SURVEYS

OF THE

"ST. AUGUSTINE RICE AREA"

AND THE

"FLORADALE HILL AREA"

TRINIDAD

BY

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1948-1949
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The object of this introduction, is to give a brief account of the position and problems of Agriculture in Trinidad, and the bearing that the following surveys of two district agricultural areas have on these factors:

1. Position and problems of agriculture in Trinidad

Most of the facts here are gained from a Royal Commission Request of 1939 (Ref.1). Though conditions have changed slightly since then, they are not enough to alter the main issues, and, if anything, emphasise the conclusions. Reference is also made to 1949 article in the Economist (Ref.2).

Mineral exports, of which oil products form the vast bulk, are approximately double the value of agricultural exports. Agriculturally, Trinidad is markedly dependent on export crops of which sugar and cocoa make up 73% and 16% respectively of the total. Approximately half the population is dependent on the agricultural industry for employment. This reliance therefore, on two main crops, the financial status of which depend entirely on the notoriously hazardous world trade in primary products, is most unhealthy - witness the tremendous social and political requirements in the British West Indies, as a result of the economic depressions of cocoa and sugar in the inter war period. This danger is further emphasised by the island's dependence on imports for its food supply, this being much greater than any other West Indian Dependency. In 1938 the total agricultural exports were only slightly higher in value than the imported foodstuffs. The value of imports of food per head of population then equaled £3.1.4. - much higher figure now. Pre-war the proportion of home produced food to imported food was slightly under one fifth. The largest items of import were wheat, flour, rice, meat, milk, fruit and vegetable provisions, in that order of magnitude.

Compared to approximately 200,000 acres of land on the island producing sugar cane and cocoa, there are only 20,000 acres producing internally consumed food crops, half of which is rice. Livestock production is almost negligible and occupies a very subsidiary position to that of food crop production.

Some of the reasons for this inattention to internal food production are:

1. A large proportion of the population, employed in mineral industries, grow little or no food at all.
2. High prices for export crops in the last century, and the islands suitability for these crops, caused over specialisation.
3. The soils of Trinidad are, generally speaking, poor and not very suitable for food crop production.
4. Little attention has previously been paid by the Government to the marketing and production of food.
5. A local belief that imported food is ipso facto of a better quality than home grown food.

Coupled therefore, with an agricultural income dependent on the world trade of two primary products, is a marked dependence on an imported food supply; a highly dangerous economic situation. For example since 1948, cocoa prices have dropped 30%, and the sugar industry is clamouring for a long term sale guarantee, to save it from the inevitable slump in the world market, expected as soon as 1952.

That is the position at present, but looking to the future a further problem presents itself, viz: overpopulation. The population at present is about 600,000, or 328/sq. mile, quite a dense population, considering that geographical and agricultural pastures make at least 1/5th of the land agriculturally useless. The average natural increase of population in the last 5 years, equals 2.5%, which means that the population will double itself in 28 years. No future vistas
of employment appear, as oil (\(\frac{3}{4}\) of the island's total exports) is rapidly running out. There are no projects of deliberate birth control and the suggested emigration schemes to British Guiana and British Honduras are too small to be effective, even if they are successful, which at the present seems doubtful.

It seems inevitable that finally the island will have to be aided externally. Meanwhile agricultural remedies that can be suggested are, that the industry should be made less dependent on two export products by diversification, and especially a more balanced and efficient system of food production should be fostered, thus reducing the colony's dependence on food imports.

2. The objects of the two surveys following

Food production is, at the moment and likely in the future, to be dependent on the peasant smallholder. He adopts, except in the rice areas, a farming policy based on shifting cultivation - a wasteful use of land. Livestock have played a very minor part in farming. Any attempt therefore, to increase the output of peasant produced foodstuffs, will probably be dependent on finding a suitable system of mixed farming, to replace shifting cultivation

(a) Survey of the St. Augustine Rice Area

The Agricultural Society of Trinidad (Ref.1) have suggested a rice development scheme on 8-10,000 acres of the Caroni plain, costing £250 per acre to develop. The survey area is on the borders of this plain, and ought to provide some useful indication on the development of the proposed scheme. The survey attempts to discover:

1. What natural factors are essential for optimum rice growing.
2. What form of land tenure is most suitable for the peasant producer.
3. What irrigation and water supplies are necessary.
4. What is the best system of farming to follow.
5. What is the place of livestock in that farming system.
6. What are the problems of peasant holders in that area.

(b) Survey of a 4 mile area N.W. of St. Joseph in the foothills of the Northern Range.

Along the whole North coast of the island, and farming perhaps 1/5th of the island's total acreage, is a mountain range. This land assumes quite a high proportion of the total area which has not been alienated for export, plantation crop production. 75% of this range lies beneath 1,000 ft. and is therefore, not too inaccessible for peasant cultivators.

In the foothills many peasants eke out a living growing food crops on a basis of shifting cultivation, and the purpose of this survey is to discover:

1. The density of gardeners per unit of land.
2. The output per unit of land in relation to the input of labour.
3. Whether the dangers of erosion through shifting cultivation are so great that the land should be afforested or planted to tree crops.
4. Whether the wasteful system of shifting cultivation cannot be replaced by any other farming system, preferably mixed farming. If not, is the present farm sufficient to maintain soil fertility.
5. To find the particular problems associated with hill farming and see if they can be overcome.
6. Whether smallholding food crop production on the hill is economically profitable, or can be improved sufficiently to make it so.
A SURVEY OF THE
"ST. AUGUSTINE RICE AREA"

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SUB-SECTION I : NATURAL RESOURCES IN AREA UNDER SURVEY

(1) LAND:
(a) Area and location
The area consists of a square block of 650 acres, lying between the Tacarigua river on the Churchill - Roosevelt highway, one mile to the South of St. Augustine. In the S.W. corner the border crosses the river, and 75 acres lie on the south of this river (See Maps Nos. A & O).

(b) Topography
The area marks the beginning of the Caroni valley flats and slopes gently to the South. The land immediately South of the Churchill - Roosevelt highway is 6 - 10 ft. higher than the remaining 2/3 of the area, which is approximately 25 ft. above sea level.

(c) Soils
Geologically the area is a young alluvial flat. The parent material is colluvial detritus, derived from the metamorphic rocks of the Northern range, ½ - 1 mile the North. During colluviation, water sorting has taken place, differentiating soil types with different structure properties. Thus there is a range from a high % of sand in the North, to a low % in the south: Golden Grove sandy loam - 38.5%, Pasea and Cunupia clays - 13.5% (Map No.B). The structural and drainage properties, closely affect the type of crop grown and cultivation methods used. Vegetable and sugar cane crops are grown on the free draining sandy soils, and rice on the heavy impeded draining clay (Map No. E). Chemical analysis of these soils show, as would be expected considering the poor quality of the parent material, that they are acid, are deficient in N.P.K. and have a low C/N ratio (Appendix 2).

(2) CLIMATE:
(a) Seasons
The year is divided into well marked Mohr's Classification (Appendix 1) dry (January - Mid-May) and wet (Mid-May - December) seasons. A short dry season of 2 - 3 weeks duration, known as the "Petit Caren" often occurs in Sept.-Oct. Crop growth and agricultural practices are therefore seasonal.

(b) Rainfall
Average monthly rainfall figures for the St. Augustine meteorological station (2 mile due N. of survey area), are given in Appendix 1. Total yearly rainfall has averaged 78". A shower analysis on the Well's system (Appendix 1), indicates that only 17.9" of rain during the wet 6 months, and 2.7" in the dry 6 months, are effective. Therefore any dry season crop must be drought resistant or water irrigation is required.

(c) Temperature and humidity
Average monthly humidity (min. and max.) and temperature figures are seen in Appendix 1, and all show very little variation throughout the year. Temperatures vary between 67 - 72° and minimum humidity between 50 - 60%, being lowest in Feb. March and April, and highest in June at the beginning of a wet season. Thus, linked with the poverty of rain in the dry season, is a lower humidity, causing a higher rate of plant transpiration and therefore accelerating the effects of drought. Max. humidity shows negligible variation.

(3) NATURAL VEGETATION:
Was Evergreen Season Forest. Since that the area has been a sugar estate for 100 years and peasant gardens the last 30 years. Thus only a few patches of waste land are found and species commonly growing on these
are: Cedar (good wood), Poui (fuel), Sandbox (fuel), Buxus (shrub), Casarina (windbreak), Bamboo (timber), Glyceridia (steak), Samaan (pasture shade). On Streatham Lodge Estate, once a swamp, "gru-gru" palm is found.

(4) WATER RESOURCES:

(a) Rivers
The two rivers flowing through the area originate in the foothills of the Northern range (Map No.A). The Tunapuna river originates as the San Miguel, from the run off of the St. Benedict mountain area. Known locally as the Dry River, it outfalls into the Guayacal river, and flows S.W. across the area before joining the Caroni river. The second and larger, the Tacarigua river, arises from another part of the Northern range and forms the Southern border of the area. This is dammed, near its source, to supplement the islands water supply, and again, in the survey area, for an irrigation scheme. All the rivers dry up in the dry season and are liable to flooding in June - August, with the result that considerable erosion of their banks or beds occur, and in some places the river beds are 16 - 20' below normal land level.

(b) Wells
The permeable, detrital parent material of the soil is a good water bearing stratum, and temporary wells 10 - 20' deep are often dug in the dry season by peasants, when other work is scarce, to supplement their water supply (Map No.C).

SUB-SECTION 2 : HUMAN FACTORS
(For further details on this Section, see Ref.No.4)

(1) POPULATION:

(a) Number
Living within the area of 1.02 sq.miles, are 105 families which, with an average of nearly 5 per house = 500 individuals or nearly 500 per sq.mile. A large number of peasants on Streatham Lodge Estate, live in Streatham Lodge Village just North of the estate and not in the survey area.

(b) Race & Class
Very few negroes. Chiefly Hindus derived from the Vaisshya (agriculturalist) and Shudas (untouchable) classes, but class distinction has broken down and free intercourse occurs.

(c) History
The older members of the population and their fathers came from India under the Indentured labour system, which ended in 1919. They worked on sugar estates for 5 yrs., before being granted a plot of land to garden in part payment for their labour.

(d) Main occupation
Very few have another main occupation but some do temporary work in a trade during the dry season.

(e) Social structure
The Indians live gregariously, but are economically independent.

(1) Women and Marriage
Women occupy a subsidiary position to the men, though their treatment has improved considerably during the last few years. They are expected to work on the gardens as well as keep the home.

Marriage is the major celebration in their lives and the total cost of this ceremony averages $200 - 300 of which the bride's family provides the greater share. The marriage season extends from April - June, during the bearing season of the Mango tree, which possesses a special religious significance in the complex rites that take place. Girls normally marry
between the ages of 13 - 16 yrs. and boys 16 - 18 yrs.

(II) Language

The old people can only speak a dialect derived from Hindustani, but the young converse normally in a type of English.

(f) Administration

(I) General: The Warden's Office, Tunapuna division is responsible for the general administration of the area.

(II) Agriculture: Ide in the area supervised by a Field Assistant, whose H.Q. is at St. Joseph, who is responsible to a Senior Agriculture Assistant at San Juan. Their presence is practically unknown, the only recent work in the area being a survey of crop acreages.

(III) Irrigation: The scheme on the government estate is under the control of the Government Hydraulics Dept.

(g) Education

(I) General: Education facilities are fairly good. In Tunapuna there are two schools, a Canadian Mission and a Roman Catholic school. In Curret there are a Canadian Mission and a Church of England school. The Indians prefer the Canadian Mission schools, so the negroes attend the others.

Attendance at school is compulsory for all children between 6 - 12 yrs. of age, but attendance is irregular because children are expected to look after the house when their mother is working in the garden.

Besides the day schools, the Indians have obtained permission and voluntarily set up evening schools in Tunapuna and St. Augustine, to teach their children Hindustani.

(II) School gardens: The Trinidad Department of Agriculture lays much value on these as a method of extension. A good example is the Canadian Mission school in Curret, where the children each spend 1 - 1½ hrs. per week working on an ½th of an acre containing vegetable, grass and cereal gardening, and rabbit, poultry and bee management. The following criticisms can be levelled at these gardens:

1. The headmaster of the school, agriculturally an untrained man, runs the garden.

2. A cup is presented yearly to the best garden with the result that the general aim is to produce a beautiful garden, to the detriment of its teaching value.

3. No special allowances are made to the school for the garden's upkeep.

It is suggested, that a special section of the Agriculture Dept. should concern itself solely with advice on the setting up of school gardens, supplying equipment and giving short training courses to masters, demonstrating the purpose and methods to be used in such gardens and carrying out inspections. The value of 4 H clubs in Trinidad is negligible. It appears that at present little value is obtained from youth extension on agriculture, but the school garden system efficiently run has large potentialities.

(2) LIVING CONDITIONS:

(a) Housing

Observation here is limited to families living in the survey area, and does not take into account tenants or owners of land in the area, who live in Streatham Lodge village, though conditions there are very similar.

There are about 105 houses in the area chiefly adjacent to the Churchill - Roosevelt highway (Map No.C). About 6 of these houses are
built in brick of a European design, but these are owned by businessmen working elsewhere. The rest consist of the typical Indian peasant house (photos: 1, 2, 3) with a porch and 2 rooms. First a framework of timber is put up, then a corrugated iron or thatch roof (the former is gradually replacing the latter), is put on and finally the framework is plastered with a mixture of sub-soil, Tapia grass (Sporobolus indicus) and cow manure suspension.

St. Augustine loam sub-soil makes an excellent base for the plaster. Windows consist of 2 ft. x 2 ft. holes in the wall with wooden shutters. A house of this type will remain habitable for 10 years and is inexpensive to make (i.e. £200). The beaten earth floor is easy to keep clean, and the gap under the eaves provide good ventilation. The only source of criticism is the lack of sanitation.

(b) Water Supply

Consists solely here of a standpipe service (Map No.C). The paucity of standpipes causes much loss of potential labour for the gardens, because of time wasted in queuing for water and carrying it over long distances. A water service rate is charged to houses lying within ½ mile radius of the top, at a rate of 7½% of the rateable value of the house, which for the average peasant house equals 96 cents tax per yr.

Families living on Streatham Lodge Estate, far away from taps, often dig small wells to supplement the water supply during the dry season, when the rivers have dried up.
(c) **Sanitation**

None, as is realised when walking through the area.

(d) **Social amenities**

Only a few scattered houses are separated from the main resident block in the N.W. (Map No. C). There is one small shop, but most trading occurs in the local economic and social centre, Tunapuna, 3/4 mile to the North where there are numerous shops, rum shops and 2 cinemas, the latter two being the main forms of relaxation.

(3) **COMMUNICATIONS:**

(a) **External**

Excellent metalled roads give good communications with Port-of-Spain, the market and trade villages of Curepe, St. Augustine and Tunapuna (Map No. A).

(b) **Internal**

Map No. C, differentiates between metalled roads, non-metalled roads suitable for cart haulage and footpaths. It shows that the government state is sufficiently supplied, but that Streatham Lodge State is short of cart haulage roads. This is due to the past and present deterioration of such roads, being particularly noticeable on the track running through the sugar cane belt, which should be fit to carry much traffic of well loaded carts, but is in fact in such a deplorable condition that removal of the cane is a difficult and dangerous task. Further, bridges and culverts are kept in poor repair, and two broken down bridges have been replaced by single planks, so preventing the passage of carts. If these communications had been well maintained as is the duty of landlord, then they would be excellent.

(4) **FOOD SUPPLY AND DIET:**

Discussion is confined to the East Indian race, because this forms the great majority of the people in the survey area.

(a) **Diet:** This is largely composed of carbohydrate foods such as rice, white flour, and ground provisions, and protein foods such as pigeon peas, other peas and beans, dried fish and goat meat. The staple carbohydrate food of this area is rice of which an individual will eat 2-3 lbs./day - the staple protein food is pigeon peas. The main cooking oil is coconut oil. The main fruits eaten are Mango and Avocado Pear, the latter being a valuable fat supply.

Results of nutrition surveys (Ref. II) show that the biggest deficiency is in Calcium, which can be rectified by adding Calcium Carbonate to the bread. Most other deficiencies can be corrected by encouraging the consumption of milk in schools, peas and beans, green and yellow leafy vegetables and fruits at home. Half the children at least in an average school suffer from dental infections as a result partly of Colloid deficiency.

(b) **Food Supply:** Rice, ground provisions, pigeon peas, other peas and beans and fruits are all grown on the peasant holdings. White flour, certain ground provisions, dried fish, meat, coconut oil have to be bought in the market, or from private shops.

(5) **HEALTH:**

Despite the terrifying figures of the disease rates of venereal diseases, influenza, malaria and hookworm (See Appendix 4) given by the Health Dept., it appeared from general observation in the area that the population was healthy and the children, a reliable indication of the standard of feeding, were strong. Most of the children start work very young (5-10 yrs. old) and the heavy work they perform (i.e. carrying grass to the cattle) eventually has a debilitating effect, so the people become aged and decrepit early in life, and the expectation of life is not as high as that of the European population.

A few of the houses are situated on the lower land, to the South of the main block, and the damper conditions here make the families more susceptible to influenza and pneumonia.
ECONOMIC CONDITIONS:

(a) General

The standard of living is low, but conditions of housing and health suggest that it is sufficient.

(b) Credit facilities

1. Savings Bank at Tunapuna post office - little used.
2. Several agricultural credit banks in the neighbourhood, run by credit societies whose members run their own affairs, with the aid of advice from the Dept. of Agriculture. Little used at present, but the idea has been successful and as the standard of education rises it is most probable their importance will increase.
3. Moneylenders - Little use of these (2 in the area) made by the Indian who prefers to borrow within the family. Their rates of interest are high and security is usually demanded, because the expectation of repayment is well below 10%.
4. Su-Su - This is an indigenous organisation, and is the main form of credit facility. It consists of 15 - 30 members, who elect a secretary to manage the business. Each member pays in a monetary unit, fortnightly or monthly, and lots are drawn by members annually according to the number of units paid in. A member in dire need may draw a lot out of his turn. This acts as an incentive to saving and as an insurance scheme, but suffers from the disadvantage that the money does not appreciate, but depreciates slightly, because the secretary has to be paid for his work out of the funds.

(c) Indebtedness

Most difficult to ascertain, but it appears that the strong tendency for families to help each other out prevents any apparent indebtedness. Although borrowing is frowned upon during that most expensive ceremony of marriage, it is certain that none must take place. Otherwise the Indian peasant is a thrifty person and rarely needs to borrow.

(7) LAND TENURE:

There are two estates in the area (Map No.C) on the East is Streatham Lodge Estate, privately owned land of 350 acres. Lots are rented to peasants here at an average rent of $8 per acre/yr., but the demand for land is such that tenants can traffick their land for extortionate rents, i.e. $100 per acre for sugar cane beds. During recent years, little has been spent by the landlord on the upkeep of an irrigation system, drains, or internal communications, with the result of serious deterioration of these assets.

On the West is the government estate of 200 acres, complete with an irrigation scheme set up in 1945-47 and fine internal communications, for the upkeep of which 1/2 land tax/yr. per acre is charged. I cannot make out whether the peasants on this area hold a freehold or a long term lease, but suspect the former to be correct.

(8) LAND USAGE:

The whole area is gardened by smallholding peasants. (Map No.C), shows that three types of gardening are found, according to the type of soil. About 60% of the area, chiefly on the drainage impeded Fasea clay, is rice, 15%, on the free draining River Estate loam and Orange Grove sandy loam, is sugar cane, while the remaining 25%, consisting of the higher land adjacent to the highway, is covered by house lots and ground provision gardens. The Department of Agriculture have reserved 3 acres of land for rice variety experiments.
Below is given a more detailed table of land usage on Streatham Lodge estate:

<table>
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<tr>
<th>Land Type</th>
<th>Rent</th>
<th>Acreage</th>
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<tbody>
<tr>
<td>Rice land</td>
<td>$10 acre 150</td>
<td></td>
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<tr>
<td>Sugar cane land</td>
<td>$50 &quot; 100</td>
<td></td>
</tr>
<tr>
<td>House lots and ground provisions</td>
<td>$20 &quot; 90</td>
<td></td>
</tr>
<tr>
<td>Pasture and waste land</td>
<td>common land 10</td>
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Note the low acreage of waste land over pasture. On the Government estate there is practically no sugar cane and a much higher proportion of house lots and ground provisions.

9) CONCLUSIONS:
(a) Better supply of water taps necessary.
(b) Development of more efficient school gardens and formation of a special section in the Dept. of Agriculture to carry out this policy.
(c) More varied diet giving a more balanced nutrition.
(d) Greater sense of responsibility on the part of the owner and manager of Streatham Lodge Estate, to ensure that the rapidly deteriorating internal communications and irrigation system, be repaired and maintained.
(e) Prevention of trafficking in leases on Streatham Lodge Estate.

SUB-SECTION 3: AGRICULTURE

1) NATURE OF HOLDINGS:
(a) Size:
Holdings vary from ½ to 5 acres. The majority of peasants garden approximately 1 acre of rice land, plus ½ -1 acre of ground provisions round their houses. This is supplemented on the Streatham Lodge estate with a further 1 - 2 acres of sugar cane.

(b) Compactness
A garden of a particular cropping type is usually compact, but fragmentation of a total land holding is necessary, because ground provision gardens, sugar cane and rice are suited to different soil types.

A few peasants also garden land elsewhere.

2) SYSTEMS OF FARMING:
(a) Sugar cane area
Continuous cane cultivation. Ratoon the crop for 3 - 4 yrs. leave the land fallow for 1 year before replanting.

(b) Rice area
The rotation here depends on the volume and distribution of the irrigation water, but everywhere rice is the main crop. In all areas there is sufficient water to grow an autumn rice crop, but only on a few small low patches of ground on the Government estate is it possible to grow a second spring crop. The first crop is successful ratooned on ½ - ¾ of the Government estate where irrigation water is available, but on Streatham Lodge estate paucity of water allows ratooning only on small areas. During the dry season, a proportion of the rice area is sown to ground provision crops, of which okraas constitute approximately 50%, Sweet Potatoes 20%, Tomatoes 20%, Melongenes (egg plants) and Padi 10%. Approximately 20% of Streatham Lodge estate rice area is under such cultivation and 15% of the Government estate. There seems to be a possibility of increasing the output per unit of land, by growing more crops on the fallow rice area during the dry season.

Pigeon peas are planted annually on the rice beds to supplement the food supply.
(c) Houselots

No fixed rotation can be found here. A wide variation and mixture of crops are grown continuously. Crops grown are: melonenes, yams, tannias, sweet potatoes, cassava, tomatoes, maize, pumpkins, cucumbers and pigeon peas. A few gardens on River Estate loam soil grow small beds of lettuce and carrots, but these require heavy labour because watering is essential.

(d) Livestock

Are not essential, though most peasants keep some stock, notably dairy cattle, goats and draughtstock such as Zebus, water buffalo, donkeys, mules. No special crops are grown for feeding. Their manure is used mainly on sugar cane, the ground provision area and ground provisions grown on the rice beds in the dry season.

(a) Crops and Their Cultivation

(a) Crops

Only arable crops are cultivated in this area. No grass is grown, though a peasant has successfully grown Guinea grass (Panicum Maximum) on the North side of the Churchill - Roosevelt highway.

Scattered tree and shrub crops are found throughout the houselot area.

1. Coconuts: Round most houses, collected or transported by donkey cart to Port-of-Span where sold by "barrow boys".


3. Breadfruit or Chataigne: Former smooth, latter spiny. Several trees in house lot area. Only eaten by Indians when other food scarce.


7. Avocado Pear: Round most houses. Important part of diet.


(b) Implements

All cultivating work is done either with a hoe or with the European type garden fork. For weeding the cutlass and hoe are used. A short (9") sickle is used for cutting rice. For threshing rice a bamboo stand is used (see Rice).

(c) Weeds

With good cultivation practice weeds are not a serious factor in this area. Below is given a classification of the species:

Ubiquitous - Stachytarpheta cayennensis

Rhytis sp.

Sida sp.

Sedges on rice beds - Cyprus rotundus

" cuyulae

Eleocharis caribaea

" subtilis

Grass weeds on house lots - Eleusine indica

Sporobolus "

Useful forage weeds on ditches etc. - Bidens pilosa (railway daisy), useful forage

Paspalum conjugatum (sour grass) - useful forage if food scarce

Axonopus compressus (Savannah grass) - useful forage.
It appears from observation that more attention is required in weeding rice beds, many of which suffer from weed competition.

(a) Growing

Below is given a resume in note form, of the characteristics of the cultivation of the main arable cash crops in this area. No survey was carried out on the details of cropping in the house lots, where crops are grown mainly for home consumption, and only the surplus, if any, is sold.

1. Rice:

How grown - First the seed is sown in a nursery, and when 40 - 60 days old the plants are transplanted into the main rice beds.

Nursery - A 64 sq. yd. nursery is required for 1 acre of transplanted rice. 12lb. of rice are broadcast over this area on a lightly forked soil. The nurseries are placed near the houses so that a watch can be maintained to keep stock away.

Sowing is done at the beginning of the wet season, i.e. end May - Mid June. If sowing rice early in nursery, can cover the seedbed with a sugar cane mulch. This keeps the soil moist and at an even temperature, thus forcing the rice. By this means one can obtain a 3" growth of rice one week after planting.

Date of planting - 40 - 60 days after nursery sowing, i.e. July to August.

Rice-bed preparation - From May onwards most gardeners cutlass their rice bed and repair bunds. Then dig with fork and cutlass weeds prior to final ploughing; this kills off most weeds. Finally let in 4" of water, plough and harrow with wooden implements, let in more water and transplant.

Planting method - Transplanted by hand. Space 1' apart, 3 - 5 seedlings per hole - 150,000 plants per acre.

Manuring - Very few put pen manure on their rice beds. Many apply up to one cwt. of sulphate of ammonia per acre. This can be broadcast before the water is let in, or a bag of it is placed in front of the inlet drain prior to introducing water.

Intercultivation - Yield is strongly affected by weed and water control. There is very little weed competition in this soil and little weeding is required. Actually, better yields could often be expected if greater attention was paid to weeding, which is rarely carried out at all. A water level rising from 6" - 1' is kept continually on the beds until mid Oct., when no further water is supplied by the irrigation scheme.

When harvested - Takes 60 - 80 days to mature after transplanting, i.e. end Oct. - Nov. Rice stubble may then be reflushed and ratoon crop taken from end Dec. - Jan.

How harvested - Is cut by hand with a short rice sickle to a stubble of 3 - 4" and threshed on the spot, on bamboo frames. The thrasher catches hold of the sheaf of rice by the stubble end, and then beats the heads against the frame. This is an efficient but slow method.
Yield - Main Crop = 10 - 16 barrels = 1,000 - 1,600 lbs.
Ratoon Crop = 2 - 3 barrels = 200 - 300 lbs.

Spring Crop - Receives the same treatment as autumn crop. The rice is transplanted into the beds at the end of Nov. and harvested Jan. and Feb.

Uses - The grain is the staple starch food of the Indians; only the surplus over that required for home consumption is sold.

Varieties grown - Popular white vars. are Joyah (early) and Jarrahan (late). Many red types, i.e. Demerrared, grown. Some very poor.

Pests - No very important pests in the area.

Diseases - Bunt (Tilletia horrida) last year caused some loss. Is an unimportant disease.

Milling - One mill in Streatham Lodge village supplies the area. Cost of milling 6 - 7 cents (or 1 lb. milled rice) for 30 lb. rice. Unmilled rice is 70% rice + 30% husk.
2. Sugar Cane:

How Grown - Is first interplanted with vegetable crops, but is left as a pure stand when the vegetables are harvested.

Land preparation - Hand forking and ridging.

Planting date - End of wet season z Dec. - Feb.

Planting method - The sugar cane is interplanted with okroes, pigeon peas and tomatoes. The 24' wide cane beds are ridged, and on the ridges the vegetables are grown, and in the troughs the cane.

Manuring - Pen manure is usually applied when planting and also about 2 cwt. of sulphate of ammonia.

Intercultivation - The ground provisions are removed after their harvesting, i.e. April to May, and the ridges are then moulded back against the cane. The cane is bushed three times annually with a cutlass.

When harvested - 1st harvest occurs 15 months after planting i.e. Mid. Jan - Mid. May and thereafter every year for 2-3 years. There is a tendency for harvest to be late in the season because estate factories crush their own cane first. Peasants claim that there is some loss through delay in cutting.

How harvested - The cane is cut with curlylasses. Cannot reduce heavy work in cutting by burning because would burn neighbours cane as well. The factory reduces the price by 60 cents per ton for burning.

Yield - The yield is 25 - 35 tons per acre.

Market - The peasant carts to the factory at Orange Grove, 1 mile to the East, at the time specified by the factory.

Main Uses - Main cash crop. Cane tops are used for stock feeding and mulching land, i.e. rice nurseries.

Varieties - BH 1012 the favourite because it is not a very trashy cane and requires less labour than many others. It is fairly disease resistant, though susceptible to the many rot diseases. It is a good "poor man's cane".

Diseases and Pests - Worst is Froghopper (Tasmacis sacharina) on ratoon cane. Control by putting B.H.C. round stools in March-April.
3. Okras

How planted - Usually as a pure crop when grown on the rice beds in the dry season, but mixed with others in the ground provision area, and with sugar cane when planting (See Sugar Cane).

Planting date - After the first rice cut, i.e. Mid. December.

Planting method - On rice beds - First put rice straw back on beds to conserve moisture and keep the soil cooler during the dry season. Then fork an 8" diam. space in the mulch and sow the see.

Seed rate - 10lb. per acre. Spacing = 2½' x 2½' z 15,000 plants per acre.

Manuring - A pinch (½ oz.) of Sulphate of Ammonia is placed round each plant when 4" x 5" high = ½ cwt. per acre. Emphasis on putting it in a ring 3" x 6" away from stem, so as to cause roots to spread. Manuring ensures anearly crop which may catch the higher early season prices.

Intercultivation - Weed and mould the soil round the stem twice during January.

When harvested - 8 weeks after manuring i.e. end of February. It can be harvested until Mid. May. After that it becomes too hard and the rest is kept for seed.

How harvested - Pick every other day.

Yield - 1,800 - 2,500 lbs./acre.

Uses - Major dry season cash crop on rice area and for home consumption.

Diseases - None recorded.

Varieties - Dwarf varieties are favoured, as yield is as high as tall varieties and mature earlier, thus again making an early market possible.

4. Tomatoes

How grown - First grown in a seedbed or young plants bought from outside. Transplanted as a pure stand on to rice beds as dry season crop or intermixed on ground provision area as sugar cane beds (See Sugar Cane) with maize, melongenes and okras.

Seed bed - Forked. 4 packets of seed (30 cents per packet) per acre.

Transplanting - When 3 - 4 weeks old, i.e. Middle - end of January. Fork holes 2½" x 1½" apart in rice straw mulch on rice beds. It is possible to buy plants from St. Augustine propagation station for 35 cents for 25 plants. The peasants claim this is too expensive.

Intercultivation - Weeding twice and moulding earth round plants once. Plants require watering a few times towards the end of the dry season when water table has dropped low.

When harvested - 3 months to mature, i.e. end of April and May.

Yield - If well watered 2,000 lb. per acre. If no watering yield reduced considerably.

Uses - Cash crop. Too expensive for home consumption.

5. Sweet Potatoes

How grown - As a pure stand in ground provision area, as on the rice beds during the dry season.

Planting date - December.

Planting method - 6" x 9" stem cuttings (with leaves on) and planted on ridges prepared with a fork or hoe, 2½' wide and 1' deep.

Intercultivation - Weeding required between the ridges. One peasant intends to try sowing Woolly Eyrol (Phaseolus Mungo), a quick growing legume, to see if it would choke weed growth. It would also provide a certain degree of N to the soil, and give a useful yield of seed for sale.
8. **Planting sweet potatoes.**

6. **Melongenae or Egg-plant**

How grown - Chiefly in housetop area as a mixed or pure crop. A few are grown in the rice beds of Streatham Lodge estate. Estate during the dry season. Grown like tomatoes and seed bed and then transplanted.

**Planting Date** - March - May.

**Transplanting Method** - Sown 2' x 3' apart, on ridge or flat. Put pen manure in transplanting hole.

**Intercultivation** - Weeding and moulding.

When harvested - 3 - 4 months to mature. **Yield** 2 - 3 crops before pulling up the following May.

**Yield** - 8 fruit per plant.

**Uses** - Cash crop and home consumption.

7. **Pigeon Peas**

Are grown in the housetop area and on the bunds of the rice beds when they are planted in June and harvested in February. Mainly for home consumption.

8. **Lettuce**

How grown - Lettuce and carrots are the two temperate vegetable crops, which are grown by a few peasants on the Golden Grove sandy loam.

**Seedbed** - Seed is brought from the Government control board and put in a fine seedbed. Plants are ready for transplanting after 3 - 4 weeks.

When transplanted - December.

**How transplanted** - Make raised beds 2'6" wide by 4" high. Plant 3 rows along the bed. Plants are dibbled in.

**Manuring** - When transplanting put a little pen manure in each hole.

**Intercultivation** - Weeding and watering. When possible irrigate between the beds and splash water if necessary. Otherwise much labour required for watering.

When harvested - Mid.- end January.

**Uses** - Cash crop only.
(a) Beliefs

The majority of gardeners hold the same superstitions and plant according to the state of the moon, as those in the hill area (Cropping section). One exception, plants according to the stars or rather according to the translation of their good or evil power in an almanack, i.e. Gemini is bad and Scorpio good. Another, a most eloquent Christian Indian, believes that it does not matter when you plant, so long as you let your seeds dry and warm in "God's sun" before planting. Then every seed that will germinate at all, will do so, within three days, i.e. the Resurrection period.

(4) LIVESTOCK

(a) Types and Nos.

1. Cattle: Form the majority of the livestock. Draught types are Zebu, except for a few water buffaloes. Milking types range from Zebu to high grade Friesians, the majority being between ½ to ¾ grade Friesian, plus a few of Channel breeds extraction.

2. Donkeys: Many peasants own donkeys for draught purposes.

3. Goats: Many peasants own goats for milking.

4. Poultry: A few own poultry, but the numerous half starved dogs which each Indian family owns are bad pests.

5. Pigs: Hindus will not keep them. Have only seen 2 pigs belonging to one of the few negroes in this area.


(b) Housing

1. Cattle: Kept in a bamboo framed shed with a thatch roof. No systematic attempt is made to make pen manure. Usually very little little bedding is supplied, and most of the urine runs to waste, as the beaten mud floor is usually raised to provide for such drainage. The faces are collected as required for manuring and are not stacked away cleanly.

2. Poultry: Kept in any sort of dog proof box, or roost in the open.


10. Donkey harness and cart.

11. Poultry house with cattle shed in the background.
(c) Feeding

1. Ruminants - Mainly rough grass from the roadside of weeds from the fallow rice beds. During the wet season all the stock are found tethered on the roadside verges and on the ditches in the rice area. The luscious sword is dominated by two coarse species, Savannah Grass (Axonopus compressus) and Bamboo grass (Pandanum fasciculatum). Along 200 yards of the Churchill - Roosevelt highway 22 cattle, 7 donkeys, and 5 goats were seen grazing one day in October. Savannah grass has a P.E. (Protein equivalent) of 1.5 and 13.4% carbohydrate. Presuming a cow grazes a minimum of a 100 lbs. per day that gives 1.5 lbs of protein equivalent, the limiting factor, which is sufficient for maintenance and 1 1⁄2 gallons of milk under temperate conditions. Preliminary work by Harrison (Ref.5) and Paterson suggests that, if anything less protein is required for maintenance under tropical conditions, then the .7 P.E. of temperate conditions.

In the dry season this supply of food literally dries up, and a tethered animal cannot reach enough of the desiccated roughage to maintain itself, and further, even the roughest grazing becomes scarce. As the owner may have to travel several miles to cut grass and weeds and considerable quantities of this almost valueless "food" are required per beast, even to maintain it in a semi-starving condition, this may prove the major occupation of a peasant during the dry season. Grazing on the fallow rice beds help a little. Goats and donkeys are by nature resilient to such nutrition deficiencies and appear little the worse, but all the cattle, even the Zebu draught animals, and the mules, appear very emaciated by the end of the dry season (See Photo.15). Although the Zebu type is considered to be more resistant to unfavourable conditions, general observation in this area shows no difference in the degree of emaciation of Zebu's and approximately 3 grade Friesians (in appearance).

It would be interesting to investigate this further, because, if this observation proves true, the higher milk yielding and better tempered high grade Friesian may well replace the lower grade Friesians and Zebus as dairy cattle. Sugar cane gardeners can usefully supplement grass roughage with their sugar cane tops during the dry season.

Approximately 20% of the peasants in this area sell milk, and whilst the cows are usually expected to produce milk solely on rough grazing in the wet season, they receive a supplementary feed during the dry season. The common concentrates in use are coconut meal (16 P.E + 73.6 S.E.) costing 25 per 100 lbs., and a mixture of bran, molasses and salt. Feeding averages about 7 lbs. of coconut meal per milking cow per day, which is equivalent to 1.1 lb. P.E. which is sufficient to supply maintenance and 2/3 of a gallon of milk. The aim in management is to calve down in April-May, so the maximum part of the lactation falls in the wet season. Yield averages vary between 2 - 4.00 gals./lactation, so during the end of the lactation when yields are unlikely to be above 1 gallon/day, this rate of concentrate feeding plus the small amount of nutrients in the 100 lbs. or so rough roadside grass cut and carried to each beast per day, appears sufficient and in many cases could be reduced. A comparison between photos demonstrates that young stock require supplementary fed during the dry season, and that 2 lbs, coconut meal/day per yearling is sufficient. Draught animals do not, but also ought to, receive a concentrate ration. Feeding of concentrates should vary according to yield, because the price of coconut meal is so high that profits from selling milk will be negligible if it is wasted. With this fact in view and the heavy demands made on labour cutting and carting roadside grass it is suggested that a certain proportion of stock food may be grown on the fallow rice beds in the dry season. Legumes have a high protein content and it may be possible to grow, say Woolly Byrol (Haseolus Mungo) on the rice beds or between certain ground provision crops, i.e. sweet potatoes.

It would be unreasonable to recommend permanent grass crops, which would replace crops with a higher economic output under this environment.
2. **Poultry** - Are fed on maize grown in the house lot area and podilusak, and a large part of the time are left to scavenge what they can find.

This type of stock is of minor importance and is not considered further in this report.

(d) **Manure**

Fen manure is collected from the cattle sheds as required, for manuring crops. No attempt is made to supply enough bedding to absorb the urine and make the maximum amount of manure, or to store it properly. The poor quality manure that is available is applied to the sugar cane beds when planting and to the house lots, and to dry season crops on the rice beds.

(e) **Management**

Housing and standards of cleanliness are most primitive for dairying. No attempt is made to drain away the urine or cover the faeces, so that there is a high fly population. Milking operations are not efficient or as clean as required for hygienic dairying, especially in a tropical country, where the dangers of disease infection through milk, and the turn off rate of milk are higher, because of the more rapid rate of multiplication of microorganisms. There is a high incidence of Tick (Boophilus sp.) infection, on which experimental spray work is required.

(f) **Conclusions**

1. A ½ grade or over, Friesian cross Zebu appears to be a more efficient milk producer than the lower grade Friesian or pure Zebu in this environment.
1. Extension is required on:
   1. Correct balanced feeding of cattle, and feeding dairy cattle according to yield.
   2. Better management, i.e. More hygienic housing and efficient milking conditions.
   3. Making manure. Optimum use should be made of stock as manure producers. Either, shed floors should be sunk and a satisfactory supply of straw put in daily to make good manure and keep the shed hygienic, and store the manure thus, or, the manure should be cleared out daily and tightly packed in a stack outside, until required for crops. Tightness of stacking is emphasised, as this prevents a high loss of nitrogen through ammoniation.
   3. Experiments are required: To find suitable crops, especially legumes, to grow as catch crops between the ground provisions and on the fellow rice beds. The aim of these crops is to supply feed for stock during the dry season.
   4. Utmost use should be made of the bye-products of the crops grown in the area, i.e. rice straw for bedding, rice husks, sugar cane tops, ground provision crop for feeding.

It appears that if the above problems are successfully overcome, an extremely useful cattle industry (dairy or breeding draught animals for sale) could be built up to supplement the main income derived from crop sales, to use up crop bye-products and to provide the maximum amount of organic manure for the crops.

5. SOIL FERTILITY AND MANURES
   (a) Soil Fertility
   Analysis of soils in this area (Soils Section) show them to be acid and markedly deficient in N, P and K. This shows that a nutrient conversion system, i.e.

   nutrient in crop --- in manure --- in stock

   will not overcome this shortage, but that they will have to be imported from outside as artificial.

   The yields of sugar cane and rice appear to be low, and application of inorganic fertilisers may give increases.

   (b) Manures
   1. Organic: This is confined at present to applying very low quality pen manure to the ground provision area, sugar cane, dry season crops on the rice beds and sometimes to the rice itself. Certainly the utmost should be made of the nutrient conversion cycle, because artificial is expensive and great improvement is needed in the preparation and storage of pen manure, giving more quality and quantity.

   At present the manure may be dumped near its place of future application several weeks early, so by the time it is applied to the ground it has completely dried out, and is of very little value. Rice straw, after harvest, is left on the rice beds as a mulch. This adds some organic matter to the soil.

   2. Inorganic: Nitrogen is the only nutrient supplied in inorganic form, but soil analyses suggest that Phosphate and Potassium are required. It may be possible to aid nitrogen manuring by growing legumes, as catch crops on the fallow rice beds, and between suitable ground provision crops. This is especially worth considering in view of the high cost of sulphate of ammonia ($10.50 per bag of 210 lbs.)

6. SOIL EROSION

   Chief danger of erosion is to the river and ditches association with the irrigation and drainage system.

   There is some, but unimportant erosion, on the highly cambered sugar cane beds.
(7) DRAINAGE AND IRRIGATION:

North of the Tacarigua river, the water drains naturally into this river. In the section of the survey area south of the river, drains flow back to the river or to the Caroni factory skimming drain.

(a) Government estate

1. Survey - The government during 1945-47 built a dam on the Tacarigua river and set up a controlled irrigation scheme at a cost of $2,000 (Map No.D). The scheme is controlled by the Water Hydraulics Dept. and is supervised by a water bailiff, who controls the water level and maintains the ditches. Day and night watchmen are on constant duty, to control the water level and prevent peasants from tethering livestock on the banks of ditches, or bathing or fishing. Previously 2 men were employed in the upkeep of ditches which are damaged by erosion and zingee (eels), which burrow into the sides of the banks and cause most damage. This year no men are employed, and the ditches have deteriorated with the result that uneven flooding occurs in section D.3 and D.4. The watchmen now do essential repairs. Gardeners are responsible for opening and closing holes in bunds, to supply their gardens with water.

Appendix 6 is a diary of water supply during 1948 and shows the seasonal rise and fall of water in the Tacarigua river, and also the variation due to the action taken at the Caura dam, which holds water for the island's drinking supply, 9 miles upstream. There is no correlation of operations between the two dam authorities and this often makes irrigation control difficult.

Water for D.5 and D.6 used to come from a temporary dam across the Tunapuna river, but in August 1948 floods washed it away and at present no water is available for these areas. The dam on the Tacarigua river is not well constructed, and water is able to flow around the side of it, thus eroding its foundations.

It is difficult to supply water for a second rice crop in Nov.-Dec. because areas under Okra, and Beoli would be flooded and destroyed. Therefore very few peasants can grow a second rice crop.

The skimming drain, running from E to W in the South of the area, was flowing at an approximate rate of 18 cu.ft/sec throughout the dry season, after all other water supplies had dried up. If it were not for the harmful chemicals from the sugar factory waste, this is an excellent potential supply for a dry season irrigation, at least for the area south of the Tacarigua. Provision of such a scheme, would allow a tremendous increase in output of ground provision crops from the fallow rice beds, or provide for a good second crop of rice.

2. Recommendations:

1. Erection of a permanent dam on the Tunapuna river to irrigate areas D.5 & D.6.
2. Repair the main dam on the Tacarigua river, to prevent its foundations being washed away.
3. Employment of labour to maintain the banks and ditches.
4. Correlation of water control between this scheme and the Caura dam.
5. Investigate the chemical constituents of the water in the Caroni drain to see if it is harmful to plant growth. If not, consider setting up a small subsidiary scheme for dry season irrigation.

(b) Stratham Lodge Estate

1. Survey - No efficient irrigation scheme if available here, and the volume of water in the ditches and the rice beds depends on the immediate rainfall. No attempt to provide irrigation water or to maintain ditches and culverts is made by the manager, resulting in alternate periods of drought and flooding and several cut communications. Peasants further the destruction of the dilapidated ditches by allowing their livestock to graze.
on their banks. Although the first rice crop can be grown and only a few beds lost through flooding, it is impossible except in a few low lying areas to raise this rice crop successfully.

2. Recommendations:
   1. Set up an irrigation scheme.
   2. Repair existing ditches and culverts.
   3. Prevent peasants from grazing livestock on the banks of ditches.
   4. Maintain labour to keep such a scheme.

18. Method of carrying water.

(a) Rice

Majority of this crop for home consumption and only the surplus is sold locally at an official price of 4½ c/lb. but according to one peasant the unofficial price rises to a ceiling of 14 c/lb. retail.

(b) Sugar Cane

This is sold to Orange Grove factory at a price of £7.25 ton. It is transported one mile to the factory on carts drawn by donkeys, bullocks, water buffaloes and mules.
(c) Ground Provisions

These are sold in the local markets of Tunapuna (1 mile N) and Curepe (2 miles N.W.). Prices are controlled at approximately the same level in all three markets, but produce sells faster at Fort-of-Spain and warrants the extra expense of transport by donkey and bullock cart.

The supply and price position in Curepe market (Appendix No.5) shows a considerable variation throughout the year. For instance, at the beginning of the 1949 season the price of pigeon peas was 10 cents/lb. but 14 days later it had dropped to 5 - 6 cents/lb. Assuming a steady demand, the price is primarily affected by the supply. If, therefore, the supply could be better distributed by storage, the prices would vary less and the demand would remain on a higher average level.

Certain crops, i.e. pigeon peas, cereals and root crops, can be stored inexpensively at home and extension on the need and methods of storage may help to carry this out. Storage of perishable crops, i.e. tomatoes and okra, is too expensive to be considered either by individuals or a locally formed co-op.

(9) PROBLEMS AND CONCLUSIONS:

It appears, that the system of land usage and agriculture followed is suited to the environmental potentialities of this area. Output per unit of land could and may be increased by the following suggestions:

(a) Crops and Cropping

1. Greater use to be made of the rice area during the dry season, 2/3rds at present lies fallow.

2. Improvement in manuring crops:

   1. Experiments with N.P.K. inorganic fertilisers on crops.
   2. Experiments with legume crops on fallow rice area in dry season and between ground provisions, i.e. sweet potatoes, to help nitrogen supply.
   3. Extension on improved methods of making and conserving pen manure.

(b) Livestock

    Could form a far larger part of the income of the peasant, either by developments in dairying or in raising draught cattle for sale.

    Improvements are required in:

    1. Management and feeding.
    2. Development of legume and other feeding catch crops on the fallow rice area, or between ground provision crops for feeding, and so reduce concentrate expenses and labour required for cutting roadside grass roughage.
    3. Extension on making and conserving pen manure.

(c) Irrigation and Drainage

    2. Streatham Lodge Estate : Set up an irrigation scheme.

    The final analysis in the detailed survey will attempt to show if, under the present conditions, peasants on both the estates are able to make enough profit from their holdings to maintain a reasonable standard of living.
INTRODUCTION:

Below is given an outline of the social, economic and agricultural status of two peasants. The main items of interest and the economics of growing the two main crops of this area, sugar cane and rice, and from these costings it is hoped to draw some tentative conclusions regarding the standard of living that can be maintained under the present system of farming.

PEASANT A:
Race - Indian. Age - 30 years. Family - Wife, son 2 yrs. old, daughter, 9 months old.
Habitat - Streatham Lodge village in typical peasant house (see General Survey).
Health - Apparently good.
Main occupation - Works on a U.S.A. base at Makareep in 12hr. shifts. Does 6 days work, then has 6 days off. Pay = £35 per week. During 6 days off he works on his holding. Thinks job is unsafe and is investing his money in land.

Holdings - Area

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<thead>
<tr>
<th>Product</th>
<th>Amount</th>
<th>Value</th>
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<tbody>
<tr>
<td>Sugar cane land</td>
<td>2 acres</td>
<td>£7.50 acre</td>
</tr>
<tr>
<td>Rice</td>
<td>1/4 acre</td>
<td>£4.20</td>
</tr>
<tr>
<td>House lot</td>
<td>1 acre</td>
<td>£5.50</td>
</tr>
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</table>

Rent

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<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
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<td>Streatham Lodge estate</td>
<td>£7.50 acre</td>
</tr>
<tr>
<td>Streatham Lodge village</td>
<td>£2.20</td>
</tr>
</tbody>
</table>

Sitting

Sugar cane land is very valuable and he had to "buy" it from the original tenant for £65/acre, and is buying some more now at £100/acre.

Fertility - See General Survey.

Livestock - Owns 2 milking cows only. Yield in Nov. 1948 (i.e. 7th month of lactation) = ½ gal. per cow per day. Fed on roadside during wet season and on sugar cane trash during day.

System of farming:

(a) On rice land - Grows one crop of autumn rice only.
(b) On house lot - Continuous cultivation of ground provisions.
(c) On sugar cane land - Continuous cultivation of cane.

Ratooned 3 times. Plants - tomatoes, okras and pigeon peas when planting cane.

Cropping - Follows that outlined in the General Survey.

Marketing - Sells the sugar cane. Sells only the surplus ground provisions and consumes all the rice.

Sugar cane costings

(a) Expenditure - per acre.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent</td>
<td>£7.50</td>
</tr>
<tr>
<td>Hand forking (1 man per 5 days)</td>
<td>10.00</td>
</tr>
<tr>
<td>Planting</td>
<td>8.00</td>
</tr>
<tr>
<td>Cost of Sulphate of Ammonia, 2 bags of 210lb. @ £10.50 per bag</td>
<td>21.00</td>
</tr>
<tr>
<td>Cost of carting manure, 2 days</td>
<td>6.00</td>
</tr>
<tr>
<td>Bushing 3 times year @ £10 per time</td>
<td>30.00</td>
</tr>
<tr>
<td>Cutting, 3 tons day (yield 30 tons/acre)</td>
<td>20.00</td>
</tr>
<tr>
<td>Transport to factory @ £1.20 per ton</td>
<td>36.00</td>
</tr>
<tr>
<td>Sundries, i.e. cost of planting materials, implements, etc.</td>
<td>30.00</td>
</tr>
</tbody>
</table>

Total = £183.70

(b) Income - per acre. 30 tons cane @ £7.25/ton = £217.50.

Value of tops and trash as feed. No estimate made.

(c) Profit.

Profit therefore £4.9/acre or £1.63/ton. This is rather higher.
than his estimated profit of $1.20/ton, taking his own labour into account.

Expenditure on ratoon crops will be approximately $30 less, i.e. cost of
forking, planting and manuring, but gross income will be similarly low,
because of a 4-5 ton drop in yield which occurs in ratoon crops.

Net income will therefore be approximately the same.

Actually, his own financial expenditure will be, when labour is employed,
vis: the starred items on the expenditure list (He does not own a donkey
or cart) = approx. $60/acre.

Therefore, discounting the cost of his own labour, he is making a net
income of $157.50 per acre or $5.25/ton. From his 2 acres of cane
therefore his net income is $314.

Total income = From working on U.S. base = $375.
          From 2 acres of sugar cane = $314. Total = $1,189.

Expenditure - Comparatively small. Main supplies of ground provisions
and rice come from his houselot and rice garden. Probably buys rice
ration as well 2½ lb/individual/week @ 70/c = $26/yr. for his family.
Also buys fish and meat at $50/yr. and extra ground provisions at $60/yr.
Also buys clothes, light, rates and has to pay for travel to and from
U.S. base.

Conclusion - Sugar cane pays a handsome profit and it is little wonder
there is some trafficking with sugar cane leases. He could maintain
a fair standard of living for his family without the work on the U.S. base.

(3) PEASANT B:

Race = Indian. Age = 50 years. Family = Wife.

1 son = book keeper in Fort of Spain
1 son = banker
1 son = 16 yrs. old at St. Mary's College.
3 sons = at school
4 daughters.

He supports his entire family at home, free of rent and living costs.
His book keeping son helps to pay the college expenses for the 16 yrs. old.

Habitat - lives next to the "Monarch" cinema, in St. Augustine, in a
European type house. His standard of living is higher than that of
the normal peasant.

Health - Apparently good.

History - Was working in the Government survey department for 15yrs.
Bought a shop in April 1945.

Main occupation - Keeps a general store in Tunapuna. Gardening is a
subsidiary occupation. His wife looks after the shop while he is
gardening. During the holidays the children help him.

The shop - Rent = $5-600 yr.
7½% Rates = $45 yr.
Water Rates = $10 yr.

Had to borrow money to set up shop but it pays well now.

Holdings - Owns 2 holdings (left by father). On the Government Estate,
3 ½ acre - gardens himself.
2 acre - his brother gardens - rent free.

Refused an offer of $600 for his 3 ½ acre of land, besides it worth over $300.

Fertility - See General Survey.

Livestock - Only a few chicken kept for home consumption.

Food supply - Supplies himself and family from his 3 ½ acre holding. Buys
extra ground provisions, beef and fish, but could not estimate the work.
Pigeon peas grown on the rice bunds, and okras grown on the rice bed in
the dry season offered a good supplementary supply.
System of farming - Autumn planted rice = main crop.

In dry 1/20th acre in okra.
Remaining 14/20th acre lies fallow.

Growing - follows that in General Survey.

Economics of Rice Growing -

(a) Costs /2 acre

- Parking of stubble .. .. $8.00
- Outlassing prior to ploughing .. $8.00
- Ploughing (contract) .. .. $14.00
- Sewing (5 people for 2 days + 1)
  @ $1.50/day for women .. .. $8.50
- Harvesting (5 people for 2 days + 1)
  1 day to harvest .. .. $9.50
  1 day to thresh .. .. $9.50
- Milling: 7c/lb. for 14 barrels .. $3.24
- Seedbed preparation + cost of seed and
ton sundries .. .. $6.00

Total expenditure .. .. $56.24/2 acre

(b) Income:
From 1/2 acre yield of milled rice = 1,200 lb @ 5c/lb. = $60.

(c) Profit: Profit from 1/2 acre = $5.66 if the cost of his labour is
accounted. But if this is not taken into account (stared items
plus part of other costs), his costs are depreciated by $25,
leaving a profit of $23.66/2 acre at $38.20 per acre.

Conclusion - His small acreage of okra has not been costed.
From a financial point of view rice growing does not pay well,
but it must be remembered that this is their staple food and is
subject to further consideration therefore, than the financial
returns would suggest.

(4) CONCLUSION:

Unfortunately, neither of the peasants are really typical of
the gardeners of this area, because they both belong to the minority
group which have another main occupation. They are included, because
they gave the most detailed accounts of the economics of rice and
sugar growing.

The limited conclusions that can be drawn are:

1. Sugar cane is an extremely profitable crop.
2. Rice has other important considerations viz: Its place as the
staple food of the people, besides its low financial return.
   It is felt that the low yield in this area could be increased
   considerably, by improvements in manuring, water control and
   cultivation practices.
A general and detailed family survey has been carried out of 650 acres, of land known as the St. Augustine's rice area.

For greater details on observation and conclusions, reference should be made to the correct sections, as only the main conclusions are outlined below.

1. Observations on natural environmental factors are included and the main conclusion of agricultural importance is the nutrient deficiency of all the soil types.

2. Observations on health, diet and living conditions of the people in this area, indicate that the standard of living in this area is low, but, with minor alterations, sufficient.

3. A note is made of the absence of agricultural extension influence in this area, and the need for much improvement in the school gardening method as the most effective form of youth extension.

4. The area is approximately bisected into a well run, government owned estate of 300 acres and a poorly run private estate of 350 acres.

5. Drainage, irrigation and communication facilities are good on the Government estate, but have deteriorated badly on the private estate and need immediate repair.

6. The type of crop grown is primarily affected by soil type, and three distinct cropping areas are apparent, rice, sugar cane and ground provisions (housetlot).

7. Holdings vary in size from $\frac{3}{4}$ to 5 acres, and fragmentation of a holding is necessary, because of the influence of soil type in determining the most suitable crop to grow.

8. Details of crops and their cultivation are given, and it is suggested that:
   (a) Increases in the yields of nearly all crops could be produced with the greater use of organic and inorganic manures.
   (b) Crops should be developed to grow on the fallow rice in the dry season.

9. Observations on livestock feeding, management and conservation of pen manure, show that with the enormous improvements possible, a most important dairy or draught animal rearing industry, could take the place of the present subsidiary position it occupies in relation to crop output.

10. A valuable irrigation scheme operates on the Government Estate, but minor improvements are required. Rice growing is more hazardous on the private estate, as no reliable scheme is in use and it is suggested that one is necessary.

11. Storage of ground provision crops, may help to level out the variable prices in the island's markets for these crops, so making their production less of a financial hazard.

12. The incomplete detailed report of two, unfortunately atypical, peasants, suggests that the present system of farming is sufficient to allow a fair standard of living, and, on the sugar cane land, a most excellent financial return. The low yield of rice prevents a good financial return, and one of the main crop agronomic aims should be to increase this yield by at least 25%.
15. A final general assessment concludes that the type of farming is suited to the environmental, sociological and agricultural potentialities of the area, but there is plenty of room for improvements in crop and livestock production by the farms, and in the management of Streatham Lodge private estate, by the landlord.
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- Soil

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- Vegetation
- Vegetation
- Vegetation
- Vegetation
- Vegetation

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- Survey

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5. FOOD SUPPLY AND DEMAND
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(1) LAND:

(a) Area and location

The area of 400 acres selected for survey lies in the foothills of the Northern Range, 1/2 mile north of the village of St. Joseph (See Map No. A).

(b) Topography

The land rises steeply from the 200' contour line at the south end of the area to 2,000 at the top of the ridge to the North. The area therefore predominantly faces South, and is sheltered from the prevailing N.E. Wind.

It is dissected by two coumbes, the larger on the West containing a continuously running stream. There are therefore three watersheds, the smallest being the central. (See Map No. E). The slope of the land varies widely and erratically and can be well over 30°. (Photos No. 1-4)

Photos 1-4 illustrate the topography of the area, also shows the result of erosion after clearing bush.
The soil is a free draining lithosol of a mica derivation, varying in depth from 3 - 4 to 8 or more inches according to the degree of erosion. The rapid decomposition of the parent rock by weathering compensates partly for its susceptibility to erosion, which is considerable on the steep slopes.

The results of a sketchy and incomplete soil survey carried out in 1948 (Appendix 3), showed such a wide variation through every degree of factors affecting fertility, that no general conclusions may be drawn; perhaps a further survey linking sampling with the gradient of land may produce a correlation. The survey shows a tendency for slight accumulation of organic matter in uncultivated land, but a more complete survey is required designed to show:

(1) The effects of cultivation on virgin land.

(2) The effectiveness of secondary bush as a soil renovator.

**CLIMATE:**

*Seasons*

The year is divided into marked Mohr's classification, (Appendix 1) dry (January to Mid-May) and wet (Mid-May to December) seasons. A short dry season of 2 - 3 weeks duration, known as the "Petit Caren", often occurs in Sept. - Oct. Growth and agricultural practices are therefore strongly seasonal.

*Rainfall*

Average monthly rainfall figures for the St. Augustine meteorological station, (2 miles SE of the area), are given in Appendix 1, but in this high area rainfall tends to be 10 - 20" higher per annum. A short analysis on the Well's system (Appendix 1) indicates that only 17.9" of rain during the wet six months and 2.7" in the dry six months are effective. Actually, it is probably considerably less than this on the hillside, when the rate of run off will be higher. Therefore any dry season crop must be extremely drought resistant.

*Temperature and Humidity*

Average monthly humidity (minimum and maximum) and temperature figures for the St. Augustine station, are seen in Appendix 1, but the hill temperatures will show a greater diurnal variation and a lower daily average (3 - 7°) than the given figures. Humidity values are probably higher in a zone with higher rainfall and protected from the prevailing wind.

**NATURAL VEGETATION:**

The original vegetation is tropical evergreen forest with a proportion of semi deciduous species. This has only been preserved at the extreme North of the area. On the cultivated area occasional Cedar, Crappo, and Immortal trees are found. Cedar, Crappo, Sip, and Mahogany are all timber value trees that will grow in this area.

The effect of continual rotational burning and cultivation in the area, is to reduce the number of timber trees in favour of the invasion of quick growing bushy trees and fire resistant palms. Therefore the secondary bush is composed of the following: - Trash palm, Gru-gru palm, Cocorite palm, Corn grass and Bamboo, Balisier in the valleys, and a few species of Sandbox, Locust, Yellow Poui, Matchwood.

Whether the eventual effect of shifting cultivation, based on a short bush fallow period, will reduce the land fertility to a degree so that the rotational vegetation will consist entirely of valueless grasses is unproven; though certain authorities (Ref.No.6) think that the St. Joseph Savannah, a hill area to the east of the survey area, where the vegetation is now predominantly valueless grasses, (i.e. Sword grass); arose by continual annual burning. Erosion is even sufficient under natural vegetation to prevent the formation of a complete soil profile. (Ref.7).
(4) WATER RESOURCES:

The only water supply is a small continuously running stream of clean water, arising at the top of the ococum, and flowing down it to eventually join the St. Joseph river (Map No. E).

All, except three, of the families working hill land live outside the area, so a household water supply is not important.

Agriculturally, water is only required to water crops during the dry season if an optimum yield is to be obtained. The nature of the terrain makes it impossible to use the stream for watering.

SUB-SECTION 2 : HUMAN FACTORS

(1) POPULATION:

(a) Number

Approximately twenty families work on the 300 acres under survey.

(b) Races

The majority are East Indians, the remainder being negroes, some of creole origin.

(c) Main occupation

Most are full time gardeners during the wet seasons and obtain subsidiary employment, usually in a trade, during the dry season. Now that the U.S.A. naval base at Makareep (NW corner of the island) employs far fewer labourers than during the war, spasmodic employment is becoming increasingly difficult. At least two gardeners have main employment elsewhere and cultivate their gardens in their spare time with the help of their wives.

(d) Social structure

Only three families live in a wooden shack a third of the way up the La Baja road (Map No.E), the rest living in the nearest part of the village of St. Joseph, and walking to their gardens daily.

(e) Administration

The Warder's office is responsible for the administration of the whole area, its chief duties being the control of hill fires, and maintenance of regulations affecting clearing and burning bush. It also has to prevent "squatters" clearing and burning land in the Government reserved area, which is under the control of the Forestry department.

(f) Education

At St. Joseph there are 2 Roman Catholic schools, 1 Government school and 1 Church of England school. Education facilities are therefore good.

General education and agricultural education are discussed in further detail in the report on the St. Augustine Rice Area.

(2) LAND TENURE:

(Map No.E)

89 acres, Providence Estate, around Floradale was purchased by the Government in 1943 at $50 per acre and is controlled by the Forestry department.

87 acres in the ococum is owned by Mrs. Sankers, and four tenants garden in this area at a rent of $5 per acre, per yr. No subletting is allowed and suitable tenants are persuaded to remain in occupation. All holdings are let to tenants on a yearly contract basis. The policy of this owner is to maintain the fertility of the hillsides by replanting the estate to a mixed plantation, as the owner and overseer consider that the present system of gardening is rapidly deleting fertility. The remaining four tenants are merely kept to meet the expense of government land tax which equals 2½ cents/acre for 87 acres = $20.88, as against an income of $20 per yr. from rents.
The remaining 300 acres, occupying the ridges and combe to the east and north are owned by R. Hanndes, Esq., an absentee landlord living in San Fernando who is chiefly interested in a good financial return which is considerable with 16 peasants paying a rent of $8 per acre per yr. The exploitation of land and peasant is much greater on this estate.

Both private estates maintain an overseer, who is granted rent free land and free access to any plantation produce left on the estate, as means of payment for day to day supervision. He allocates new land for tenants, collects the rent and is responsible for the upkeep of roads and paths.

This cash contract system of tenure offers an interesting comparison to the metayer system seen in the St. Benedict Valley 2 miles to the east where each contractor is responsible for 10 acres of plantation crops. He receives back a% the price of the products of these crops as payment for his work. Further a contractor can grow provisions to supply himself and family on cleared patches where tree crops are being replanted or where the land is vacant, the bailiff will buy the surplus at market prices. The contractor is paid for extra work such as replanting plantation crops and cutting wood. (Ref. No.8).

The Government policy regarding the foothills of the Northern range is unknown, but the following recommendations have been made:

(a) Evans report of 1936. All watersheds to be kept under forest and no gardens allowed.
(b) Conservator of Forests in 1936

(1) Acquisition of entire foothills over 500'
(2) Above 500' only forest and permanent crops to be planted.
(3) Below 500' proper measures of soil conservation to be enforced.
(4) To carry out (3) Government legislation would be required to control cultivation on private land.
(5) Improve methods of fire protection and control and prevent predial larceny.

Except for the purchase of Providence estate, no further action has been taken on this policy.

(3) LIVING CONDITIONS:

The three families living in the wooden shack on the hill exist under bad conditions. Each family (one with 3 children) lives in a single room 12' x 16', with no sanitation or water supply. The remaining families living in St. Joseph, occupy typical houses (see St. Augustine rice area report) and also enjoy the amenities that the social and economic centre for the neighbourhood can supply.

(4) COMMUNICATIONS:

(Maps Nos. A and E.)

(a) External


(b) Internal

The main internal arterial is a donkey path, too steep and narrow for cart haulage, is Baja road, which, joining the end of the tarmac road at Floridale, leads a third of the way up the hill. This is a Government road and is repaired by the Tacarigua local board once or twice a year. From this road, many footpaths branch off to the whole area and the upkeep of these is the responsibility of the owners of the estates over which they run.

(5) FOOD SUPPLY AND DIET:

(a) Indian

The staple food of the Indian is rice, which an individual will consume to the extent of 2 - 3 lbs per day. Protein is supplied mainly
by pigeon, peas and fish, the cooking oil used is coconut oil. Eaten to a lesser degree, are ground provisions and goat meat.

The foods, except for fish which is bought, salted and dried, and rice, are all grown in their gardens. Coconut oil is usually bought.

The Mango is an important fruit both in a religious and dietetic sense for Indians and most families grow Mango trees round their houses and some are grown on the hillside.

(b) Negroes

The negro eats a far wider range of diet, and rice plays a less important part, whilst ground provisions are of greater importance. Further, most negroes keep a few hens around their houses for home consumption.

Agriculturally, therefore, the Indian tends to concentrate on cash crops in his hill garden, whilst the Negro grows a greater proportion of ground provisions for home consumption.

For a more detailed discussion, on this section, see report on St. Augustine Rice Area.

(6) GENERAL HEALTH CONDITIONS:

As far as could be ascertained, families were all in good health. Rapid senility occurs in the older age groups as a result of overstrain and overwork when young. Children, though dirty, appear healthy.

(7) GENERAL ECONOMIC CONDITIONS:

High rents, combined with high labour costs, do not allow very profitably returns from hill gardening, so their standard of living is usually low. On the other hand, they are practically self-supporting and are therefore more resilient than most self employed groups, to large economic changes, especially depressions. No cases of indebtedness were discovered and no use appears to be made of credit facilities.

(8) LAND USAGE AND PROBLEMS:

(Map No.E).

Three methods of land usage can be seen in this area :

(a) Forestry

This is to be developed in the 89 acre Providence Estate, owned by the government, and is advocated for all land over 500', and for watersheds by the Forestry Dept. As yet the bush is growing at random, and no forestry policy is being pursued on this estate. Economic timbers such as Cedar, Sip and Mahogany can be successfully grown on these hillsides.

(b) Plantation

This is being developed in Mrs. Sankers' 87 acre estate. It is thought that a mixed plantation of coffee, cocoa, bananas and tannas beans will provide practically as effective cover against soil erosion as the natural forest does, and will also prevent severe economic depression likely to occur from over specialisation in one crop, which crop may suddenly lose demand. For example, most of this estate was planted in cocoa, an important export cash item, but in the depression of the 1920's, it became uneconomic to even pick the cocoa, and the plantation was allowed to go derelict with the result that only 6 - 7 acres, containing approximately 500 trees, are left alive at the top of the cocomb.

(c) Gardening

The third method of land usage is that of small 1 - 3 acre gardens based on shifting cultivation, with at present a 2 yr crop period and a 3 yr. renovation period under secondary bush. This is not strictly a bush fallow, because the land under bush is not rented, and a tenant does not necessarily rotate in the same area of land, but can make his garden in any suitable area of bush. At present the majority of the area, constituting about 60 acres of Mrs. Sankers' estate and the whole
300 acres of R. Hanandes estate, produces crops in this way, except for 70 acres of virgin forest. There are 4 tenants on Sankers' estate and approximately 16 on Hanandes. A glance at these figures indicates the large area of land required by each tenant = 15.5 acres.

The apparent discrepancy between the rotation acreages (for 2 acres under cultivation per yr. and a 3 yr. bush fallow period, 8 acres of total land are required per holding), and the above figure is accounted for by uncultivable acres such as steep, rocky land, paths, and patches of old plantation.

(d) Best type of land usage

Before passing judgment on present farming in the hill area, in comparison with plantation or forest usage, it is necessary to carry out a detailed survey of the agricultural system and find answers to the following questions:

1. What is the extent, and eventual result, of soil erosion under peasant gardening?
2. Is a three year "bush fallow" period sufficient to prevent a gradual deterioration of soil fertility?
3. Does hillside cultivation cause repercussions elsewhere, such as on irregular water supply coupled with damaging floods, in the flat lands to the south?
4. Can a peasant farm profitably and securely on the hill, in view of its natural disadvantages of inaccessibility, creating high transport and marketing costs, and rapid loss of fertility through erosion nutrient leaching?

SUB-SECTION 3 : AGRICULTURE

(1) NATURE OF HOLDINGS:

(a) Size

Two to three acres equal the average size of garden in actual cultivation; but associated with it are 6 - 9 acres of land recovering fertility under secondary bush.

(b) Siting

Along the stony base of the coombs and the top of the ridge in the north, which is under forest, there are no gardens. Except for the plantation area in Mrs. Sankers' estate, the gardens range all over the private estates. Gardens are not allowed on the Government estate. The higher land is more favoured because it has not been so long under cultivation and is supposed therefore to be more fertile. There is apparent disregard for slope, and gardens can be seen on land with a slope of 45° or over.

(c) Compactness

All holdings are contracted out in acre lots, but tenants usually contrive to obtain lots close together, even if not in a complete block. A few peasants also own or rent land elsewhere, and nearly all rent ½ acre house lots on which they grow ground provisions.

(2) SYSTEMS OF GARDENING:

(a) Rotations

There are no fixed rotations, and systems of gardening are very variable. Further, growing a great number of inter-mixed crops, a practice more followed by the negroes than the Indians, makes it more difficult to analyse any definite rotations.

1. A basic 2 yr. rotation used by the Indian is:

   1st year: Cutlass and burn prior to rains in May.
   Plant tomatoes in June and harvest in Aug-Sept.
   " pigeon peas " " "  Dec-Feb.

   2nd year - Land is much less fertile:

   Plant tannia all yr round, and harvest when mature.
Plant cassava in May, and harvest after 1 – 1½ yrs.
" maize in May–June, and harvest in Sept.–Oct.
" pigeon peas in June, and harvest in Dec.–Feb.
A variation on this to ensure a more even distribution of work during the year is to plant in the:
1st yr : during the "Petit Carem":
a mixed crop of:
Salad Beans in Nov., harvested in Dec.–March.
Pigeon Peas in Dec., " " Oct.
(2) Another 2 – 3 yr rotation used widely by the negroes with different variations and with more diversified cropping than number (1) is
1st year : cutlass, burn in May.
Plant rice in June, and harvested in Sept.
" pigeon peas " , " Dec.–Feb.
2nd yr. & 3rd yr. cutlass in May :
Plant cassava in May, and harvest 1 – 1½ yrs later.
" tomatoes in June, and harvest in Sept.–Oct.
" tannia all yr. round, and harvest when required.
Again, similar to rotation (1), a piece of land may be planted during the "Petit Carem":
Plant maize in Oct., and harvest in March
" tomatoes in Oct. and harvest in Jan.–Feb.
" salad beans in Nov. and harvest in Dec.–March.
" pigeon peas in Dec., and harvest in Oct.
" cassava in Dec. and harvest 1 – 1½ yrs. later.
Amongst both the above rotations random plants of pumpkins, cucumber, yams and okras are grown on any patches of available ground. There are many variations on these two most tentative attempts to rationalise the many systems of farming.
(3) These two apply to gardeners who consider it their main occupation, but those who rely on outside employment for a main occupation, and rent small gardens, cultivated in their spare time, mainly for the purpose of producing household supplies, a rotation requiring less supervision and work has been developed. The land is cleared in May as usual and planted with a variable mixture of ground provisions including cassava, tannia (or dasheen near the stream where the soil is always wet), pigeon peas, salad beans, maize and yams, and these are harvested when suitable and when required. As a piece of land is harvested so it is replanted. As the majority of crops planted are root crops and also as the mixed crop provides a good soil coverage, soil fertility is not so rapidly depleted and this process may continue for 4 yrs. before the land is returned to bush.
(b) "Bush fallow"
The land is allowed to revert to secondary bush after the rotation has been finished. At present it lies under bush for approximately 3 yrs. before recultivation, and an important question is whether this period is long enough for the land to recover its full productivity, in view of the loss of actual soil and nutrients by erosion during cultivation, and the absence of manuring in the rotations.
(3) CROPS AND THEIR CULTIVATION:
(a) Crops
Pigeon peas and tomatoes are the main cash crops grown by Indians
and negroes in their gardens. Other hill garden crops used for both cash and subsistence are:— Maize, rice, cassava, (bitter and sweet varieties) salad beans, tannias, dasheen, yams, okra, pumpkins, cucumber, banana. No grasses are cultivated at all because of the unimportance of livestock in their farming system. Successful plots of Elephant grass (Pennisetum purpureum) and Guatemala grass (Tripsacum laxum) have been developed, at a height of 500', on the St. Benedict hill to the East.

(b) Clearing and burning

Prior to cropping, the 6 - 12' high bush has to be felled by cutlass. A permit for burning the felled bush must be obtained from the Warder's Office, which will not issue them till May. The permit stipulates that a 10 ft trace must be kept clear round the area of bush to be burnt, two men at least must control the fire, and the operation must be carefully carried out with due regard to direction and strength of wind. Contravening these regulations makes the tenant liable to prosecution.

No general cultivation of land occurs after burning, only patches immediately affected by planting are hoed, up to a 6" depth, according to the crop and depth of soil.

Burning effectively kills all weed seeds in the soil and little weed growth occurs in the first year of cultivation. In the second year, when crops are less vigorous and the soil has not been heat sterilised, weed competition becomes a serious problem and certain crops, notably cereals, should not as a rule be grown, whilst all crops need a thorough weeding three or four times during the year.

(c) Implements

The only soil cultivating implements used are a type of pickaxe and an iron hoe. The shallowness and rocky nature of the soil makes other cultivating implements impracticable. In native hands both prove to be effective cultivators.

For weeding, two implements are used. For cleaning the high weeds a cutlass is used; for clean weeding crops such as tomatoes and salad beans a scraper (drawing) is effective.

(d) Cropping

Below is given a resume in note form of the relevant details regarding the cultivation of the main crops in this hill area:—

1. Pigeon Peas
   How grown — Usually grown with an undercrop planted between the rows, which is harvested when the peas reach 3 - 4' high.
   Land preparation — Hoeing.
   Planting date — May - June or October.
   Planting Method — Dibble in 5 - 6 seed to one hole.
   Spacing — Plant in rows six to eight feet apart or 2 - 3' within rows.
   Manuring — None.
Later cultivation - Weeding with outlass once or twice. 
When Harvested - With summer planting, Dec.-Feb., or with autumn planting, the following Feb., when a small crop is obtained or November when a much heavier crop is picked. Can pick continuously for six weeks.

How harvested - For sale, pick green peas daily throughout the period.

Yield - 1,400 - 1,600 lbs. per acre.

Uses - A good protein feed (22% C.P.) much valued by Indians especially. Valuable cash crop.

Diseases - Pests.

Varieties - Usually much mixture but two main varieties are Lasierva and Tobago.

Misc - Crop can be rotted after harvest, but this is rarely done because a much lower yield is obtained in the 2nd year, and whereas in the first year it is resistant to a stem boring pest, this becomes a danger in the next year.

2. **Tomatoes**

How grown - Grown either as a pure or mixed stand.

Land preparation - Hoeing.

Planting date - June or Oct-Nov.

Planting method - Plant 8 - 10 seeds per hole.

Spacing - Varies with type of cropping, from 2 - 4' apart.

Manuring - None.

Intercultivation - Thin to 2 - 3 plants per hole when 6" high. Weed cleanly with outlass and scraper, and mould soil round stem once or twice.

When harvested - With summer planting in Aug-Sept. With autumn planting in Jan-Feb. Harvest over a 6 week period.

Yield - 1½ - 2 lbs. per plant = 1,400 - 1,800 lbs per acre.

Uses - Valuable cash crop. All sold as too expensive for household use.

Diseases pests - Eshit occurs on the autumn crop, which also suffers from drought in Dec-Jan.

Varieties - Stone, Red Rock and other English varieties.

5. **Clean weeding tomatoes with hoe.**

3. **Maize**

How grown - Usually grown in a mixed crop.

Land preparation - Hoeing.

Planting date - May - June, or Sept - Oct.

Planting method - Dibble in 2 - 4 seeds per hole, 2 - 3" deep = 8 lbs seed per acre.

Spacing - Very variable, average of 5' x 5' according to type of cropping.

Manuring - None.

Intercultivation - Weeding and moulding twice.

Yield - 1,000 - 1,400 lbs. per acre.

Uses - White varieties give good flour and porridge. Yellow varieties make good stock feed. For cash, subsistence and poultry feed.

Disease & Pests - None recorded in area.

Varieties - Mixed stock used.

4. Hill Rice

How grown - Grown as a pure crop as with few maize plants.

Land preparation - Hoeing. Land must be very clean as it cannot compete with weeds, so only grown on land just cleared and burnt, or after a clean weeded crop, usually tomatoes.

Planting date - June

Planting method - 2 - 3 seeds drilled per hole.

Spacing - 7” between plants.

Seed rate - 20 - 80 lbs. per acre.

Manuring - None

Intercultivation - Weeding.

When harvested - September.

How harvested - Cut and threshed by beating ears on a wooden frame.

Yield - 1,000 lbs - 1,400 lbs unmilled rice per acre.

Uses - Basic stock food, especially for Indians, who keep it all for subsistence. Negroes sell some.

Diseases, Pests - Very few. None recorded in area.

Varieties - Red Vars. very common.

5. Salad Beans

How Grown - Always grown in a mixed stand.

Land preparation - Hoeing.

Planting date - June or Oct - Nov.

Planting method - 3 - 4 seeds dilled per hole.

Spacing - Very variable, as crop usually fills in spaces between other already planted crops.

Manuring - None


Yield - 2 - 300 lbs of seed per acre.

Uses - Picked green for salad or dry for seed. Most sold.

Diseases, Pests - Blight common in Sept - Oct. growing.

Varieties - Black seeded varieties only grown.

6. Cassava

How Grown - Grown in a mixed or pure stand.

Planting Date - Planted in May or Oct - Nov.

Planting Method - 2 stem cuttings 8 - 12” long are pushed into 2 holes (as seen in the drawing and photo) made with a pickaxe.
Spacing - 4' x 4'.

Intercultivation - Weeding and moulding.

When harvested - The sweet variety takes 1 year to mature, the bitter 1½ yrs.

Yield - Sweet, 1½ lb. per plant; bitter = 2 lb. per plant.

Uses - Bitter vars. are made into cassava flour, the sweet, after removal of skin, make a good stock and human food. Act as good food reserve during a drought. Chiefly subsistence, some sold.

Varieties - Sweet varieties most commonly planted.

7. Tannia

How grown - Grown in mixed cropping often with plantains and banana.

Planting date - Planted throughout year as area of land becomes free.

Planting Method - Plant tubers.

When harvested - Take 6 - 12 months to mature.

Yield - Up to 11 lb. per plant.

Uses - Good starch root food. Chiefly for subsistence.

The remaining crops, yams, okras, dasheen, bananas, pumpkins and cucumbers are either too unimportant or too irregularly planted to even attempt to regularise their cropping in the same way as has been attempted with the above crops. It must be pointed out that the variation in types of mixed cropping make any assessment of spacing when planting, seed rate and yield very approximate, given merely because it is impossible, without carrying out a long term survey of yields on each mixed crop grown on the hill, to give any idea of the productivity of the area.

(e) Superstitions

An interesting feature of their cropping system, is a belief shared by both the Indians and Negroes that the moon strongly influences the growth of plants. For instance, pigeon peas must be sown 3 days after the full moon, because if sown before they will grow too high. Similarly, root crops must be sown, if the roots are to develop properly under the ground, 4 days after the full moon. Tree crops must be planted 3 days before or after full moon in order to get a vigorous tree with a high yield. Planted at the new moon a slim, small fruited tree will be produced. Pruning and picking also done according to the moon in some cases.

A survey of scientific literature showed, that whilst many investigators found no correlation between any phase of plant growth and the moon, a Russian, Kalisko, claims that planting 2 days before full moon can give a lasting stimulus to plant growth. The only other evidence to second this, is the indirect evidence of a group of workers who found that moonlight is slightly plane polarised, and plane polarised light of low intensity increases the hydrolysis of starch, and may produce a very slight increase in the growth of plants. In conclusion, it is safe to say that even if the moon has any effect on plant growth at all it is too negligible to be a factor to be considered...
Weeds

Burning the land effectively prevents weed competition in the first year of cultivation. Progressively during the succeeding year weeds, of which corn grass (Rottboellia Exaltata) is the most serious, become a limiting factor, and eventually act as a co-deciding factor with loss of fertility in returning the land to bush.

Crop Diseases

Diseases, generally speaking, are not epidemic in this area, but a localised attack upon a small area, such as was witnessed with pigeon pea infected with a root disease during Jan. 1949, may have severe repercussions upon a peasant who can at the best expect only a low margin of profit.

DRAINAGE AND IRRIGATION:

The soil is free draining, and the whole area drains naturally into the stream in the combe and so into the St. Joseph river (Map No.5).

Water is only required for the tomatoes and salad beans during the dry season, and possibly during planting of these crops. But the terrain of the land makes any suggestion of watering systems impossible, except for gardens adjacent to the stream.

LIVESTOCK:

(a) Number and Type

These occupy an unimportant and accessory part of hill farming. Most peasants only possess a few poultry and/or a pig or two, some of which they sell and the rest they eat. One gardener successfully runs a small pig unit, and another rears one or two cart bullocks yearly.

(b) Feeding

Poultry and pigs are fed on by-products and inferior quality produce from the hill gardens. The bullock owner tethers his bullocks on the hill while he works and so obtains free grazing.

(c) Housing

All livestock are kept near the peasant’s houses because:

(1) Predial larceny on the hill is very common and small stock could easily be stolen.

(2) Building sheds to house stock would be very difficult in isolated areas.

(3) Whereas gardeners do not work every day on their hill gardens and often do other full day employment, livestock require daily attention and therefore must be kept close to the peasant’s residence.

(d) Manure

Pen manure from the stock is not returned to the hill gardens, because of the tremendous labour required to carry an appreciable amount up a hill where only a donkey can travel.

(e) Conclusion

It is not proposed to discuss livestock further in this general section, because they are entirely extraneous to the hill gardens, the main problem under discussion.

SOIL FERTILITY AND MANURES:

(a) Manures

It can be seen (Crop Section), that no manures of either organic or inorganic nature, except the small amount of nutrients derived from the ash residue from burning the bush, are used during a 2-4 year rotation in which all the crops are removed from the land. A minor benefit to the nitrogen supply is obtained from the two leguminous crops grown, pigeon peas and salad beans. The peasant cannot afford to buy
artificial manure, i.e. \( \geq 5 \) per 100 lbs. of S/A, which would be rapidly leached out by the heavy rains on such sloping land, and the distance and poor roads from his homestead, where his livestock (if any) are kept, prohibit the application of pen manure to the garden.

(b) Bush fallow

Therefore he relies almost entirely upon his "bush fallow" of 3 yrs. to restore:

1. A good structure to a soil which has deteriorated through incessant cultivation and erosion.
2. A good supply of nutrients lost through selling crops produce and erosion.

Evidence from an overseer, on the hill for many years, indicates that yields are greater on virgin forest land than on oft cultivated secondary bush; i.e. 2,000 lbs. of maize and rice per acre against, 1,000 - 1,200 lbs. Further, on virgin land, bush will regenerate to a height of 4 - 5' in one year, whereas patches of more cultivated land are barely covered by bush after 2 yrs. The overseer maintains that crop yields are steadily declining and in his opinion, the soil requires 8 - 9 yrs., under secondary bush to recover its full fertility. That would mean, for an average holding of 2 acres, there would be 16 acres of secondary bush and therefore 9 holdings would replace the 20 holdings at present in occupation unless more land was taken into cultivation. However, direct experimental work is required on the problem of restoring fertility, combined with investigations upon the control of erosion which would lessen the "fallow" period.

(7) SOIL EROSION:

(a) Forest and secondary Bush

Erosion is sufficient to prevent the formation of a soil profile but is not catastrophic.

(b) Plantation crops

As far as could be ascertained erosion appeared to be more than (a) Enough to make it sociologically apparent.

(c) Gardens

Evidences that considerable erosion does occur are:

1. Shallow soil (3-4"), in many places combined with the exposure of underlying rocks.
2. Appearance of minor landslips on the steeper slopes.
3. The large volume of silt to be found in the St. Joseph river, especially at the beginning of the rainy season, which allows peasants owning land in a loop of the river, (Map No.A) to carry on a very profitable, continuous cultivation of tomatoes and cabbages merely by annually flooding the area and letting the silt deposit.

The effects of the erosion are:

1. To raise the level of the St. Joseph river bed and therefore make storm flooding in the wet season more common.
2. Loss of fertile soil and break up of soil structure on the hillside. Fortunately, this loss of soil and nutrients is partly compensated by the rapid weathering of the parent rock (See Soil Section). On the steeper slopes, erosion is much too rapid to maintain an equilibrium, and the shallow soil left is very susceptible to drying out and frequent large losses of yield of crops, such as tomatoes and salad beans, are caused by drought during the dry season. Further, the appearance of underlying rocks makes cultivation difficult.

Incidence of erosion occurs:

1. Throughout the period of cultivation; especially with a clean weeded crop, such as tomatoes, which do not effectively cover the soil surface.
2. After cleaning and burning the bush when the first torrential
rains of the wet season (Mid-May) occur. These heavy storms beat on a completely bare soil, causing immediate break up of soil structure and considerable sheet erosion, and on the steeper slopes minor landslides. This is when the greatest part of erosion occurs during the cultivation system. Unfortunately, firing the bush is not well controlled, and the enforcement of fire burning regulations (See Systems of Farming) by the Warden's office is not very strict. Therefore fires get out of control, and most years nearly the whole hillsides is damaged by fire, leaving vast tracts of easily erodible bare soil, where the accumulative effects of soil wash are only too apparent.

Measures suggested to control erosion are:

1. Crops should be planted on the contour. Only one peasant in this area follows this policy.
2. That a mixed crop giving good soil coverage should be always used.
3. That a crop cover should be maintained throughout the rotation, especially during the wet season, as far as possible.
4. All weeds, pulled or cut, should be left lying on the surface as extra soil protection, or if necessary rolled on to the contour to act as contour banks.
5. All gardens to be separated by strips of protective bush. This would slightly increase the cost of clearing and burning.
6. By far the most important, that burning should be much more strictly controlled, and strong measures taken against peasants who let fires get out of control through their own negligence. Experiments could be carried out to find:
   1. If burning could be done at the very beginning of the dry season, thus giving the vegetation time to grow over before the beginning of the rains. This was found to be successful in Uganda with a rather different type of vegetation (Ref:10).
   2. If, better still, burning could be dispensed with entirely, or the cut bush rolled on to the contour, where it would act as a contour bank.

It is doubtful if either of these methods, especially No.2, would be successful because much more labour would be required and weed growth would be much greater.

At the present, erosion could be considerably reduced by getting the simpler remedies carried out. To do this a strong extension campaign is required, though there appears to be no machinery to do this.

(8) MARKETS, STORAGE AND TRANSPORT:

(a) Transport and Markets

Except for a few peasants who own donkeys, the crop produce is all carried off the hill to St. Joseph by hand. It is then taken, by hired donkey carts or vans, to the local markets of Curepe (2 miles S.E.) or St. Augustine (3 miles S.E.) or to the capital, Port-of-Spain, (8 miles West).

Prices are controlled at approximately the same level in all three markets, but in the larger market of Port-of-Spain provisions sell at a much greater rate and therefore many peasants prefer to entail the greater expense of transport.

The transport costs make the cost of marketing a considerable factor, in the costs of production.

(b) Prices, Supply and Storage

The supply and price position in Curepe market (appendix 5) show considerable variations throughout the year. For instance, at the beginning of the 1949 season, the price for pigeon peas was 10 cents/1b,
but a fortnight later it had dropped to 5-6 cents/lb. Assuming a steady demand, the price is primarily affected by the supply. If, therefore, the supply could be better distributed by storage, then prices would vary less and on the average maintain a higher level. But about a third of the hill produce, tomatoes and salad beans, are perishable and cannot be cheaply stored. The remaining crops, pigeon peas, cereals and root crops require only protection from pests and could easily be stored at home. The peasant cannot store them on the hill because of considerable praedial larceny, which is the reason for a certain loss of standing crops. Extension on the principles and practice of marketing and need for storage may help to overcome this problem.

There is no solution to the problem of the high labour cost involved in carting produce from the hill. To build a cart road for 20 peasants over such terrain is uneconomic. Similarly, it is doubtful if a co-op for 20 farmers, to transport their produce to market and possibly for storage, would be large enough to be economic.

(9) PROBLEMS:

Problems associated with hill gardening can be divided into two types:--

(a) Those arising from the inaccessibility of the position:--

1. High costs of transporting produce to or from the gardens
2. Separation of the homestead from the hill garden.
   1. Much wasted time and energy travelling to and from the garden.
   2. Therefore, only go to garden when essential and crops suffer from lack of supervision.
   3. Praedial larceny is simple and is rife in this area.
   4. Wife cannot devote spare time to gardening if house to be kept properly, because too far away. Therefore either the holding or the home tends to be neglected.
   5. Stock cannot be kept on the holding because daily supervision is necessary.
   6. Pen manure from the stock is not put on the land, because of the difficulty in getting it to the gardens.

(b) Those associated with the type of land on which the holdings are situated.

1. Heavy losses of soil through erosion.
2. Rapid loss of fertility via. erosion and leaching of nutrients.

These problems can to a large extent be remedied (Fertility and Erosion sections).

The problem therefore narrows itself down to:--

(a) Can the small peasant gardener still maintain a steady profit, allowing him a fair standard of living, in face of the insurmountable problems of (a), provided (b) problems are remedied? To answer this an attempt to analyze his present income and expenditure must be made (Detailed Section), and a conclusion drawn from that.

(b) Or would the output per unit of land, be greater under forest or some type of plantation cropping, and the income per peasant be higher if he were working as a cash labourer in this area, instead of being a self-employed gardener? I do not possess the required knowledge to answer this, but make a few suggestions below.

(10) FOREST AND PLANTATION:

(a) Forest

The conservator of forests is probably correct in recommending that the higher altitudes, and the watersheds should be planted to forest (Land tenure Section) because:--

1. Even under plantation farming, erosion control and regulation of
water supplies would not be so effective.

(2) The soil may not be sufficiently fertile to maintain an economic output from plantation crops.

(3) Great difficulties and cost would be involved in transporting the products of plantations out of such areas.

(b) Plantation

Mrs. Sankers is following a policy of planting a mixed plantation on her 87 acre estate. At present, there are 7 acres of derelict cocoa, consisting of 500 trees, which are estimated to yield 360 lbs. of cocoa this year, this being equivalent to 2/3 lb/tree, not a satisfactory yield. It must be remembered though, that these are old trees which were allowed to go wild during the cocoa slump of the 1920-30's, and a new plantation may give the adequate yield of 2 lbs/tree which is regarded as the critical yield for profitable cocoa growing. Only future yield trials will be able to show if the soil is sufficiently deep and fertile enough for cocoa. Bird vine (Loranthus) is the most serious pest and must be pruned off every 2 yrs. but the only other minor pests are the disease, Blackpod (Phytopthora palmivora) and squirrels.

So far, one acre of the estate has been planted to a mixture of Arabica coffee, cocoa, bananas and tona beans under a cover of tannis, cassava and pigeon pea. A mixed plantation, in the opinion of the overseer will:

(1) Reduce soil erosion to a much lower level, thus restoring greater fertility to the area.

(2) Reduce the danger of risk realised if over specialisation in one crop occurs, i.e. cocoa slump of 1920-30’s.

(3) Give a greater total yield of produce per acre than a single crop, though I cannot give any estimate of such yield in terms of money.

A pure stand of cocoa planted at 12' x 12' give about 300 trees/acre which if yield averaged a minimum of 1 lb., of dry cocoa beans/tree, equals 300 lbs/acre. The 1949 price is approximately £ 30 per bag of 165 lbs (see (c): £ 40 per bag in 1948 - a sudden, most probably temporary depression) giving an output of £ 54 per acre which is nearly as high as the output/acre from present gardens (Detailed Section). A considerably smaller labour input per acre is required under plantation farming. The average wage of labour on such estates = £ 1.20/day. Therefore, a full time labourer would earn £ 360/yr compared to his income when gardening (Detailed Section).

(c) Conclusion

There is a strong argument in favour of replanting the higher altitudes and watersheds in the area, to forest and converting the lower areas into mixed plantation on which most of the present tenants could be employed.

But this recommendation lies beyond possibility under present tenure conditions, when it is realised that the majority of the area belongs to a private owner who, it would not be expected, be either interested enough or prepared to lay out the considerable capital required for such a planting scheme.

That leaves the alternative of, an improved system of peasant farming on the lines indicated previously or, the development of the whole area in forest and/or plantation after the government had bought the land.
(1) INTRODUCTION:

Two peasants were selected for study, and from the survey of their social, economic and agricultural factors, it is hoped to produce tentative conclusions regarding their standard of living, and the economic returns from hill-gardening, these being the two main questions arising from the general survey.

(2) PEASANT A:

Race - Indian.  
Age - 29 years.  
Family - Wife (pregnant) and one child (1 yr. old)

Habitat - Small house on a \( \frac{1}{2} \) acre house lot.

Health - Apparently good.

Main occupation - Gardening. Used to work during dry season, but knows no trade and cannot now get work.

Holdings - 
- (Map No. 2)
- \( \frac{3}{4} \) acre on hill
- \( \frac{1}{3} \) " " rice on Caroni flats
- (11 miles from home)
- \( \frac{1}{4} \) " house lot

Fertility - Only surveyed hill areas. Very shallow soil with much rock showing and very susceptible to drought. The \( \frac{3}{4} \) acre plot is higher on the hill and has been cultivated for a shorter time than the lower \( \frac{1}{4} \) acre, which he considers to be less fertile.

Livestock - Unimportant. In the dry season he only keeps three breeding hens, which feed themselves. In the wet season the chicken are reared on maize in the holdings.

System of Cropping on the hill - Two yr. cultivation period before returning the holding to the bush.

1st yr.: - Barns and clears land in May.
- Plants tomatoes in June and harvests in Aug-Sept.
- " pigeon peas " " " Dec-Feb.
- " tomatoes Oct. " " Jan-Feb

2nd yr.: - Plants tannia in June and harvests when required
- " cassava " " " 1 ½ yrs. later
- " corn " " " in March
- " pigeon peas " " " Dec-Feb.

Also grows small quantities of cocoa, yams, cucumbers, salad beans, okras and pumpkins.

Cropping - Follows that outlined in the general survey. Weeds his holding three times a year. Uses no manure.

Income -

<table>
<thead>
<tr>
<th>Crop</th>
<th>Quantity</th>
<th>Price/Qty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 lb. maize from ( \frac{1}{4} ) acre for himself and poultry feed</td>
<td></td>
<td></td>
<td>( \£ ) 56.</td>
</tr>
<tr>
<td>600 lb. tomatoes</td>
<td></td>
<td></td>
<td>( \£ ) 56.</td>
</tr>
<tr>
<td>&quot; sells 400 lb. @ av.</td>
<td>( \£ ) .12</td>
<td>( \£ ) 56.</td>
<td></td>
</tr>
<tr>
<td>800 lb. pigeon peas</td>
<td></td>
<td></td>
<td>( \£ ) 40.</td>
</tr>
<tr>
<td>&quot; sells 500 lb. @ av.</td>
<td>( \£ ) .08</td>
<td>( \£ ) 40.</td>
<td></td>
</tr>
<tr>
<td>700 lb. rice from ( \frac{1}{4} ) acre Caroni rice land</td>
<td></td>
<td></td>
<td>( \£ ) 30.</td>
</tr>
</tbody>
</table>

Sale of minor cash crops and poultry products: \( \£ \) 30

Total income: \( \£ \) 120

Expenditure - No labour employed on cultivation on the hill areas.  
Hosty sews his own seed. Cost of transporting produce to market (owns no cart or draught animals) and other sundries, i.e. implements, some seed: \( \£ \) 10.00
Labour, employed for ploughing, transporting, harvesting, threshing and milling ½ acre of rice

Cost of bus fares and other sundries connected with rice area

Rent of all land

Buys rice ration of 2½ lb. per week @ 70c/lb. for 2 individuals

Supplies meat by hunting lapp and deer on the hill, also buys much fish (dried)

Total labour, rent and food expenditure

Leaves £ ¾ for rates, clothes, light and other items of food which have to be bought, i.e. salt, coconut oil.

Conclusion - Certainly this shows a precariously low margin of profit, which any small misfortune, i.e., crop disease, ill-health or failure to sell above glut prices, may turn into a deficit. The standard of living is therefore necessarily low.

(3) PEASANT B:

Race - Negro. Age - over 50 yrs. old. Family - Wife, Mother, 8 legitimate children - 2 daughters married 2 illegitimate children

Habitat - Family live in a house in Curepe, where he owns 1 acre of land, freehold, which the family farms. He lives in the wooden shack on the La Baja road ½ of the way up the hillside. Visits family from time to time. He therefore only has himself to support from his hill holdings.

Living Conditions - His house is a primitive, semi-detached, one-roomed, timber shack with a wooden shed outside; no sanitation or water. As he lives by himself, is not so bad.

Health - Appears all right. Old for his age.

Main occupation - Gardening on the hillside and helping Hanandes' (landlord) overseer with his duties, i.e., maintaining paths. Does no other work during the dry season.

Holdings - 1 acre of freehold land in Curepe, farmed by family. Not considered further.

2 separate acres on Hanandes' estate (See Map, No.E). These and the house are rent free as payment for his work as assistant overseer.

Fertility - Both acres are situated on rather steep land and show signs of considerable erosion, leaving a shallow, drought susceptible soil.

Livestock - Keeps none at all. Claims dogs make poultry keeping impossible.

System of Cropping - 2 - 3 yrs. rotation before returning land to the bush.

1st yr: - Burn and clear land in May

Plant rice in June and harvest in Sept.


2nd yr: - Plant sweet cassava in June and harvest 1 yr. later.

" tannia from May onwards and harvest when required " pigeon pea in May-June " Dec-Feb.

Cropping - Follows the standard methods of gardening given in the general survey. Considers growing tomatoes too difficult, as they require watering in the dry season if a high yield is to be obtained.

Income - Sells £/5th rice : 800 lb. @ 50c/lb.

" 2 pigeon peas, keeps rest for eating and seed. 600 lb. @ 80c/lb

" surplus ground provisions

Total income £ 132.00
Diet - Maize, pigeon peas, and cassava are the main foods in his diet. He also eats a large proportion of the other ground provisions he grows. Prefers cassava to rice.

Expenditure - Employs labour to clear 2 acres of bush:

- i.e. 1 man for 3 weeks at £2/day = £42.00
- labour for harvesting rice and picking peas = £25.00
- Rent = £11
- Buys rice seed only. 40 lb/acre @ 80c/lb = £3.20
- (Buys a Red Hill variety from a neighbour)
- Cost of marketing and other sundries = £10.00
- Total expenditure on holding = £78.20

Profit = £53.80

Conclusion - From this profit he has to buy food, clothes, light and other sundries. His food costs are unknown, but are very low as he lives chiefly on his own produce. He claims that he can live on the produce from any holding over ¼ acre in size. The larger the holding the more labour he can afford to employ, and the less work he need do himself.

While peasant A makes a gross income of £126 from his 1½ acres, peasant B gets only £132 from 2 acres; Peasant A is typical of a large group, who grow mainly crops for sale, whilst peasant B, is a typical member of the group who are mainly concerned with growing provisions for home consumption and only sell the surplus.

Though peasant B, therefore, buys much less food, peasant A’s system is more profitable, as he has to feed a family and yet makes a profit of £24 from 1½ acres of land, while peasant B makes less than £24 from 2 acres and still has certain expenses to pay, for himself alone.

It is thought that these two peasants are fairly typical of the 20 peasants in this area, though the sample is too small to be statistically efficient.

The final tentative conclusion is, that whilst a single man may garden a hill holding of 1 acre or more, and make a sufficient profit to allow a secure, if very low, standard of living, a peasant with a family simply cannot produce a sufficient profit to follow even a low standard of living securely from his hill holding alone. If he can obtain 2 - 3 months temporary, paid labour, during the dry season, to supplement his income (i.e. 70 days @ £2.20/day = £154), then, it is possible to maintain a family satisfactorily, at a low standard of living. But, now that the Makareep naval base requires few labourers, to obtain temporary unskilled work is almost impossible, and a man who knows a trade would be better off working full time in that trade, than treating it as a subsidiary employment to hill gardening. On the other hand, practically every peasant maintains that he prefers working as "his own boss", despite the low returns.
A general and detailed family survey has been carried out, of 400 acres of land in the foothills of the Northern Range, 5 mile N.W. of St. Joseph.

1. Observations on the natural environment, indicate particularly, that the steep slopes of the area allow sufficient erosion under forest, to prevent the formation of a soil profile in a nutrient deficient soil.

2. Most of the gardeners live in the village of St. Joseph, and no survey was completed of their living conditions. The difficulties associated with separation of home from garden are, in the main, unavoidable.

3. There are 3 estates in this area. 89 acres, reserved by the Government for forest land, 87 acres owned by Mrs. Sankers, who believes that a mixed plantation is the best method of crop production in the area, and 300 acres, owned by R. Hanandes, who is mainly interested in the financial returns and charges an exorbitant rent.

4. An outline is given of the systems of gardening, and cropping practices of the 20 peasants in the area, who garden holdings 1 - 4 acres in size based on shifting cultivation "rotation". Limiting factors in length of cultivation period are weeds and soil fertility.

5. No manuring of crops occurs and loss of soil, and nutrients from this poor soil, is rapid, through erosion. The 3 yr. bush fallow is much too short to maintain soil fertility.

6. The main erosion factor is bush burning and clearing. More rigid control, or if possible prevention, of this policy, is required. Further, erosion control practices should be adopted in the gardens. Ideally, the higher altitudes, and steeper, lower slopes should be afforested and the coombes planted with plantation crops.

7. Livestock play an unimportant part in farming in this area.

8. Home storage of non-perishable ground provisions may help to obtain better average prices, at the markets of Tunapuna, Curepe or Port-of-Spain.

9. The detailed survey indicates that a single man can keep a low standard of living from hill gardening, but it is very difficult to maintain a family.

10. In view of conclusions 6 - 9, it appears that the best policy would be, for the higher altitudes and steeper, lower slopes to be purchased by the Government, and afforested; whilst the owners of the lower area be encouraged to grow plantation crops, probably on the lines suggested in Ref:7, where the author suggests a variable plantation cropping, according to the altitude. The owners would then employ the present garden tenants as labour, possibly on a metayer system, like that in operation on the St. Benedict estate, (Ref:8). Failing this ideal policy, strict erosion control measures should be enforced, and experiments should be carried out to increase the output per unit of hill garden land, by manuring, cultivation and cropping improvements.
APPENDICES: 1 - 16.5°

REFERENCES

MAPS: A - E
APPENDIX : 1

DATA OF THE ST. AUGUSTINE METEOROLOGICAL STATION

1. RAINFALL : HUMIDITY AND TEMPERATURE

<table>
<thead>
<tr>
<th></th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Total Average</th>
<th>for 19 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity Min:</td>
<td>57</td>
<td>52</td>
<td>50</td>
<td>52</td>
<td>57</td>
<td>63</td>
<td>63</td>
<td>62</td>
<td>62</td>
<td>63</td>
<td>61</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max:</td>
<td>84</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>86</td>
<td>86</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>86</td>
<td>85</td>
<td>86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp. Min:</td>
<td>68</td>
<td>67</td>
<td>68</td>
<td>71</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>71</td>
<td>72</td>
<td>71</td>
<td>70</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainfall</td>
<td>2.95</td>
<td>1.35</td>
<td>1.35</td>
<td>1.96</td>
<td>5.23</td>
<td>8.23</td>
<td>8.49</td>
<td>9.81</td>
<td>7.34</td>
<td>6.22</td>
<td>7.84</td>
<td>6.57</td>
<td>67-89</td>
<td>25 yrs</td>
</tr>
</tbody>
</table>

2. CORRELATION OF TOTAL RAINFALL AND EFFECTIVE RAINS (W.G. Wells)

- Torrential (over 0.75"/hr) = run-off
  - Wet Season: 15.4"
  - Dry Season: 0.9"
  - Total: 15.3"
- Medium (0.74 - 0.41"/hr) = effective
  - Total: 15.2" = 2.7" = 17.9"
- Light (0.41"/hr) = evaporates
  - Total: 36.8" = 8.0" = 44.8"
  - Total: 78.0"

3. CLIMATE CLASSIFICATION : (E.J. Mohr)

<table>
<thead>
<tr>
<th></th>
<th>No. of dry months ( = 2.4&quot;)</th>
<th>No. of wet months ( = 4.0&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I A</td>
<td>- Continuously wet, every month over 4.0&quot;</td>
<td></td>
</tr>
<tr>
<td>I B</td>
<td>- Very moist</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>- Weak dry season</td>
<td>1 - 2</td>
</tr>
<tr>
<td>III</td>
<td>- Marked</td>
<td>2 - 4</td>
</tr>
<tr>
<td>IV</td>
<td>- Intense</td>
<td>4 - 6</td>
</tr>
<tr>
<td>V</td>
<td>- Fierce</td>
<td>6 - 8</td>
</tr>
</tbody>
</table>
## Analyses of St. Augustine Rice Area Soils

### 1. Golden Grove Sandy Loam

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Criticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>37%</td>
</tr>
<tr>
<td>pH</td>
<td>5.1</td>
</tr>
<tr>
<td>OM (top 6&quot;)</td>
<td>1.3</td>
</tr>
<tr>
<td>Total N(top 6&quot;)</td>
<td>0.13</td>
</tr>
<tr>
<td>%N ratio</td>
<td>5.4</td>
</tr>
<tr>
<td>Avail: P</td>
<td>2</td>
</tr>
<tr>
<td>&quot; K&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>38</td>
</tr>
<tr>
<td>Structure</td>
<td>Fair</td>
</tr>
</tbody>
</table>

- **Acid**
- **Low**
- **Medium Low**
- **Very low**
- **Poor**

### 2. Streatham Lodge Fine Sand

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Criticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>63%</td>
</tr>
<tr>
<td>pH</td>
<td>5.0</td>
</tr>
<tr>
<td>OM (top 6&quot;)</td>
<td>1.2</td>
</tr>
<tr>
<td>Total N(top 6&quot;)</td>
<td>0.07</td>
</tr>
<tr>
<td>%N ratio</td>
<td>8</td>
</tr>
<tr>
<td>Avail: P</td>
<td>7</td>
</tr>
<tr>
<td>&quot; K&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>5</td>
</tr>
</tbody>
</table>

- **Acid**
- **Medium low**
- **Low**
- **Fair**
- **Very low**
- **Extremely low**

### 3. Pasea Clay

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Criticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>13.5%</td>
</tr>
<tr>
<td>OM (top 6&quot;)</td>
<td>2.1</td>
</tr>
<tr>
<td>Total N(top 6&quot;)</td>
<td>0.204</td>
</tr>
<tr>
<td>Avail: P</td>
<td>2</td>
</tr>
</tbody>
</table>

- **Fair**
- **Good**
- **Extremely low**
Results of a survey carried out in 1948:

1) Soils were all gravelly and contained a high proportion of sand.

2) A wide range of pH varying from 5 - 9.

3) Organic matter from a high to a low level.

4) Nitrogen available $P_2O_5$ well below the initial point satisfactory for crop growth.

5) Same criticism applies to available $K_2O$ as to $P_2O_5$.

6) No significant differences apparent between cultivated and uncultivated soil, though the latter showed a slight tendency to have a high $C_M$ content.

7) No significant difference apparent with altitude.

8) Free soil in some soils at medium altitudes suggests the presence of limestone cuttings.
### TABLE 1: PRINCIPAL CAUSES OF DEATHS IN THE YEAR 1946

<table>
<thead>
<tr>
<th>Disease</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of early infancy</td>
<td>926</td>
</tr>
<tr>
<td>Old age</td>
<td>505</td>
</tr>
<tr>
<td>Diarrhoea and enteritis</td>
<td>400</td>
</tr>
<tr>
<td>Cardiac and valvular diseases</td>
<td>584</td>
</tr>
<tr>
<td>Malaria</td>
<td>355</td>
</tr>
<tr>
<td>Pulmonary Tuberculosis</td>
<td>553</td>
</tr>
<tr>
<td>Nephritis</td>
<td>338</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>351</td>
</tr>
<tr>
<td>Haemorrhage and Apoplexy</td>
<td>280</td>
</tr>
<tr>
<td>Broncho pneumonia</td>
<td>205</td>
</tr>
<tr>
<td>Other diseases</td>
<td>134</td>
</tr>
<tr>
<td>Cancer</td>
<td>257</td>
</tr>
<tr>
<td>Other causes</td>
<td>2,993</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,724</td>
</tr>
</tbody>
</table>

### TABLE 2: INCIDENCE OF MAJOR DISEASES IN 1946 IN TRINIDAD AND TOBAGO

<table>
<thead>
<tr>
<th>Disease</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>8,954</td>
</tr>
<tr>
<td>Syphilis</td>
<td>7,318</td>
</tr>
<tr>
<td>Influenza</td>
<td>4,047</td>
</tr>
<tr>
<td>Hookworm</td>
<td>3,056</td>
</tr>
<tr>
<td>Yaws</td>
<td>2,402</td>
</tr>
<tr>
<td>Pulmonary tuberculosis</td>
<td>303</td>
</tr>
<tr>
<td>Enteric</td>
<td>529</td>
</tr>
</tbody>
</table>
### SUPPLY AND PRICE CONDITIONS IN CUREPE MARKET DURING 1947

<table>
<thead>
<tr>
<th>Key:</th>
<th>S = Supply</th>
<th>W = Wholesale price in cents</th>
<th>R = Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Week ending:

- **31/5/47**:
  - Avocados (each): 3
  - Bananas: 5
  - Blackeye peas (lb): 2
  - Breadfruit (lb): 3
  - Cabbage (lb): 5
  - Cassava (lb): 4
  - Corn (lb): 4
  - Cucumber (lb): 2
  - Daikon (lb): 2
  - Eddoes (lb): 5
  - Grapefruit (each): 4
  - Lettuce (lb): 1
  - Mangos (lb): 2
  - Oranges (each): 5
  - Pigeon peas (lb): 5
  - Plantain (lb): 5
  - Pumpkins (lb): 1
  - Salad beans (lb): 5
  - Sweet potatoes (lb): 4
  - Tannias (lb): 4
  - Tomatoes (lb): 1
  - Yams (sweet): 4
  - Yams (bitter): 5

- **28/6/47**:
  - Avocados (each): 3
  - Bananas: 5
  - Blackeye peas (lb): 3
  - Breadfruit (lb): 5
  - Cabbage (lb): 5
  - Cassava (lb): 4
  - Corn (lb): 4
  - Cucumber (lb): 2
  - Daikon (lb): 2
  - Eddoes (lb): 5
  - Grapefruit (each): 4
  - Lettuce (lb): 1
  - Mangos (lb): 2
  - Oranges (each): 5
  - Pigeon peas (lb): 5
  - Plantain (lb): 5
  - Pumpkins (lb): 1
  - Salad beans (lb): 5
  - Sweet potatoes (lb): 4
  - Tannias (lb): 4
  - Tomatoes (lb): 1
  - Yams (sweet): 4
  - Yams (bitter): 5

- **26/7/47**:
  - Avocados (each): 3
  - Bananas: 5
  - Blackeye peas (lb): 3
  - Breadfruit (lb): 5
  - Cabbage (lb): 5
  - Cassava (lb): 4
  - Corn (lb): 4
  - Cucumber (lb): 2
  - Daikon (lb): 2
  - Eddoes (lb): 5
  - Grapefruit (each): 4
  - Lettuce (lb): 1
  - Mangos (lb): 2
  - Oranges (each): 5
  - Pigeon peas (lb): 5
  - Plantain (lb): 5
  - Pumpkins (lb): 1
  - Salad beans (lb): 5
  - Sweet potatoes (lb): 4
  - Tannias (lb): 4
  - Tomatoes (lb): 1
  - Yams (sweet): 4
  - Yams (bitter): 5

- **30/9/47**:
  - Avocados (each): 3
  - Bananas: 5
  - Blackeye peas (lb): 3
  - Breadfruit (lb): 5
  - Cabbage (lb): 5
  - Cassava (lb): 4
  - Corn (lb): 4
  - Cucumber (lb): 2
  - Daikon (lb): 2
  - Eddoes (lb): 5
  - Grapefruit (each): 4
  - Lettuce (lb): 1
  - Mangos (lb): 2
  - Oranges (each): 5
  - Pigeon peas (lb): 5
  - Plantain (lb): 5
  - Pumpkins (lb): 1
  - Salad beans (lb): 5
  - Sweet potatoes (lb): 4
  - Tannias (lb): 4
  - Tomatoes (lb): 1
  - Yams (sweet): 4
  - Yams (bitter): 5
<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 31st</td>
<td>River Tacarigua dry.</td>
</tr>
<tr>
<td>June 16th</td>
<td>Water pumped to the experimental rice plots.</td>
</tr>
<tr>
<td>&quot; 19th</td>
<td>3' water in river. Much rubbish.</td>
</tr>
<tr>
<td>&quot; 24th</td>
<td>9' &quot; &quot; &quot; &quot; &quot; &quot; &quot; &quot;</td>
</tr>
<tr>
<td>&quot; 25th</td>
<td>Floods. Planting on experimental rice area.</td>
</tr>
<tr>
<td>&quot; 28th</td>
<td>All area flooded, including roads.</td>
</tr>
<tr>
<td>&quot; 29th</td>
<td>Floods subside.</td>
</tr>
<tr>
<td>July 14th</td>
<td>Rice planting on area 2.</td>
</tr>
<tr>
<td>&quot; 15th - 23rd</td>
<td>Main planting in full swing.</td>
</tr>
<tr>
<td>&quot; 30th</td>
<td>Flood. 9'6&quot; depth in river.</td>
</tr>
<tr>
<td>Aug. 5th</td>
<td>Tacarigua river dam completed. Temporary dam built on Tunapuna river to irrigate areas 5 and 6.</td>
</tr>
<tr>
<td>&quot; 5th - 9th</td>
<td>Gate dropped. Supplied all areas.</td>
</tr>
<tr>
<td>&quot; 9th</td>
<td>Raise gate to let away floods.</td>
</tr>
<tr>
<td>&quot; 11th</td>
<td>Drop gates. Supply all areas.</td>
</tr>
<tr>
<td>&quot; 11th - Oct. 19th</td>
<td>Supply water daily to growing rice.</td>
</tr>
<tr>
<td>Oct. 19th</td>
<td>Stop supply of water except to experimental rice beds.</td>
</tr>
<tr>
<td>&quot; 25th</td>
<td>1st cutting on experimental rice beds.</td>
</tr>
<tr>
<td>Nov. 11th</td>
<td>Supply water for 2nd rice crop planting, chiefly on experimental rice beds.</td>
</tr>
</tbody>
</table>
REFERENCES

1. Agriculture in the West Indies. 1942. Colonial No.182.
3. Agricultural Society of Trinidad and Tobago. Feb, 1949.
11. Health Report of Trinidad and Tobago, for the year 1946.
MAPS Nos. A-E.
MAP NO. A.

GENERAL SURVEY MAP.
MAP No. B.

SOILS OF THE ST. AUGUSTINE RICE AREA.
MAP NO. C.

DETAILED SURVEY OF ST. AUGUSTINE RICE AREA.
MAP No. D.

THE IRRIGATION SCHEME ON THE GOVERNMENT ESTATE.
MAP No. E.

A SKETCH MAP OF THE 'FLORADALE HILL AREA'.
MAP NO. E

A SKETCH MAP OF THE FLORADALE HILL AREA.

HANANDE'S ESTATE
300 acres

COCO
7 acres

SINK PNL

ESTATE
47 acres

HANANDE'S ESTATE
Government land
89 acres

SCALE: 12'' = 1 MILE or 1:52,800

Legend:
- = Building
- = Path
- = Metalled road
- = Stream
- = Boundary
- = HANANDE'S ESTATE
- = Government land

SOUTH