AN ENQUIRY INTO THE PRACTICE AND MANAGEMENT PREVALENT IN A SELECTED GROUP OF PEASANT HOLDINGS IN THE COUNTY OF CARONI.

by

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CONTENTS

SECTION I.
Introduction 1
Review of Literature 2
Choice of Area 3

SECTION II.
Agricultural History of Area 6
People 6
Topography 6
Climate 7
Soil 8

SECTION III.
Methods 18
Crops 19
Markets 31
Livestock 31
Manuring 33
Irrigation 33
 Implements 34
Labour 34
Rotations and Mixed Cropping 35
Pests and Diseases 36

SECTION IV.
Summary 40
Conclusion 42
Acknowledgements 42
Bibliography 43

APPENDIX I.

APPENDIX II.
SECTION I.

INTRODUCTION.

A group of three students, working as a team during the 1939 to 1940 session, made a critical study of the Agriculture carried out by peasants on small mixed farms in an area in the County of Caroni. The group was divided into an Agriculturist, Economist and Botanist.

The Agriculturist enquired into the characteristics of the soils of the area chosen for the survey and their erosion problems, noting any natural practices and customs which help to frustrate the latter. Enquiries were made into the crops grown and their proportions, the methods of cultivation and times of operations, the number of stock kept and how handled, the implements used and dates of operation and the extent to which hand labour was relied on. The mixing of crops and rotations followed with the intercrop cultivation were enquired into as well as irrigation, labour problems and damage caused by pests and diseases to crops. The Economist studied the economic organisation of the area (markets, transport, labour and tenancy), the factors which influence the profitability or otherwise of holdings of various sizes, and social questions of economic importance. The Botanist studied the normal flora and how altered by cultivation, the plant succession in resting areas and the dominant weeds. He found out what plants, if any, could be used as cover and restorative crops, the advisability of seeding down land to them prior to abandonment and the reasons for the adoption of any particular varieties of a crop.

The dissertations of the group of students must be read together to obtain an accurate picture of the agriculture carried out by peasants on small mixed farms in the area studied. It must be emphasised that the information contained in the dissertations of the Agriculturist (the writer) and the Economist (P.H. Akehurst) must overlap; a clear picture of the agricultural and economic
status of the farms can only be obtained by studying these together.

The agricultural information, as well as the economic, was obtained with the help of questionnaires. The difficulty of obtaining reliable agricultural information must be stressed. The statements of farmers had to be checked by observation in the field and where this was impossible by numerous questions approaching the point from all directions. The inaccuracy of the yield data secured must be emphasised, because no peasant kept any record of crop yields and in the case of 'Garden Crops' harvesting is carried out over a period of time (months in the case of Cassava and Pigeon Pea) for his own consumption.

REVIEW OF LITERATURE.

There does not exist a published paper or papers dealing with the practice and management of a group of Peasant Holdings in the West Indies. There are, however, published reports of Surveys carried out in East Africa by members of Departments of Agriculture. These, together with information on the Land Settlements Surveys of Antigua, Nevis and St. Vincent, were of great assistance in devising a suitable Questionnaire for this survey.

T. R. Hayes in his paper on 'Agricultural Surveys in the Eastern Province of Uganda' (1) discusses the actual technique used in conducting the surveys in that country. The choice of an area is of great importance; it should be away from outside influences, the natives should be intelligent and the area should not be of an unmanageable size. He emphasises that all information obtained should be checked as far as possible; very often it may be inaccurate owing to the native's desire to please or fear of the consequences should the truth be told. A preliminary survey is recommended from which the investigator obtains information useful in checking the statements of the people, and during which time he becomes acquainted with them. The Questionnaire deals
with the Agricultural, Economic and Social life of the inhabitants of the area. Any other information should be added, that may be considered essential to make the survey as comprehensive as possible.

J. D. Tottill in his report on 'Nineteen Surveys done in small Agricultural areas in Uganda' (2) states that the main result of these was to classify the areas surveyed into overpopulated, balanced and underpopulated categories. The reports of these resulted in the collection of information regarding the densities of population, the position of livestock, building and water supplies, the division of labour and their methods of agriculture.

C. C. Skeete in his report on 'the Condition of Peasant Agriculture in Barbados' (3) describes systems of farming practiced by the peasant in that Island. He enumerates the difficulties of the peasant who attempts to undertake farming his holding as an economic proposition; theft of produce in the field may lead to abandonment of holdings, lack of any facilities for marketing results in hawkers underpaying the peasant for his produce in the field. Labour demands higher rates of pay for working on small holdings, and finally legislation and climate restrict the crops that may be grown in any one area.

CHOICE OF AREA.

For the purpose of this investigation, an area of small mixed farms had to be found in the County of Caroni. With the help of Mr. A. J. Alexis, Agricultural Assistant of the Department of Agriculture, six possible areas in the County were visited:

1. Cacandee area.
2. Orange Field Road area.
5. Madras Settlement.
6. Todd's Road-Ravine Sable area.

1. The Cacandee area is situated to the north-west of Chaguanaus on the alluvial flats bordering on to the Caroni swamp. Todd's Road and north-east of Longenville being one such area.
Rice is the main crop grown. Small quantities of roots and vines are grown in the immediate vicinity of the peasants' houses. This area was unsuitable owing to the lack of variety in the crops grown and the flora, the scarcity of livestock, the smallness of the area and the influence of the village of Chaguanas a short distance away. In con land varying from a mountain to flat land suit in

2. The Orange Field Road area is situated between Freeport and Carapichaima in broken country. In the swampy hollows rice is grown. The main crop is sugar-cane. In the last two years, however, the peasants have turned to the formation of gardens (on land previously in sugar-cane) in which maize, cassava, peas, with other roots and vegetables are grown. These are too recent to obtain reliable agricultural and economic data, the flora lacked variety, the area tended to be too small and there is every probability that the land in gardens will revert to sugar-cane because of increased sugar production owing to the war. For these reasons this area was regarded as unsuitable.

3. The Calcutta Settlement is situated between Freeport and Couva in slightly undulating land. Sugar-cane and garden crops are grown. This area was regarded as unsuitable owing to the poorness of the holdings inspected and to the reticence of the peasants.

4. The Mota Land Settlement was next visited. This is a recent land settlement made by the Government near Tabaquite. 14 acres out of the settlement's 60 acres have been occupied and planted in fruit trees, cassava, sweet potatoes, tonka beans etc.; the rest of the settlement is in bush and forest. A survey of this area was out of the question because of its smallness and recent origin.

5. The Madras Settlement is situated on either side of the Madras Settlement Road near Cunupia. This area proved most unsuitable owing to its small size and lack of crops.

6. The Todd's Road-Ravine Sable area is situated north of Todd's Road and south-east of Longdenville being more than one
square mile in extent. Four soil types are represented, and to
the north, east and west, forest and bush occur giving place to
cultivated land permitting the study of the flora as affected by
soil and cultivation. The main crops are cacao and sugar-cane.
Maize and cassava, and to a lesser extent peas and other garden
crops, are grown on land varying from a quarter to over three acres
in extent. Fruit trees occur throughout the holdings and some
livestock is kept. The inhabitants appeared to be singularly
communicative as compared to those in other areas visited. The
holdings vary from less than one acre to more than forty acres,
enabling an estimate to be made of the most economical size and
type under the existing conditions of climate, soil and agricul-
tural practice. It was decided, because of the above considerations,
that it was the most suitable of the six possible areas, in the
County.

The area, at the present time, is partly in cacao, partly in
sugar-cane, and partly in ground provisions and fruit trees. Natural
forest and bush occur to the east, north and west of the cultivated
land.

The County of Caroni has a population of two hundred and
thirty-nine to the square mile. The inhabitants of the area are over
in the past, the East Indian and the negro. 80% of the present
intermarried are East Indians, the remainder 15% being Negroes.
Both East Indians and Negroes were communicative, giving whatever
information was required to the best of their ability. The only
apparent difference in form, arising from differences in race, was the
fact that no East Indian kept pigs. This is due to the dictation
of their religion according to information received from two East
Indian farmers. As a general rule, from field observations, it
may be hinted that the East Indian farmer is more industrious, hard-
working and intelligent as compared with the Negro farmer in this
area.
AGRICULTURAL HISTORY OF AREA.

The agricultural history of the area is similar to that of many others in Trinidad. Thirty years ago it was covered in forest. Peasants filtered into the area, the forest was felled and cacao with shade was planted. The cacao flourished, prices were high, and ample returns were obtained. The yields gradually decreased on the advent of Witches Broom disease. In the meantime, cacao on the alluvial flats and hillsides, where the yields became uneconomic, was cut down and planted in sugar-cane. More cacao, in recent years, has been felled and the land, either planted in ground provisions, or established in fruit trees and coffee. At present, small areas of forest are being felled, burnt and planted in ground provisions. Lasetro (land abandoned to bush) is brought into cultivation for ground provisions or sugar-cane.

The area, at the present time, is partly in cacao, partly in sugar-cane, and partly in ground provisions and fruit trees. Natural forest and bush occur to the east, north and west of the cultivated land.

PEOPLE.

The County of Caroni has a population of two hundred and thirty-nine to the square mile. The inhabitants of the area belong to two races, the East Indian and the Negro. 55% of the peasants interrogated were East Indians, the remaining 45% being Negroes. Both East Indians and Negroes were communicative, giving whatever information was required to the best of their ability. The only apparent difference in farms, owing to differences in race, was the fact that no East Indian kept pigs. This was due to the dictates of their religion according to information received from two East Indian farmers. As a general rule, from field observations, it may be stated that the East Indian farmer is more industrious, hard-working and intelligent as compared with the Negro farmer in this area.
TOPOGRAPHY.

The Todd’s Road-Ravine Sable area is situated in the northern half of the county of Caroni and south-east of the village of Longdenville. The designated area is that land bounded by Todd’s Road in the south, the Government railroad in the west and the hills north of the Ravine Sable valley in the north, (see map). Its area is approximately one and a half to two square miles; its shape is roughly that of a rectangle with one corner removed.

The chief topographical features are (1) the clay flats of the Cuparo valley in the south; (2) a range of hills running through the centre of the area and rising to over two hundred and fifty feet; (3) the Ravine Sable valley; (4) the hills to the north of the Ravine Sable valley which rise to more than two hundred and fifty feet in the north-west.

As can be seen from the map, most of the land in the area lies above the one hundred foot contour line. The two ranges of hills that occur are spurs of the Central Range of the Island. These ranges run approximately from east to west resulting in the surface drainage flowing to the north and to the south. The sides of the two ranges are much broken by small valleys with steep sides which, on clay soil, frequently give landslips on cultivation in wet weather.

The area is well served by roads and traces. A road, suitable for car and lorry traffic, runs up the Ravine Sable valley for more than three miles. Another road, suitable for cart traffic only, joins the Ravine Sable road with Todd’s Road, the latter connecting up with the Cuparo Valley main road. Four other traces occur suitable for cart traffic. These roads and traces provide the peasant with an easy means of transporting his saleable produce to market.

The area, as previously stated is bounded on the west by the government railroad. Two railroad stations serve the district: one is situated near the western end of the Ravine Sable road and
ROUGH SOIL MAP OF TODD'S ROAD DISTRICT.

LEGEND.

- Valencia Sand
- Piarco Light Sand
- Talparo Clay
- L'Ebranche Clay-Silt
is within easy reach of the peasants domiciled in that valley; the other is at Todd's Road and serves the rest of the area.

Owing to the presence of roads suitable for lorries and carts, and to the government railway, the peasants are within easy reach of the Chaguanas and Port of Spain markets. The Chaguanas market is about seven miles by road from both Todd's Road and the end of the Ravine Sable motor road; The Port of Spain market is about twenty-four miles by road from both Todd's Road and the end of the Ravine Sable motor road; it is also about twenty and three-quarter miles by railroad from Todd's Road station.

CLIMATE.

The climate of the area is wet and humid, similar to that of the Central Range of Trinidad of which it is a part. The district lies in the 70" to 60" rainfall belt. There are four distinct seasons, two wet and two dry. The rains begin in May and continue to September, towards the end of which a short dry season occurs, the Indian Summer or 'Petit Careme'. A rainy season follows and then a dry, lasting from the end of January to May.

SOIL.

The soils in the district surveyed belong to four soil types namely, Valencia Sand, Piarco Light Sand, Talparo Clay and L'Ebreanche Clay-Silt, the last being an alluvial soil, according to the most recent scheme of classification provisionally suggested by Dr. E. M. Chenery, 'A Provisional Classification of the Soils of Trinidad,' (5), by F. Hardy. These types are shown and differentiated on a soil map (inset).

It must be emphasised that the soil map is inaccurate, especially with regard to the boundaries of the soil types. This inaccuracy is accounted for by the lack of a reliable soil map or data for the area, and of time and road facilities which did not
A PROFILE OF THE PIARCO SAND.

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<tr>
<td>CAX292</td>
<td>Compact hard sand.</td>
<td>3&quot;</td>
<td>45.9</td>
<td>14</td>
<td>4.8</td>
<td>3.8</td>
<td>2.38</td>
<td>0.09</td>
<td>14.8</td>
<td>34</td>
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<td>293</td>
<td>Similar; crumbly.</td>
<td>6&quot;</td>
<td>45.2</td>
<td>14</td>
<td>4.8</td>
<td>3.8</td>
<td>1.91</td>
<td>0.08</td>
<td>14.1</td>
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<td>294</td>
<td>Similar; fewer roots.</td>
<td>9&quot;</td>
<td>44.0</td>
<td>15</td>
<td>4.9</td>
<td>3.8</td>
<td>1.40</td>
<td>0.08</td>
<td>10.7</td>
<td>17</td>
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<tr>
<td>295</td>
<td>Transition.</td>
<td>12&quot;</td>
<td>40.6</td>
<td>17</td>
<td>4.9</td>
<td>3.7</td>
<td>1.00</td>
<td>0.06</td>
<td>10.0</td>
<td>18</td>
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<td>296</td>
<td>Red, concretionary, spotty.</td>
<td>15&quot;</td>
<td>39.1</td>
<td>25</td>
<td>4.7</td>
<td>3.7</td>
<td>0.90</td>
<td>0.06</td>
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<td>297</td>
<td>Red-spotted; crumbly.</td>
<td>24&quot;</td>
<td>34.9</td>
<td>28</td>
<td>4.7</td>
<td>3.7</td>
<td>0.64</td>
<td>0.05</td>
<td>6.8</td>
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<td>298</td>
<td>Broad red mottled.</td>
<td>36&quot;</td>
<td>25.9</td>
<td>35</td>
<td>4.6</td>
<td>3.7</td>
<td>0.34</td>
<td>0.06</td>
<td>3.3</td>
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<td>299</td>
<td>Transition.</td>
<td>42&quot;</td>
<td>19.7</td>
<td>34</td>
<td>4.6</td>
<td>3.7</td>
<td>0.23</td>
<td>0.06</td>
<td>2.3</td>
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<td>300</td>
<td>Yellow-brown, red spots.</td>
<td>48&quot;</td>
<td>20.5</td>
<td>33</td>
<td>4.7</td>
<td>3.7</td>
<td>-</td>
<td>-</td>
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<tr>
<td>301</td>
<td>Grey; orange smears.</td>
<td>56&quot;</td>
<td>27.3</td>
<td>29</td>
<td>4.5</td>
<td>3.7</td>
<td>-</td>
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<tr>
<td>302</td>
<td>Orange smeared sand.</td>
<td>66&quot;</td>
<td>59.6</td>
<td>18</td>
<td>4.7</td>
<td>3.7</td>
<td>-</td>
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<tr>
<td>303</td>
<td>Grey; orange.</td>
<td>72&quot;</td>
<td>60.8</td>
<td>10</td>
<td>4.6</td>
<td>3.7</td>
<td>-</td>
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<td>304</td>
<td>Cemented floor.</td>
<td>-</td>
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N. B. This profile was sampled by Prof. Hardy et al., the samples being taken at the ten and a half mile post on the Southern Main Road.
permit the checking of the boundaries of the soil types in detail.

On the map (inset) four soil types are shown:

Valencia Sand
Piarco Light Sand
L'Abranche Clay-Silt (Alluvium)
Talparo Clay

Valencia Sand.
This is characterised by free drainage and a deep water-table. It is derived from non-calcareous parent materials. The soil is a loose sand developed from a white or red-stained sand of recent geologic origin. The internal and external drainage is excellent. The topsoil varies in colour from grey to black in the surface layer, to a reddish-yellow or grey in the deeper profile. The soil type is characterised by having a low or unsatisfactory lime and plant nutrient status owing to leaching, indicated by red staining caused by dehydration of ferric oxide.

During the course of the survey, a roadside cutting was examined giving a profile of approximately five feet in depth. In it, irregularly spaced, wavy bands, one quarter to one inch in thickness, dark red in colour, were observed throughout the depth of the profile. These bands appeared to consist of sand particles bound together by dehydrated ferric oxide (probably haematite) forming hard impervious material, similar to an 'iron-pan' or ironstone, difficult to crush between the fingers and surrounded by a loose sand. A possible explanation of these bands may be either that the sand was laid down under water, being raised periodically only to sink again, or that it was laid down by wind with the addition of fresh layers from time to time. In either case, when the surface became exposed to climatic weathering agents, dehydration of iron oxides occurred, resulting in the formation of cemented bands.

Piarco Light Sand.
This soil type shows partially impeded drainage, caused by
impervious or slowly permeable clayey substrata and intermittently high water-tables. The parent material is a non-calcareous, yellow-stained clay of recent geologic origin. The external drainage is satisfactory though variable. The topsoil ranges from black to brown to grey sand, passing downwards into a mottled clay parent material. In the upper part of the mottled clay, crimson colours usually predominate, gradually giving place downwards to yellow. This transition in the mottled clay layer from crimson to yellow indicates impeded internal drainage, favouring the formation of dehydrated ferric oxide (haematite giving crimson colours) in the upper half, and hydrated ferric oxide (limonite giving yellow colours) in the lower half. The lime and plant nutrient status is low and very unsatisfactory (see profile data).

L'Ébranche Clay-Silt

This shows partially impeded drainage, caused by impervious or slowly permeable substrata and intermittently high water-tables, as in the case of the Piarco Light-Sand. The parent material is non-calcareous river alluvium of recent geologic origin. The external drainage is satisfactory, but the soil tends to be impervious after heavy rains, and in the dry season cracks develop at the surface. The soil is a silty-clay with a pale brown topsoil and an olive-green subsoil which is often streaked with orange at the transition zone between the top and the subsoil. The lime, humus, phosphate and potash status are satisfactory while the nitrogen status is very satisfactory (see creation).

Talparo Clay

This soil shows impeded drainage caused by an impervious compact clay topsoil. The parent material is a non-calcareous, blue-grey siltstone of Pliocene-Miocene age, giving a clay type of soil. The external drainage is generally satisfactory, but the internal drainage is unsatisfactory. The most striking feature of this soil is the reddish mottled appearance of the subsoil. The
Topsoil is brown to salmon-red, passing downwards into a red-mottled grey subsoil giving way to the blue-grey parent material, often rusty-stained and containing ironstone concretions. Gypsum usually occurs in the subsoil or parent material in pockets or veins. During the rainy season, the topsoil is generally completely saturated with water. This allows percolation to take place only after the topsoil has cracked, ceasing when the compact structure is regained. The nutrient status is low. The nitrogen status may be satisfactory, but lime and plant nutrients are usually deficient in amount.

**Productivity.**

By the term productivity is implied the inherent capacity of the soil to produce crops without intensive manuring or drainage.

1. **Garden Crops.** They require certain conditions for the realisation of maximum production. A continuous and well regulated water-supply is essential, together with a free-draining soil, an abundant reserve of plant nutrients, especially humus, lime and phosphate, and a ready market not too far away. The L'Esbranche soil type may give high yields of root crops for some time without manuring and with drainage. The Valencia, Piarco and Talparo soil types often produce good yields of corn, cassava and sugar-cane for one to three years after the felling of the forest. Yields rapidly deteriorate, becoming low to very low as the nutrient supply obtained from the ashes of vegetative material after burning is leached away, and the topsoil, with the humus supply, is lost through surface erosion.

2. **Cacao.** The soil requirements for the successful production of cacao are similar to those for garden crops. A wider tolerance of unsatisfactory drainage conditions is generally found. The cause of the high productivity of the L'Esbranche soil type is probably because of a favourable water-supply and suitable atmospheric environmental conditions, since chemical soil analyses do not reveal an unusually high plant nutrient status. Cacao grown on the Talparo Clay gives low yields because of the low nutrient
status and unsuitable physical properties of the soil (landslips, waterlogging in the wet season followed by intensive cracking in the dry, contribute to its low productiveness). The Valencia and Piarco soil types exhibit very low productivity. This is explained by lack of essential nutrients and susceptibility to drought in the free-draining Valencia Sand. In the Piarco Light Sand, it is attributed to waterlogging because of the bad internal drainage and to lack of nutrients.

3. Coffee. The soil requirements for coffee are the same as those for cacao. Coffee thrives well if interplanted with cacao without reducing the yield, unless the coffee is too thick so as to produce too much shade. Overshading causes higher relative humidity, as a result of which a saturated atmosphere occurs more frequently. A greater incidence of Witches Broom and Black Pod diseases may occur, as the spores of the fungi causing these diseases require a saturated or nearly saturated atmosphere for germination.

4. Sugar-cane. The requirements for sugar-cane are the same as for cacao, except that more attention must be paid to the lime requirement and nitrogen supply. Provided the lime status of the soils of the L'Ebranche soil type is satisfactory, it will exhibit very high productivity. The Talparo clay exhibits low productivity to sugar-cane because of the lack of nutrients and unsuitable physical properties of the soil. The Valencia and Piarco soil types both exhibit very low productivity because of the lack of nutrients and unsuitable water relations (drought or waterlogging).

5. Coconuts. They require a free-draining soil with a continuous fresh water-supply and the total absence of stagnant water. A balanced nutrient supply is necessary with the absence of excessively high alkalinity. These conditions are most frequently found in the proximity of coast lines. The L'Ebranche soil type exhibits a low productivity because of the unsuitable drainage conditions. The Talparo, Piarco and Valencia soil types exhibit
very low productivity by reason that the Talparo and Piarco soil
types lack nutrients and have very unsuitable drainage conditions
resulting in waterlogging, while the Valencia soil type lacks
essential nutrients and is very susceptible to drought.

6. Citrus. Citrus requires an adequate water-supply and
suitably balanced and abundant nutrients. Calcium is required for
quality. Portugals, however, on soils of the Talparo and Valencia
types appear to give quite satisfactory yields under conditions
of low nutrient status and inadequate drainage. Oranges grown
on soils of the Talparo, Valencia and L'Ébranche soil types give
good yields under similar conditions.

7. & . Tonka-Bean and Cashew-Nut. These thrive on well-
drained, acidic soils. Yields are uncertain unless a balanced
manurial treatment is applied with nitrogen and potash dominant.
These crops appear to do best in the soil phases of the Valencia
type which are free-draining. From observation, their yields appear
to be satisfactory without manuring so long as, in the case of
Cashew-Nut, the trees are not attacked by cacao Thrips, causing
defoliation and flower shedding. On a plantation scale, manuring
would be essential.

Erosion.

The erosion problem is serious in the area under investigation.
Many instances of the reduction of crop yields as a result of erosion
were observed. It was found that erosion was most serious and
conspicuous on soils of the Talparo and Valencia types. It did
occur, however, on soils of the L'Ébranche and other types, but
to a lesser extent. In Talparo clay erosion was very marked.
Seven large landslides on soils of this type were found in the
area. These had occurred in very wet weather. The Talparo soil
is very prone to land-slip, which truncates the profile exposing
the subsoil or parent material. The estimated area of the individual
slides varied from two acres to six acres. When these slides
occured on a single holding, they rendered a large percentage of
the peasant's cultivable land unfit for use because of the loss of topsoil and infertility of the subsoil. The crops growing on this land before it slid—cacao and cane—were lost. Surface washing, also, may remove the yellow-brown topsoil, exposing the infertile salmon-red subsurface soil or subsoil.

Erosion is also very marked in soils of the Valencia type. This soil type is naturally very prone to erosion and requires very careful handling. The soil is subject to surface-washing and gully eroding. In the area, this type is found frequently on the tops of ridges overlying soil of the Talparo type. When forest or laestro growing on Valencia Sand are felled and burnt, considerable surface-washing occurs before the crops that are to be planted cover the ground; felling and burning usually takes place at the beginning of the rainy season in May. If Maize and Cassava are planted or any other garden crops that are grown in the district, surface-washing takes place even after the plants are well grown. In fields of bearing cacao, erosion by surface-washing and gully eroding is very apparent. This surface-washing is dependent on the saturation of the soil with water, the slope of the land, the clear felling and burning of the land, mal-practices of cultivation and the absence of any anti-erosion measures whatsoever. The result of this erosion, more noticeable on steeply sloping land, is the loss of the topsoil on which the fertility of the soil of this type depends, indicated by diminishing yields, particularly in areas under garden crops.

Proof of the occurrence of erosion on Valencia Sand under garden crops was obtained by soil sampling and laboratory examination of these samples. The samples were taken from the top and one side of a ridge; six sites were sampled at the depths of 0"-3" and 3"-6", the samples being examined in the College soil laboratories.
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### Diagram

Diagrammatic Section of hill.

- **X**: Site of sample.
- **T**: The foregoing facts demonstrate the role of sheet erosion on the side of a hill that has been affected by sheet erosion, leading to the formation of terraces.

Certain interesting conclusions can be drawn from the above analytical table and diagram. Samples A1 and A2 were taken from the top of the ridge, the surface being covered with grass and small plants. This, together with its position, resulted in a neutral to slightly acidic reaction, a fair P₂O₅ and rate of solution contents. Samples B to F were all taken from the side of the ridge. Samples C1 and C2, E1 and E2 were taken from positions where the hill tended to level out, forming terraces. These samples should show higher organic matter contents and higher C/N ratios than samples taken immediately above or below them, if
erosion by surface-washing is taking place. On inspection of the data, this is apparent. Fl, however, possesses a higher organic matter content than El but a lower C/N ratio, which indicates that, although the organic matter content is higher, it is made up mainly of decomposed material. Sample Fl possesses an Index of Texture of 18 and F2 of 37; this shows the transition from sandy soil (Valencia Sand) to a clay (Talparo Clay) in Fl. Fl also shows high P2O5 and rate of solution contents with a slightly acidic reaction. It is as fertile as Al and much more fertile than the samples from B to E. The available nutrient value is much higher than that of any other sample, indicating the presence of colloidal matter retaining nutrients. If the average is taken of the laboratory results for the 0" - 3" and 3" - 6" samples at each site, it will be found that the general tendency is for these averages to increase from B to E for pH, nitrogen and available phosphate contents, indicating the leaching downwards of plant nutrients and bases. In all cases, the average of samples B1 and B2 are lower than that for Al and AE. The foregoing facts demonstrate the occurrence of sheet erosion on the side of a hill planted in Maize and Cassava, and the leaching downwards of plant nutrients and bases is indicated. It indicates, further, the poorness of soils of the Valencia type on which the vegetation has been felled and burnt, subsequent planting of garden crops doing little to prevent sheet erosion.

Sheet erosion undoubtedly occurs on L'Ebranche Clay-Silt. This is proved by small deposits of silt noticeable in the bottom of drains in the land planted in cane. Surface-washing of topsoil and gullying occur on soils of the Fiarco type. This was apparent in soils west and east of the Southern Main Road (see map).

Erosion is most serious in the Talparo Clay and Valencia Sand; in the L'Ebranche Clay-Silt, it is slight. Practically all of the peasant farms inspected were on soils of these three types. The problems affecting these soils are the prevention of land-slip and sheet erosion. Any land inforest or laestro, with a steep slope
that is likely to slide, should never be clear-felled and planted, even in tree crops. Such land should be left in forest or laestro. If, however, it is to be planted, it should be thinned out gradually and planted in tree crops; sugar-cane or garden crops should never be planted.

The sheet erosion problem on soils of the Valencia type is a very serious one. On steeply sloping land, forest or laestro should never be clear-felled and burnt. If they are, however, rapid leaching of soluble bases and erosion of the topsoil occurs, both of which are very rapid between burning and the establishment of the crop, because of the heavy rainfall. If land of this soil type has to be cultivated, burning should be avoided; the crop should be established as quickly as possible, and planted in rows along the contours in such a way as to reduce surface erosion to a minimum. Cover crops or trailing vines may be very useful in checking erosion. Where garden crops, such as Maize and Cassava, are planted, cover crops will greatly check the loss of soil, if grown under them. Contour banks and terraces constructed on steeply sloping land made up of sandy soil are useless. Even if the banks and terraces could be satisfactorily constructed and money were available to cover the cost, the capital outlay would not be justified because of the inherent poorness of the soil and the limited economic agricultural life of the land. In conclusion, it may be stated that steeply sloping land in soils of the Talparo type should not be cultivated if it can possibly be avoided, because of the probability of landslips. Owing to the occurrence of sheet erosion and gullying on soils of the Valencia type, steeply sloping land should be left in forest and never brought into cultivation. Land with a moderate slope may be cultivated, but it must be realized that it has a limited agricultural life which may be prolonged, but not indefinitely, by careful cultivation. Sheet erosion in soils of the L'Ebranche type should have little, if any, effect on the crops grown.
METHODS.

It was necessary for the purpose of this investigation, to select an area of small mixed farms within the County of Caroni. This necessitated visiting six areas in the County, of which the Todd's Road-Ravine Sable district was finally chosen.

A preliminary survey of the area was carried out. The topography, soil conditions, and crops were studied, and the acquaintance of a number of peasants was made. In the meantime, a questionnaire was compiled: the basic ideas were obtained from reports of surveys carried out in East Africa, and the Land Settlement Survey forms used in Antigua, Nevis and St. Vincent by the Economics Department of the Imperial College of Tropical Agriculture. This questionnaire was tested by submitting it to a few peasants so as to determine what alterations, if any, were necessary. By this means, a number of superfluous questions were eliminated and the space left after each question for the peasant's reply was adjusted. The finished questionnaire was cyclostyled and one hundred copies made.

The survey proper then commenced. One questionnaire was required for each farmer. The farmer was interrogated on his holding or holdings and his replies were noted. These replies were checked where it was thought necessary by additional questions and observation in the field. The peasant's farm was then thoroughly inspected; any corrections required in the data obtained by interrogation were made together with notes on soil, topography, health of crops etc.

Fifty-eight questionnaires were completed during the course of the survey which lasted from January to May 1940. The length of time required to complete any one questionnaire varied greatly, depending on the intelligence of the farmer, the size of the holding and the variation in crops grown. For holdings up to three acres, the time required varied from half to one hour, for
### TABLE I.

**Class I. Holdings up to 3 acres.**

<table>
<thead>
<tr>
<th>Garden</th>
<th>Rice</th>
<th>Cane</th>
<th>Cacao and/or Coffee</th>
<th>Bush Crops</th>
<th>Laestro</th>
<th>Total</th>
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### TABLE II.
Class II. Holdings of more than 3 acres to 10 acres.

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<th>Bush Crops</th>
<th>Laestro</th>
<th>Total</th>
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18.8%  0.6%  23.1%  40.8%  6.2%  10.5%  100%
### Table III

**Class III. Holdings over 10 acres.**

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<tr>
<th>Garden</th>
<th>Rice</th>
<th>Cane</th>
<th>Cacao and/or Coffee</th>
<th>Bush Crops</th>
<th>Laestro</th>
<th>Total</th>
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<td>14</td>
<td>10</td>
<td>7</td>
<td>14</td>
<td>17</td>
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</tbody>
</table>

**Average crop yields for each class:**

- **Garden:** 42
- **Rice:** 14
- **Cane:** 24
- **Cacao and/or Coffee:** 19
- **Bush Crops:** 17
- **Laestro:** 17
- **Total:** 19

**Notes:**

- All values are in acres.
- Percentages of total acres:
  - Garden: 9.4%
  - Rice: 1.6%
  - Cane: 13.0%
  - Cacao and/or Coffee: 42.6%
  - Bush Crops: 10.6%
  - Laestro: 22.8%
  - Total: 100%
After examination of the completed questionnaires, it was decided to classify the British holdings on an acreage basis.

### Average crop yields for each class

<table>
<thead>
<tr>
<th>CLASS I</th>
<th>Maize</th>
<th>Cassava</th>
<th>Rice</th>
<th>Cacao</th>
<th>Coffee</th>
<th>Cashew</th>
<th>Yams</th>
<th>Cane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
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</tr>
<tr>
<td>CLASS III</td>
<td>1750</td>
<td>62½</td>
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<td>236</td>
<td>-</td>
<td>20.2</td>
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</tbody>
</table>

**N.B.** Maize yields are quoted in lbs. of grain per acre. Cassava and "roots per acre" are included in the total acreage. All the crops are planted "in either a" or "as a" dry beans per acre. Cacao, "the cocoa" or "the" "parchment coffee per acre." Coffee, "the coffee" or "the" "other nuts per acre." Yams, "the yams" or "the" "tubers per acre." Cane, "the cane" or "the" "tons" or "cane per acre."
holdings of over three acres up to two hours, and for a few of
the larger holdings three to four hours. A blank questionnaire
forms Appendix I. The questionnaire used by the Economist has
been added for completeness and will be found in Appendix II.

CROPS.

After examination of the completed questionnaires, it was
decided to classify the peasant holdings on an acreage basis.
They were classified into three groups (see inset tables):

Class I. Holdings up to 3 acres.
Class II. Holdings of more than 3 acres to 10 acres.
Class III. Holdings over 10 acres.

From table I, it can be seen that 57.6% of the total area of
this class is in sugar-cane, 28.2% being in garden crops. Sugar-
cane cultivation, thus, dominates the agriculture of this class.
Peasants, who do not grow sugar-cane, cultivate garden crops,
although some of them grow both. It may be noted here that small
peasant farmers, when establishing or replanting sugar-cane,
usually take off one crop of maize and sweet potatoes which are
interplanted with the sugar-cane. These catch crops are ready
for harvesting before the young sugar-cane covers the ground.

Examination of table II, shows that 50% of the total holdings
included in the three classes belong to this group. 40.8% of the
total area is planted in cacao or coffee which dominates the
agriculture of this class. 23.1% of the total area is in sugar-cane
and 18.8% in garden crops. Some holdings possess land in cacao or
coffee, sugar-cane and garden crops; others have land planted
in two of these three crops, and some in only one. 6.8% of the
total area is in bush crops, although they are grown by only 14.8%
of the farmers of this class. 29.6% of the farms possess land in
sugar-cane as in class I.

Examination of table III shows that cacao or coffee are planted
in 42.6% of the total area of this class. They again dominate
the agriculture of the group. 13.0% of the total area is in sugar-
cane as in class I.
cane and 9.4% in garden crops. It must be noted, however, that in the majority of holdings cacao or coffee, sugar-cane and garden crops are grown. 10.6% of the total area of the class is in bush crops which are grown by 33.3% of the farmers. 22.8% of the total area is in laestro, this percentage being distributed over 50% of the farms. Two months later, although some cane were found in

In comparing tables I, II and III, it will be noted that, as the area of holdings increases so do the number of crops grown. In class I, garden crops or sugar-cane are mainly grown. In class II, garden crops, sugar-cane and cacao or coffee with bush crops are cultivated. In class III the same crops are grown as in class II, but the percentage of bush crops is higher. It is clear, also, that in class I no farm had any land in laestro. 10.5% of the total area of class II was in laestro rising to 22.8% in class III.

Some farmers who had laestro practiced intercropping with garden crops. As the size of the holdings increases there is a predominance of crops with low labour requirements.

Garden Crops.

These include maize, cassava, pigeon pea and other legumes, yams, sweet potatoes, egg-plant, tomatoes and other minor crops. Maize and cassava are the most widely grown of these crops.

Maize. The maize grown in the area belongs to the 'Dent' type, but is very mixed. It is grown mainly on soils of the Valencia Sand type. Forest or laestro is clear-felled, burnt and planted in May or October after the beginning of the rains in May, or in October after the 'petit careme'. After two to four years, in soil of the Valencia type, the land is allowed to return to bush because of the steadily diminishing yields of maize and cassava; cassava is mainly grown and its sticky type are common, the Butter Stick being generally always interplanted with maize, which is the rule rather than the exception. They are sown in all types of soil, but chiefly on Valencia Sand. As for maize, planting should be done

A seed-rate of 6 to 10 lbs. per acre is required. 3 to 4 seeds are placed in a hole, the crop being planted at a spacing of 4 x 4 feet. This distance is usually judged by eye and so
variation in either direction occurs. Supplying, if carried out, takes place two weeks after planting. No thinning out of seedlings is attempted. The crop may be weeded once or twice, depending on the industry of the peasant farmer. If it is weeded twice, the first weeding occurs about a month after planting and the second, a month to two months later, although some cases were found in which no weeding was done. Four to five months after planting, the crop is harvested in several ways. The cob is removed from the dry plant, the husk is stripped off and the cob is carried home. There it is shelled; the grain is dried in the sun and stored. A variation of this procedure is, the cob is shelled in the field and the grain is taken home where it is dried and stored. Cobs that are to be kept for seed are removed from the plant but are not husked, being hung over the kitchen fire to preserve them from weevil damage. The grain is stored in sacks. If the cobs are not shelled they are dried and stored in barrels, the grain being sold on the cob. There is no effective native method of storing grain (insect pests attack the grain whether in sacks or in barrels). The grain is kept for food (ground into flour) and for feeding fowls. Any surplus is sold. The yields are very poor which is to be expected owing to the smallness of the cob; a result of degeneration by inbreeding (no fresh seed introduced) and the poorness of the soil coupled with a lack of manuring and cultural care. Yields varying from 200 to 700 lbs. of grain per acre were found, with an average in classes I and II of 500 and 375 lbs. respectively. Cassava. Four varieties of cassava are grown namely, White Stick, Blue Stick, Red Stick and Butter Stick or Governor. The White, Blue and Red Stick types are common, the Butter Stick being a recent introduction. They are grown on all types of soil in the area but chiefly on Valencia Sand. As for maize, planting takes place with the start of the rains in May to June or October. Usually, the crop is interplanted with maize and legumes. Cassava is propagated vegetatively, setts from mature stems
and branches with 4 or more nodes, 6 - 12 inches in length being used. They are planted either 3 x 3 or 4 x 4 feet, but the spacing varies because it is judged generally by eye. A small, saucer-shaped hole (known as a 'cup-hole'), about 1 - 2 feet in diameter, is dug with a hoe. Two setts are planted in each hole about 1 foot apart, and are half buried in the ground at an angle - about 45° - to the horizontal. Supplying is done one month after planting. At the same time the plants are moulded up with a hoe. Weeding is carried out as for maize; no weeding is done after the maize is harvested.

On Valencia Sand, the White, Blue and Butter Stick varieties are harvested after 6 - 8 months. Harvesting may begin in 3 months at which time a small return is obtained. The Red Stick is mature after 9 - 12 months. On Talparo Clay, the White, Blue and Butter Stick types are mature after 9 - 12 months and the Red Stick after 12 - 15 months. On sandy soils the roots are pulled up by hand, while on clays, they have to be dug out with the aid of a cutlass or fork. The roots are seldom stored, but if they are, they are buried in dry sand where they are said to keep for a month or more. Usually, however, farmers harvest whatever roots they require for immediate consumption. Roots may be harvested and sold by the basket. Roots, that are not stored, eaten or sold by the end of the crop, remain in the ground where they rot. The mature plants are cut down, setts are taken from them and immediately planted out. A yield of 240 lbs. per acre of roots in class I is low (table IV).

Legumes. The Pigeon Pea is the chief legume grown. It may be interplanted with maize and cassava or grown as a pure crop. Planting takes place in May or October, 2 - 3 seeds being planted in each hole at a spacing of 4 x 4 to 8 x 8 feet. No supplying or thinning is done. When interplanted, weeding is carried out as for maize and cassava. When it is grown as a pure crop, weeding may be done once or twice, as required, until the crop shades the ground. Harvesting occurs over several months. It is done by hand, the pods being picked green for food or sale. At 10 - 12
months the plants may be cut down and a ratoon crop may be taken or it may grow as a perennial for a number of years. The ratoon crop is always smaller than the plant crop. Harvesting becomes more difficult if the plant is allowed to become a perennial because of its continued growth.

In various gardens, a few plants of woolly pyrol, green gram and canavalia are grown. Many varieties of beans are grown for sale, namely French beans, Salad beans and Lima beans.

Other Crops. A number of varieties of sweet potato are grown. They are planted on banks at the beginning of the rains. They are propagated vegetatively by slips 1 - 1½ feet long. The banks are 3 - 4 feet apart, slips being put in 6 - 12 inches apart. One weeding is done about one month after planting. The crop is harvested by breaking down the banks with a fork or hoe. The crop is used for food, any surplus being sold.

Small quantities of Irish potatoes, tannias, eddoes, dasheens, plantains, tomatoes, watermelons, pumpkins, pineapples and other garden crops are grown for food and sale.

Rice.

Little rice is grown in the area. The paddies are small. At the beginning of the wet season in May, they are forked, all weeds and crop residues are turned under. Each paddy is levelled and planted. A small nursery is made in May. The seedlings from this nursery are transplanted in June when they are about 1 foot high. 3 - 4 seedlings are planted out at each site, the spacing used being 6 x 6 inches. The paddies are flooded with rain water after the seedlings have caught. They are covered 3 - 6 inches deep with rain water as long as it is available. Weeding is done twice, all grass and weeds being removed by hand. No supplying is done.

The crop is harvested in November. A ratoon is taken, which is harvested in January. The paddies are then left in weeds until May when they are prepared for the next rice crop. The paddi is threshed and stored in bags. It is used for human and animal consumption. No yield figures could be obtained for rice grown in
the area. The figure quoted in Table IV refers to yields obtained from 4 acres of rice land on the Caroni alluvial flats owned by a farmer in the district.

Sugar-Cane.

A number of types of sugar-cane are grown namely, B.H. 10/12, seedling varieties and Bourbon cane. Noble canes are grown because sugar factories will not accept thin canes. Sugar-cane is grown within the area chiefly on L'Ebranche Clay-Silt and Talparo Clay soil types. Planting is undertaken in May or October.

Farmers possessing small areas in sugar-cane, take a crop of maize and sweet potatoes off the land before the sugar-cane covers the ground, usually when planting or replanting. Farmers having larger areas in cane grow it as a pure crop.

Land that is to be planted is prepared into beds 22 feet wide, having 1 to 2 foot drains on either side. The beds are forked, and where possible, a slight camber is given to them, though this is very difficult to impart by means of the fork, and so the operation is seldom attempted. Beds are not made on steeply sloping land. If sugar-cane is planted in May, cane-tops are the only setts used. In October, setts are taken from the whole cane, each sett possessing three nodes. The setts are planted 4 x 4 feet with a cutlass at an angle to the horizontal. When the land to be planted has not been forked, 'cup-holes' are made with a fork and hoe, into which the setts are planted. Two setts, 1 foot apart, are generally planted at each site. Weeding is performed two to four times per annum. Supplying is effected at the end of each harvest. Trashing is performed once a year, usually at the same time as the last weeding before harvest.

If sugar-cane is planted in October, the first crop is reaped 18 months later; if planted in May, it is reaped 12 months afterwards. The cane is cut, trashed and topped with a cutlass, loaded on to owned or hired carts and transported to the nearest buying scale of the factory to which the cane must be sold. The yields
obtained by farmers vary. On examination of Table IV, the average yields per acre are seen to increase steadily from Class I to Class III. It would be expected that the small farmers of Class I would obtain higher yields per acre than those with larger farms in Class III, because more intensive cultivation and care may be lavished on a small area. This does not actually occur however, because the small farmer cannot afford to employ labour, and it is necessary for him to work as a labourer in order to support himself.

Cacao and Coffee.

Cacao. Cacao is grown on all soil types found in the area. The trees are raised from seed. Planting is done in May to June. The majority of farmers plant coffee under their cacao, while some grow it as a pure crop. Orange and Portugal trees, bananas, plantains and a few tonka beans are generally found scattered throughout the fields. Cacao is often planted by contract. The owner of the land lets it out to a contractor who is allowed the use of the land free of rent, provided he plants certain crops - usually tree crops - specified by the owner. When these crops come into bearing, the owner can take back his land on the payment of a certain agreed sum per bearing tree. A written agreement is seldom signed. The price paid by the owner for established trees varies, namely, 30¢ per bearing tree, 18¢ per half-bearing tree and 12¢ per quarter-bearing tree, or 30¢ per bearing tree and 15¢ for a 'jorquettet' tree.

No new plantings of cacao have been made within the past five years. The land originally was clear-felled from forest, burnt and planted with cacao seedlings or seeds. Seedlings were obtained for planting out by making a nursery with beans from a large pod. The seedlings when 1 to 2 feet high were transplanted into the field. Some farmers preferred to plant the seed at stake. The cleared land was lined with rods at a spacing of 12 x 12 feet, varying a few feet either way depending on the individual. If seedlings were used, holes 16 inches square and of sufficient depth were dug to
receive them. Immortal trees and later, (owing to the demand for the nut) cashew trees were planted for shade. The number of weedings any one farmer gives his cacao varies from none to three times a year. Weeding consists of brushing the undergrowth with a cutlass. Cacao with deep shade from coffee seldom requires to be cutlassed. Supplying is done once a year in May to June. Seed or seedlings may be used; if seedlings, they are obtained either from under mature trees where a few may be found developing from fallen pods, or a small nursery may be made. Pruning is attempted once a year in March or April, towards the end of the dry season. All dead wood and Witches Brooms are removed. Drains are usually dug in cacao fields on the clay soils of the area; these vary but none are over two feet deep. These drains, however, are invariably dug straight down the slope of the land, a mistake often leading to gully erosion. Farmers who have received a cacao subsidy are bound to drain, prune and supply their cacao fields with the money they receive in order to improve this crop.

Cacao is harvested by picking the pods off the tree with a cacao knife. Up to 12 pickings are made at fortnightly intervals. The pods are collected in the field; they are broken open with a cutlass, the contents removed and put into a basket. The wet beans are taken to the sweat boxes. If the farmer does not possess a sweat box, the wet beans are placed on the ground and covered with plantain leaves. Sweating lasts for 3 to 6 days. The fermented beans are then dried on a sack, wooden tray or cacao drying-floor in the sun for 5 to 7 days, or even to 10 days in wet weather. The dried beans are bagged and sold either in Port of Spain or, more usually, to the local produce dealer (the shopkeeper).

The yields of dry cacao per acre vary greatly, depending on the state of neglect of the farm, the incidence of Witches Broom disease, and the amount of shade. The average yield of Class I was gauged from a single holding, and is not necessarily applicable to all. The yields of Classes II and III are less than a bag of dry cacao (165 lbs) per acre. Only five cacao farms gave yields of
more than one bag of dry cacao, but less than two bags per acre. The average yield of Class III is lower than that of Class II; this may be explained by the fact that the farms in Class III are larger than those in Class II, the low returns not permitting the employment of extra labour.

Coffee. Two species of coffee are grown in the area, namely, Coffee arabica and Coffee robusta. A few trees of robusta coffee are grown; 99% of the coffee grown is Coffee arabica. The crop is grown on all soil types occurring in the area. Most of it is grown under cacao shade, a few farmers only growing it as a pure crop. Oranges, tonka beans and other trees are found in fields where coffee is grown as a pure crop. The crop is often planted by contract. The conditions undertaken by the owner and contractor are the same as for cacao. The price paid by the owner is usually 12/- per bearing tree, 6/- per half-bearing tree, and 3/- per quarter-bearing tree.

Planting is done in May to July. The land is clear-felled, burnt and lined with rods. Where grown as a pure crop, the seedlings are planted 8 x 8 feet; under cacao, however, the planting distance varies from 6 x 6 to 9 x 9 feet. Seedlings used for planting are obtained from beneath bearing coffee trees. These are pulled up by hand when 1½ to 2 feet high and transplanted. Planting may be performed in several ways:— (1) a hole is dug with a cutlass and a narrow boring, with a stick or coffee digger, is made in the bottom of it to receive the tap-root; (2) a hole is dug with a coffee digger, the bare-rooted plant stuck in, and rammed down; (3) a hole is made with a cutlass.

Under cacao, coffee trees are shaded by the cacao and its shade trees. When grown as a pure crop, bananas, tannias and cassava may be grown as catch crops and for shade. Immortel and cashew trees are planted to provide shade in later life. Weeding is performed once a year in August, although, when interplanted with cacao, the coffee is weeded as often as the cacao. Supplying with seedlings is effected once a year, in May to July. Pruning is
never attempted. Drains dug specifically for the benefit of coffee are not favoured, although coffee lands may incidentally enjoy good drainage because cacao used as shade may be drained with help received from the subsidy.

Coffee is harvested by picking the ripe cherries off the tree. Three to four pickings are made during November and December. The cherries are picked by hand, placed in baskets, and carried to the farmers' houses. There they are sweated for 4 to 7 days. Sweating may be carried out in the cacao sweat-box, in bags, or in a heap on the ground covered with plantain leaves. After sweating, the cherries are pounded lightly, dried in the sun, pounded again, and the whole finally winnowed. The parchment coffee is collected and sold or kept for the farmers' use. Variation occurs in the method of treating the cherries after picking. When brought in from the field, they may be either dried without sweating, pounded and winnowed, or pounded lightly, sweated, dried, repounded and winnowed.

The yields of parchment coffee per acre are very low. The average yields given in Table IV were derived from yields quoted by the farmers. No check of their validity could be made, because the crop was over when the investigation began. The lowness of the yields may be attributed to poor soils, lack of cultural care (pruning, overshadowing etc.), and the indifference of the farmer.

Bush Crops.

These include coconuts and cashew-nuts. Miscellaneous crops occur through land in which cashew-nut trees predominate.

Coconuts. Coconuts are grown on Talpero Clay and Valencia Sand soil types. They are generally planted by contract, as cacao and coffee are. Under this contract system, the owner of the land provides the seedlings and the contractor undertakes to plant and bring the seedlings into bearing; the owner takes over the coconuts at his own convenience, paying 30¢ per bearing tree. As with contracts to plant cacao and coffee, a written agreement is seldom signed. The land is cleared, lined 20 x 20 feet, and seedlings 3
to 4 feet high are planted in May in holes of a suitable size. When planting, the top of the nut is left exposed. Brushing is carried out twice a year with a cutlass. Supplying may or may not be attempted; if it is, the contractor has to procure the required seed. Drains 1 foot square are dug 20 feet apart where the soil type is Talpero Clay. These drains may be ineffective, because they may fail to lower the water-table owing to their inadequate depth. Hence they may actually augment soil erosion by surface-washing and gullying, since they are dug straight down the slopes.

The coconuts fall from the trees when mature, and are picked up, husked with a cutlass, and coconut oil is made from the flesh (endosperm) for home use. The bearing trees usually die after reaching the age of 10 to 15 years, being generally destroyed by Bronze Leaf Milt disease. The crop should never have been planted in the area, since the drainage conditions are not suitable to it (poor drainage in clay; too free drainage in sand), and the soils lack nutrients.

Cashew-Nut. Cashew-nut is planted on Valencia Sand soil only. It may be planted through cacao and coffee as shade, or it may comprise the main crop along with 'Miscellaneous Crops', or alone with bush under it. Cashew-nut is sometimes planted by contract, but this is the exception rather than the rule. The land is cleared and the seeds are planted singly in May, using a cutlass, and spacing at 20 x 20 feet. No brushing is attempted. Supplying is carried out to replace trees that have been killed by cacao thrips. The nuts fall from the tree when mature, and are picked up and sold in 'pan lots'. A 'pan' is a four gallon kerosene tin which, when filled, holds about 34 lb. of nuts. The nuts are sold mostly to a cashew-nut factory near Chaguanas, where the kernels are extracted by machinery. The farmer receives 50¢ to 72¢ per pan, depending on the market. The yields vary, and are said to have fallen off in recent years, because of increasing severity of attack by cacao thrips, causing defoliation and flower shedding.
Miscellaneous Crops.

Numerous fruit trees, other than those mentioned, are grown within the area; they may give some revenue or provide food.

Citrus. Oranges and Portugals are the chief citrus crops grown. They are planted on all soil types, and are sporadically distributed through cacao and coffee fields, sugar-cane fields, and cashew-nut groves. The majority of trees are old. No care is taken of them, and the orange trees usually require pruning and cleansing from parasitic plants. They are planted anywhere, 2 to 3 seeds being placed in a hole. They yield fair to good crops, especially the Portugals. Orange trees are known to yield over 400 saleable oranges in a season, for which 12\(\frac{1}{2}\) to 24\(\frac{1}{2}\) per 100 is received, the buyer picking the fruit. Portugals are sold at 6\(\frac{1}{2}\) to 12\(\frac{1}{2}\) per 100 under the same conditions.

Tonka Beans. A few bearing trees occur within the area. Numerous seeds of this tree have been planted 20 x 20 feet apart, through peasant farms, the high value of $1.00 per lb. for the kernels providing an incentive to planting. Full bearing trees occurring within the area yield up to one lb. of kernels per tree. They do not appear to be attacked by Blossom Blight.

Bananas & Plantains. These have been planted near houses and in cacao and coffee fields. The fruit is used for food and any excess is sold. Bunches are frequently stolen from the fields.

Mangoes. A few trees occur scattered through the holdings; the fruit is used for food and is sold to 'marchons' on the tree by the hundred.

Other Tree Crops. Avocado pears, nutmegs, and guava occur throughout the area.

During the day, the poultry run around in search of food, being fed once or twice daily on corn or rice and any scraps from the kitchen. At night the birds roost on trees. Laying boxes filled with straw are provided. These are usually procured from the shopkeeper, fixed on a platform 2 - 4 feet above the ground into a shed made of poles with open sides and a 'dort' roof (one of thatch palm leaves). Costs are provided under the shed; they are made of
MARKETS.

Produce may be sold on the tree, to the local produce dealer, or in the Chaguanas and Port of Spain markets. Oranges, Portugals and mangoes are sold on the tree to buyers for resale elsewhere. Cacao and coffee are generally sold to the local produce dealer; a few of the larger growers take their crops by railroad into Port of Spain to be sold to the highest bidder. Cashew-nuts may be taken to the factory in Chaguanas or sold to 'marchons' on the farm at a lower price. Maize, cassava, pigeon pea, egg-plant etc. may be sold to 'marchons', either on the farm or in Todd's Road village. Tomatoes are usually sold by the box in the Chaguanas market, the price received varying greatly depending on the state of the market—see Akehurst (8).

LIVESTOCK.

The farmers in the area possess little livestock, but horses, mules, asses, cattle, pigs, goats and poultry may be seen on farms throughout the district. The relative importance of each type of stock can best be judged from the following table:-

<table>
<thead>
<tr>
<th>Horses</th>
<th>Mules</th>
<th>Asses</th>
<th>Cattle</th>
<th>Pigs</th>
<th>Goats</th>
<th>Fowls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7%</td>
<td>5.2%</td>
<td>5.2%</td>
<td>17.5%</td>
<td>13.4%</td>
<td>24.1%</td>
<td>74.1%</td>
</tr>
</tbody>
</table>

N. B. Percentages express the number of farms of the total number surveyed, possessing each type of stock.

74.1% of the farms surveyed keep poultry, nearly three-quarters of the number consisting of fowls of mixed breed with a few guinea fowl and ducks. The number kept on any one farm varies from 1 to 25. During the day, the poultry runs around in search of food, being fed once or twice daily on corn or rice and any scraps from the kitchen. At night, the birds roost on trees. Laying boxes filled with straw are provided. These are usually procured from the shop-keeper, fixed on a platform 3 - 4 feet above the ground in a shed made of poles with open sides and a 'carat' roof (one of thatch palm leaves). Coops are provided under the shed; they are made of
wooden slats in which hens with their broods are kept. A separate shed may be installed for the poultry, or part of a shed built for the housing of carts, harness and stock, may be used.

24.1%, nearly one-quarter of the farmers keep goats. The majority of the goat keepers are Indians who rear them mainly for their own consumption. The animals are fed by tethering them out to graze in leastro or on roadsides and traces. 13.4% of the farmers keep pigs; they are kept mostly by Negroes. Pigs are fed in their sties with kitchen waste and crop residues. The sties may have a concrete floor or one made of wooden slats with a 'cart' roof. Boars and sows with litters are kept in different sties. During the day, the pigs are allowed out to root for food and there is usually a pig wallow near by. The farmers in the area have 17.5% of the farmers keep cattle. The cattle are of mixed breed, and as a rule are small and thin. During the day, bulls, dry cows and calves are tied out to graze in leastro or on roadsides. Milking cows may be tied out or stall fed; if the latter, grass and crop residues are cut and fed. The stalls are built under a shed made of poles with open sides and a 'cart' roof. No concentrates are fed. The manure obtained from the stall-fed cows is used on certain garden crops, egg-plant and tomatoes mainly. Cows are kept for milk and bulls for draught purposes, the latter never being castrated.

5.2% of the farms possess asses and the same percentage keep mules. 1.7% of the farmers keep horses. The horses are tied out to graze, and are used for pulling carts and transporting produce in panniers. 24.1% of the farms surveyed do not keep any type of livestock; 27.6% only keep poultry which do not produce any quantity of manure. Thus 51.7% of the farms do not produce any farmyard manure. Stall-fed cattle are the largest producers of farmyard manure, but no farmer owns more than four head. Horses, mules and asses produce smaller quantities of manure, but again no farm possesses more than one animal of these three types. The area is very understocked,
as a result of which little farmyard manure is produced.

MANURING.
Very little organic and inorganic manuring is done in the area. Organic farmyard manure when available is applied to garden crops, mainly egg-plant and tomatoes. Seedlings of both these crops are planted in holes, in the bottom of which is placed a large handful of manure. Any surplus is placed in banks prepared for sweet potatoes. The only inorganic manure used is ammonium sulphate. This has been applied by a single farmer to a 16-acre field of sugar-cane at the rate of two bags (400 lbs.) per acre. Two applications of fertilisers were made per annum: one bag was applied in May and another in October. No other crops in the area have received any artificial manure. Several farmers expressed the desire to use organic manures on their annual crops if they could obtain it, since they had found by experience that their yields were thereby increased, particularly if the soil type be Valencia Sand. Inorganic manures are expensive and are beyond the means of the peasants in this district. Organic farm manures are inexpensive provided a farmer possesses livestock, particularly cattle. The soils of the area are very poor, and require artificial amendments to make up for their lack of nutrients and to improve their physical condition, particularly Telparo Clay and Valencia Sand soil types.

IRRIGATION.
Rice is the only crop irrigated in the area. It is grown on flat land beside small streams which flood in rainy weather. When a stream is in spate, water is let into the paddies and impounded. The maintenance of the water level depends on the number of floods. In wet years, sufficient water is maintained in the paddies, while in dry years the growth is poor owing to lack of water.
**IMPLEMENTS.**

Only hand implements are used in the area. There are no animal-drawn implements. Practically every farmer possesses one or more hoes and cutlasses; the majority own a fork and an axe. Farmers growing cacao and coffee usually own a cacao knife and a coffee digger; a few possess spades and grubbing hoes. Three to four shotguns are to be found in the area; they are used for shooting squirrels which damage the mature cacao pods. A number of rakes, used for removing charcoal from coal pits, are owned by farmers. Hoes and cutlasses are used for planting and weeding. Forks are used for sugar-cane planting; axes for felling trees with the aid of cutlasses. Cacao knives are used for pruning and harvesting cacao. A coffee digger is used for planting coffee seedlings. Spades are used for digging and cleaning drains; grubbing hoes for making banks and general tillage.

No relation was found between the size of holding and the number of implements owned. Light animal-drawn ploughs may be used on the flat land in the valleys, but they are unnecessary since the hand implements mentioned are sufficient for proper cultivation, besides which the necessary capital outlay is very great. At the same time, all the crops are present in one place, facilitating the rotation of the various types of foodstuffs. Mixed crops also require the employment of labourers for tending the various stages of growth.

**LABOUR.**

Many of the smaller farmers in the area, particularly those of Class I, work as labourers on neighbouring cacao and sugar-cane estates. This is necessary because the income from their farms is inadequate. The farmers in Class III do not work on estates, their time being spent on the farm. The larger farmers in Classes II and III employ labour when necessary. Sugar-cane growing necessitates the employment of labour where more than three acres are grown, to plant, weed and supply, harvest and cart. Cacao and coffee may require labour to cutlass and harvest. Labour is seldom employed for growing bush and garden crops. Labour is usually employed by the day; women are paid 35¢ per day and men up to 50¢ per day. Drains are dug by the task, at 50¢ per chain on clay for 1 to 2 feet.
ROTATIONS AND MIXED CROPPING.

Throughout the area only one type of rotation was found, namely, a land-to-garden crop rotation. Land in laestro is cut down, burnt and planted in maize, cassava and vines. Continuous cropping goes on for 2 to 4 years, after which the area is allowed to return to laestro for 5 to 10 years because of the uneconomic yields, and the cycle is then repeated. A variation of this plan is practiced by a few of the larger farmers who own laestro. As much land as is required for garden crops each year is cleared and burnt; at the end of the year the land is again abandoned to bush, a fresh area being cleared for the following year. The latter type of land-to-garden crop rotation is voluntary, while the farmer is forced into the former owing to uneconomic returns.

Mixed cropping is prevalent throughout the area. Maize, short-statured cassava, pigeon pea and vines are generally grown mixed together. Farms occur in which maize, cassava and pigeon pea are grown as pure crops. The main reasons for growing these crops mixed is because in so doing, labour is saved, because the land can be weeded at one time; all the crops are present in one place, facilitating the collection of the various types of foodstuffs. Mixed crops also require a smaller area than the same amount of crops planted as pure stands, and finally a variety of food can be obtained throughout the year from a single area. When maize, cassava and pigeon pea are mixed, different layers of the soil are tapped, as maize is shallow rooted, cassava, medium rooted and pigeon pea, deep rooted.

Coffee is usually planted under established cacao. It grows well, providing ground-shade for the cacao, frequently eliminating the need for cutlassing. The yields of coffee intercropped with cacao are said not to be lowered (4), but, from observation, it appears that yields are lowered when coffee is too heavily shaded, and when it is too thick on the ground because of the growth of seedlings developed from fallen cherries. The advantages of intercropping
coffee with cacao lie in the frequent elimination of cutlassing and the additional income obtained, though often small. When planting sugar-cane on small farms, the land is frequently raised into banks 4 feet apart, on the tops of which sweet potatoes are planted, sugar-cane being planted 4 feet apart in the furrows and maize on the sides of the banks. This interplanting has the advantage of checking erosion by partially covering the ground when the sugar-cane is young, preventing washing and providing a return from the land during 1½ to 18 months and permitting the efficient moulding up of the young sugar-cane stools on the breaking of the banks at harvest (4 to 6 months).

PESTS AND DISEASES.

Maize.

The larvae of the moth (*Laphygma frugiperda* Sand A.) feeds on the young leaves of maize as they develop inside the central whorl, towards the base of which it lives. When these leaves emerge, the leaf blades bear a series of round or elongated holes caused by the feeding of the caterpillar. Damage is not serious, but if necessary it may be controlled by insecticidal dusts. The peasants claim that the larvae die if sand is put into the central whorl.

Stripe Disease is a mosaic disease transmitted by the vector *Peregrinus maidis* Ask.. Chlorotic stripes occur on the affected leaves and the plants become markedly stunted, and the tops bunchy. It is not a serious pest, a few diseased plants only occurring in most fields. The vectors may be controlled by a nicotine spray.

Leaf Blight is caused by the fungus *Helminthosporium turcicum*. Yellowish oval spots occur on affected leaves, and these coalesce, turn brown and then grey. It is of no importance.

Weevil Borers, (*Calandra oryzae* and *Calandra granaria*) attack stored maize causing much damage. They may be the limiting factor in time of storage. A method developed in India has proved very satisfactory.
Cassava.

The Bud Maggot of cassava is the "Centello" fly (Lonchea chalybea Wied). All types of cassava are attacked. The female fly oviposits in young shoots; the eggs hatch and the larvae destroy the growing point, resulting in a check of the plant growth when the attack is intense. Severe damage is seldom caused. No satisfactory control method is known; the removal of attacked shoots by hand would prove too tiresome for the farmer.

The Gall Midge (Iatrophobia brasiliensis Rübs) causes the production of red growths or galls on cassava leaves. These may be so numerous as to deform the leaves, but they never appear to do any harm to the plant. Callan (11) states that this midge may be regarded as a relatively unimportant pest, severe injury rarely resulting from its attack.

Three young plants about 1\(\frac{1}{2}\) feet high were found, whose leaves, with the exception of those emerging, exhibited a mosaic-like chlorosis, the plants being stunted and some leaves being crinkled. Malcott (10) describes similar symptoms on cassava in Puerto Rico and St. Vincent, stating that in those islands it is caused by thrips specifically attacking cassava, namely, Corynothrips stenopterus Williams.

A Leaf Spot caused by Cercospora sp. was also found on cassava leaves.

Sweet Potatoes.

A moth borer of sweet potatoes (Megastes grandis Guenée) does considerable damage in the area. Eggs are laid on the stem, the larvae bore into it, feeding on the central portion and leaving the cortex intact. In feeding they frequently reach the tuber. Pupation occurs in the stem, tuber or in the ground. Larvae and pupae may be present in stored tubers. There is no practical method of control owing to the peculiar habits of the insect. A few potato varieties have been found which are more resistant to attack than others.
Egg-Plant.

A farmer who possessed about 1/30 of an acre planted in this crop, complained that he had obtained practically no return from his last planting, stating that his plants suffered from Witches Broom disease. On examination, shoots were found to have hypertrophied with proliferation of axillary buds, and the plants appeared to be suffering from a severe attack of this disease. In the laboratory, R. K. McKeel found that, although no fructifications were produced, the mycelium in the diseased tissue was very similar in appearance to that in the brooms of cacao. Plants on several other farms were similarly attacked. This loss appears to have occurred only in the past few years.

Pigeon Pea.

The green pods of this crop are attacked by the larvae of a moth which is unidentified, destroying one or all of the seeds, and causing slight to severe damage.

Pineapples.

Squirrels and manicous damage maturing pineapples.

Cacao.

Witches Broom disease (Marasmius perniciosus) is very serious in cacao fields, and is blamed by the farmers as the cause of the very low yields. It is undoubtedly one of the major reasons for low yields. All types of brooms are found on the trees; on some trees practically every shoot has a broom. The growth of the tree is thus checked, and few to no pods are produced. Nothing is done to check the disease; brooms are merely cut out when pruning is done once a year. This area is undoubtedly very heavily infected. Brooms and diseased pods should be cut out and destroyed, and the operation should be repeatedly carried out by all farmers. The cutting out, if done thoroughly, would very probably result in the death of many trees.

Black Pod disease is also present, doing considerable damage.
Squirrels damage mature pods, removing the beans and so destroying them.

Coffee.

Thread Blight and Sclerotial disease of coffee occur but do little or no damage. A number of stunted trees were found on a holding. The branches had hypertrophied at their ends, the inter-nodes being shortened with proliferation of the axillary buds, abundant callus formation, the leaves being small, misshapen, thick and leathery. A mite is believed to be the cause of this damage.

Coconuts.

Bronze Leaf Wilt disease is the cause of the death of bearing coconuts in the area, and is a serious disease. Briton-Jones (12) states that the cause of this disease is "physiological drought", since it occurs on badly-drained land (clay), and on land subject to desiccation during the dry season (Valencia Sand). The palms appear to grow satisfactorily, but they die between 10 to 20 years of age (estimated).

Cashew-Nuts.

In the past few years, loss of crop has occurred because of defoliation and flower-shedding caused by cacao thrips (Selenothrips rubrocinctus). Leaf blight of cacao caused by these thrips was also observed. The practice of using cashew-nut trees as shade for cacao is to be deplored since the cacao thrips live equally well on the foliage of both trees.

Mention must be made of one of the main causes of loss of crops in the district, namely thieves. The produce of garden crops and fruit trees are stolen. The stealing occurs at night, and the thieves are said to be armed.
SUMMARY.

Soil.
The soil types found in the area are deficient in essential nutrients, their physical properties are unsatisfactory and their productivity is low. They are subject to erosion, particularly in the district which served to check soil erosion.

Crops.
A large range of annual and perennial crops is grown within the area. On the larger farms, cacao and coffee are the main crops; on small farms, garden crops and sugar-cane predominate. After planting, weeding is practised; the number of weedings any crop receives may be adequate or inadequate, depending on the industry of the farmer. No other cultural operation is carried out until harvest, with a few exceptions in cacao and sugar-cane cultivations.

Markets.
The farms are well served by roads, traces and the railroad, enabling the farmer to take his produce to neighbouring markets and allowing ‘merchons’ or buyers easy access to the farms.

Livestock.
The farms are very understocked, and this accounts for a general lack of farmyard manure essential for the maintenance of soil fertility. The restocking of the farms depends on government aid, which is not employed by the small farmers. Large farmers are hoses of stock and the stock is fed on grass and other greenstuff; no concentrates are used. Milch cows may be stall fed, in which case supplies of pen manure become available. The suggested planting of types of fodder grass for stock food would probably fail, because the farmer might refuse to plant grass varieties, or, if he did, he might not give them proper attention in which case the grass crops may suffer severely from weed competition.
Manuring.

Very little organic or inorganic manuring is attempted. The use of inorganic manures is out of the question, because of their high cost. Organic manures are very necessary to maintain and improve the fertility of the soil types. Their supply may be assured either by increasing the number of livestock (particularly cattle), or by making composts with crop residues, but these might prove to be insufficient in quantity for the production of large quantities of manure on most farms.

Irrigation.

Rice is the only crop irrigated in the area. Its irrigation depends on the flooding of a neighbouring stream, so that the supply of water is variable.

 Implements.

All cultivation in the area is accomplished solely with hand implements, these being probably adequate for proper cultivation.

Labour.

Labour is not employed by the small farmers. Large farmers, however, frequently require assistance in working their farms and hence they employ hand labour, invariably employing labour by the day and seldom by task.

 Rotations and Mixed Cropping.

Only one type of rotation is practiced in the area, namely, a land-to-garden crop-rotation. The mixing of maize, cassava, pigeon pea and other minor garden crops is the rule, with but few exceptions throughout the area. The interplanting of coffee with cacao, and the mixing of perennial tree crops, such as cashew-nut, tonka bean and citrus, also is frequently practiced.

Pests and Diseases.

Most crops in the area suffer from one or more pests and diseases. None of them is serious, except Witches Broom disease of cacao and a disease with similar symptoms found on egg-plant causing serious loss of crop on certain farms.

Three main points emerge from this investigation:-
1. The inherent poorness of the soil types occurring in the area, particularly Valencia Sand and Talparo Clay, which after a few years become very unproductive, especially Valencia Sand, through loss of fertile topsoil by erosion following burning.

2. The scarcity of livestock, particularly cattle, resulting in a lack of organic farmyard manure required to maintain and increase the productivity of the land, especially that comprising Valencia Sand and Talparo Clay soil types.

3. The lack of adequate instruction of the peasant farmer as to how to improve and maintain the quality of his crops by selection of planting material (seed or seedlings), particularly maize, as well as lack of advice as to the number of times a crop or mixture of crops should be weeded, and of instruction as to anti-erosion measures, especially on Valencia Sand and Talparo Clay.

CONCLUSION.

In conclusion, the writer considers that forest and bush land, occurring on Valencia Sand and Talparo Clay, should never have been planted in agricultural crops. The fact that the Government allowed, and still permits, the clear-felling of forest for growing crops on these soil types is to be deplored, especially on Valencia Sand. After a few years' time, especially since instruction of farmers as to anti-erosion measures and cultural operations is lacking, the crop yields become uneconomic and the peasants eventually come to depend on government aid in order to live.

ACKNOWLEDGEMENTS.

The writer gratefully acknowledges the help given him and the keen interest taken in this investigation by Professor E. E. Harrison and Professor F. Hardy. He also desires to thank Mr. R. O. Williams of the Agricultural Department of Trinidad and Tobago for the facilities put at his disposal.
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APPENDIX I. Agricultural Questionnaire.

1. His Name:

2. Area owned:

3. How long has area been cultivated?

APPENDIX I. Agricultural Questionnaire.

4. Miscellaneous.
Date.

1. His \underline{Her} Name.

2. Areas owned.

3. How long has area been cultivated?

4. Miscellaneous.
Livestock.

1. Do you keep any animals? Yes/No.
   Horses Cattle [Bulls] Fowls
   Mules Pigs Others
   Donkeys Goats.

2. Do you keep any animals on the share basis? Yes/No.
   If so, state on what terms (whether animals are his or not).


4. Do you sell any? Yes/No.
   Also: Unit of sale.
   Price/unit.

5. To whom do you sell?

6. Why do you sell?

7. Are all your animals kept on holding? Yes/No.
   State where.

8. Details of how fed - paddock, concentrate, grass, from roads and lastrea, crop residues, crops grown for livestock use?
9. Details of how housed?

10. If you had any money would you buy stock and if so, what styles?

11. Miscellaneous.

   Condition.

   Diseases.
Manuring.

1. Do you use manure? Yes/No.
2. If so what style or styles of manure do you apply?
3. Is manure made on holding, brought in from outside or both?
4. Obtain the following:
   | Type | Quantity/acre | Crop | Month |
5. Are Green manures or combined cover crop green manures grown solely for this purpose? Yes/No.
6. Are any legumes grown? Yes/No.
7. Miscellaneous.
Sheet 4.

Inspection.

1. Configuration of land?

2. If ridges are present are they contoured, terraced etc?

3. Any evidence of erosion? Yes/No.

4. If so, state whether sheet, finger, gully, landslip or any other style?

5. Is it serious, moderate or slight?

6. Presence or absence of windbreaks?
   If present say whether natural or planted and what composed of?
   Natural - ridge, hills in distance, high bush, laestra.
   Planted -

7. Does holder live away from holding? Yes/No.

8. State condition of buildings?

Approximate cost.
Sheet 5.

Equipment.

1. Number of hand implements possessed by holder?
   Hoes
   Forks
   Cutlasses
   Axes

2. Has he a cart or plough?
   Does he possess harness etc?

3. Any other equipment - machines, motors, drying floors, etc?

4. Miscellaneous.

Rotation.

1. Any land rotation or crop rotation. Yes/No.

2. Area kept in pasture?

3. Miscellaneous.
Sheet 6.

Crops.

1. Names of crops.

2. Area under per annum.

3. How propagated, stating origin of propagating material spacing etc. and time of planting.

4. Pre-sowing Cultivation.

5. After-sowing Cultivation - weeding, supplying etc.

6. How harvested and time and method of preparation, if any, prior to sale?

7. How sold, price, to whom sold or used for own consumption or both?

8. If stored, state how and time of storage.

    Price/unit (lb).

10. Any evidence of pest incidence or other diseases?

11. Previous crop and following one.

12. Miscellaneous:
    Pruning.
Crops.

1. Names of crops.

2. Area under per annum.

3. How propagated, stating origin of propagating material spacing etc., and time of planting.

4. Pre-sowing Cultivation.

5. After-sowing Cultivation - weeding, supplying etc.

6. How harvested and time and method of preparation, if any, prior to sale?

7. How sold, price, to whom sold or used for own consumption or both?

8. If stored, state how and time of storage.

   Price/unit (lb).

10. Any evidence of pest incidence or other diseases?

11. Previous crop and following one.

12. Miscellaneous:-
    Pruning.
Minor Crops.

Sweet Potatoes. Planting date.
Varieties
Cultivation

Harvesting and sale or for food.

Diseases.

Cassava. Planting date.
Varieties
Cultivation

Harvesting and sale or for food.

Diseases.

Tomatoes. Planting date.
Varieties
Cultivation

Harvesting and sale or for food.

Diseases.

Peas. Planting date.
Varieties
Cultivation

Harvesting and sale or for food.

Diseases.

Vines. Planting date.
Varieties
Cultivation

Harvesting and sale or for food.

Diseases.
### Egg Plant or Melongee

*Planting date.*

#### Varieties

#### Cultivation

#### Harvesting and sale or for food.

### Diseases

### Others

---

### Economic Trees

<table>
<thead>
<tr>
<th>Oranges</th>
<th>Mango</th>
<th>Coconuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangerines (Portugels)</td>
<td>Avocados</td>
<td>Soursop</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>Nutmegs</td>
<td>Calabash</td>
</tr>
<tr>
<td>Cashew</td>
<td>Figs and plenteins</td>
<td>Others</td>
</tr>
</tbody>
</table>
APPENDIX II. Economic Questionnaire.

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Age</th>
<th>Occupation</th>
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<td>6</td>
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</table>

11. Do you want your children to follow you on this holding?
12. If so, why?
13. Who will inherit the holding?
14. If none listed, no persons, but name will inherit?
15. Who will make improvements?
I Occupier.

1. Name
2. Age
3. Race
4. Were you occupied in any other occupation before taking this holding?
5. If so, what was it?
6. How long had you been doing it?
7. Are you continuing that employment while working this holding?
8. Or are you doing any other work as well as working this holding?
9. Why did you leave it to take this holding?
10. Did you have any experience in Agriculture other than on this holding?
11. Age, number and occupation of family:

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Age</th>
<th>Occupation</th>
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</tbody>
</table>

12. Do you want your children to follow you on this holding?
13. If so, why?
14. Who will inherit the holding?
15. If more than one person, how many will inherit?
16. How much will each inherit?
17. Level of intelligence:
   - Physique
   - Appearance
II Acquisition.
1. When did you take up this holding?
2. Who had it before you?
3. Why did he leave it?
4. Did you purchase this holding?
5. What was the cost per acre (or lot)?
6. How much did you pay down?
7. How much have you paid altogether?
8. How long have you been paying?
9. How much do you pay yearly?
10. What do you still owe?
11. Where did you get the money?
12. If borrowed, how much have you still to pay back?
13. How much did you borrow?
14. Do you rent this holding?
15. How much rent do you pay per annum?
16. Who owns the holding?
17. Do you make any rent payments in kind?
18. Could you be evicted without notice?

III Housing.
1. Do you live on the holding?
2. If not, how far away do you live?
3. Why don't you live on your holding?
4. Do you own or rent the house you live in?
5. If you own it, what did it cost to build?
6. Who built it?
7. How long have you lived in it?
8. When was it built?
9. If you rent it, how much rent do you pay?
10. Who owns it?
11. What is the house built of?
12. How many people live in it?
13. How many rooms has it?
14. What is the size of the rooms?
15. What furniture have you?
16. Have you separate cooking, living, sleeping rooms?
17. Have you bathing and sanitary devices?
18. What is the water supply?
19. What taxes do you pay?
20. Does this include water?
21. Can you use the water on your garden?

IV Holding.
1. How long has this area been cultivated?
2. What is the total area you hold?
3. How much do you own?
4. How much do you rent?
5. What rent do you pay?
6. Would you have more if you could get it?
7. Is there any more available?
8. If so, why don't you cultivate more?
9. How much more would you like?
10. What would you grow?
11. Is all your holding in one piece?
12. If not, how many pieces?
13. What is the area of each piece?
14. How far away from here is the nearest piece?
15. " " " " " " " farthest piece?
16. Have you any rice fields?
17. If so, what area?
18. What rent do you pay for these?
19. Is this your only occupation?
20. If so, why do you do nothing else?
21. If not, what other work do you do?
22. How many days a week does this take?
23. Does it take as long all the year round?

24. For how many weeks a year are you kept busy on your holding?

25. If you could get more land, would you stop outside work?

26. How much of your holding is in ground provisions?

27. Do you grow enough (or more, or not enough) ground provisions to feed yourself and your family?

28. Do you burn charcoal?

29. Do you use this or sell it?

30. If sold, how much do you get?

V Sales.

1. Do you sell any ground provisions?

2. Where do you sell them?

3. Whom do you sell them to?

4. Do you sell to your friends?

5. Do you take them to market or Port of Spain?

6. How much do you get per week, (or month or year)?

7. Have you your own cart?

8. Have you an animal to pull it?

9. If not, how do you take your produce away?

10. Do you sell other crops? (enumerate)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Price per Unit</th>
<th>Quantity</th>
<th>Where sold</th>
<th>Total Price last year.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
</tbody>
</table>

11. What is your total family income?
12. Do you sell any animals?

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goats</td>
<td></td>
</tr>
<tr>
<td>Fowls</td>
<td></td>
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<tr>
<td>Pigs</td>
<td></td>
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<tr>
<td>Cows</td>
<td></td>
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<tr>
<td>Donkey</td>
<td></td>
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<tr>
<td>Mule</td>
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</table>

13. Do you sell any animal products?

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
<th>Where sold</th>
<th>Total Price last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowls</td>
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<tr>
<td>Eggs</td>
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<td></td>
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<td>Milk</td>
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<td></td>
</tr>
<tr>
<td>Calves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young goats</td>
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<td></td>
</tr>
</tbody>
</table>

14. If you don't sell, why do you keep animals?

15. If you had more animals, would you sell?

16. Why have you not got more animals?

17. Do you belong to a Co-operative Society?

18. Do you know what a Co-operative Society is?

VI Payments.

1. Do you hire any labour?

2. What tasks do you hire labour for?

3. Do any of your friends work for you?

4. If so, do you work for them at all?

5. " " do you pay them in money - and how much?

6. " " do you pay them in kind?

7. How many weeks in the year do you hire labour?

8. What is the total amount in a year you pay for hired labour?
9. What do you spend on:

<table>
<thead>
<tr>
<th>Food</th>
<th>Quantity per 2 weeks</th>
<th>Cost Items</th>
<th>per 2 weeks</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td></td>
<td>Clothing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flour</td>
<td></td>
<td>Tobacco</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td>Rum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td>Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saltfish</td>
<td></td>
<td>Land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshfish</td>
<td></td>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter, lard, etc.</td>
<td></td>
<td>Oil, coal, matches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td>Rent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground provisions</td>
<td></td>
<td>Soap</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Doctor, medicines</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amusements</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Do you use a savings bank?

11. Do you keep any accounts?

VII Credit.

1. Where do you get credit?
   - Shop
   - Estate
   - Government
   - Lenders
   - Friends

2. What is the maximum credit you can get?

3. What have you got now?

4. How much can you borrow per week?

5. What interest do you have to pay?

6. Why do you borrow money?

7. Is it more than this time last year?

8. " " " " " five years ago?

9. " " " " " ten years ago?

10. Do you belong to an Agricultural Credit Society?