia) have been reported boring into banana stems but only very occasionally when bananas are grown near cane.

Trinidad has a potential pest which is very common. This is the Banana Aphid (Pentalonia negronervosa) which in Australia is the vector of a very important virus disease, Bunchy Top. If this virus was introduced to Trinidad it could become a very serious disease; however stringent regulations are in existence to prevent such an occurrence.
In Trinidad there are twenty varieties and subvarieties of bananas and plantains, the majority of which fulfill an important function in the island's economy. Ecologically Trinidad is suited to banana cultivation, although wind and soil impermeability if not alleviated can constitute limiting factors. Cultivation of the crop does not come up to the required standards and improvements could be achieved by better drainage and the use of fertilizers and manures. Besides being a commercial and local fruit and vegetable, it finds important application in supplying shade to cacao. The lack of interest shown in its cultivation are the results of a series of disease attacks over the last fifty years starting with Moko Disease, Panama Disease, weevils and finishing with Leaf Spot.

The future of the crop rests in the hands of the banana breeders in producing a variety resistant to all these diseases and with the desired attributes of a commercial banana.
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