AGRICULTURAL THESIS.

Part 1.

MOUNTAIN SURVEY.

R. Barrie Smith.

1947-1948.
CONTENTS.

1.) INTRODUCTION.
2.) THE LAND.
3.) THE LANDLORDS.
4.) THE PEOPLE.
5.) THE IMPLEMENTS.
6.) LAND CLEARING.
7.) THE CROPS AND THEIR CULTIVATION.
8.) THE MARKET.
9.) TRANSPORT.
10.) THE PRESENT PROBLEM.

APPENDIX.  
(a) Soil report.
(b) A questionnaire and answers.
1.) INTRODUCTION.

The area in which this survey takes place consists of one of the valleys of the Northern Range Mountains that stretch from east to west along the north coast of Trinidad. This impressive range seldom rises to much over three thousand feet, and yet, so abruptly does it rise out of the sea to the north, and give way to the monotonous flat central plain to the south, that it has all the rugged features of far larger mountain areas. The peaks are sharp, and each pinnacle is deeply gullied on all sides, so that knife edged spurs spread out fanwise, enclosing steep sided, V-shaped, valleys. All of these valleys are themselves cut up by minor gulley systems down which the surplus water pours for a few hours after torrential rains, which are the normal form of precipitation in the area. It is with such a valley that we are here concerned. It lies on the slopes of Mount Tabor, running north-south, and opens with a southern aspect to drain into the St. Joseph river. The St. Joseph river flows south to join the Caroni river of the Central Plain which then flows west and empties into the gulf of Paria via the Caroni swamp.

(2) A general view of the Survey area, looking down the valley from Mount Tabor.
Location in relation to well known centres.

To reach this valley it is necessary to travel some seven miles due east from Port of Spain, the capital, to St. Joseph, which was the old Spanish capital of the island. Thence you turn north along the Maracas valley road and strike away to the west, after some two miles, along Baja road.

Accessibility.

Baja road is surfaced but is only wide enough for one vehicle to pass along at a time. It ends abruptly and marks the start of the survey area. From this point a trace winds up the valley and is wide, in good condition, and maintained by the Government. It is not suitable for vehicles due to excess steepness in parts and stream crossings. It would, however, require no great amount of work to make it so.

The main trace in the Survey area.

This trace proceeds, as is shown by the map, some half way up the valley; beyond here narrow foot paths, suitable for pack donkeys and men walking single file only, are found. These are plentiful and make all parts of the valley accessible but only with considerable effort.

Rainfall.

The rainfall in this part of the island varies between seventy and one hundred inches, being distinctly higher in the valley as elevation increases. Though not measured specially, the rainfall in this valley might fairly be taken as eighty inches per year as a rough estimate, the majority of it falling in torrential showers during the nine months of the rainy season which lasts from late April to December, with, however, a short break during September.

Elevation.

The elevation at the foot of the valley, where the well surfaced...
Baja road finishes, is in the region of two hundred feet above sea level. The summit of the valley, which rises steeply towards the peak, is some two thousand feet above sea level. This is also the summit of Mount Tabor.

**Climate.**

The climate of the valley might well be described as hot, steamy, and tropical. Its southern aspect exposes it throughout the day to the fiercest onslaughts of the sun. In the nights the temperature will be lower than for many of the less elevated parts of the island. This is an important factor when it comes to the cultivation of tomatoes as it seems that low temperatures at night are correlated to (and directly beneficial to) the setting of tomato fruit. The position of the valley is such that it is very sheltered from the north east trade winds that blow steadily throughout the dry season. This will result in locally higher temperatures and humidity values.

**Topography.**

The topography of the valley is such that unless land was extremely scarce no peoples would ever attempt to cultivate it. Level areas are in no places to be found. The steepness of the winding paths and traces makes movement to and about the area extremely difficult and fatiguing. One old cultivator remarked that he left his home in St. Joseph early in the morning after a good meal but that when he reached his garden he needed a rest and another meal before he could begin his work. "Sir," he said, "you eat a meal and you have to eat another when you get up here before you can work". Much labour is used in getting to and from the plots which is entirely unproductive. Cultivators of plots high up the valley are exhausted even before they start to do any productive work. This gives a practical idea on the topography.
The valley itself is a great gulley in the mountain side and this main valley is cut on all sides by numerous minor V-shaped gullies with sides so steep that they can only be climbed, even using both hands to haul yourself up, with great difficulty. Yet it is these, often almost vertical walls, that are laid bare and cultivated.

The sheer sides of a gully, cleared and burnt. Young maize and tomatoes were already growing when this photograph was taken.

Only the main gullies will be found to contain water and these dry out almost completely, except for occasional pools, during the dry season from January to April. After a torrential shower, however, all the gullies carry short duration torrents of water heavily laden with soil.

2.) THE LAND.

Soil erosion.

It is interesting to read the following from Charles Kingsley's book, "AT LAST", which is a description of the author's visit to Trinidad during the winter of 1868, published three years later in 1871. "Were the forests cleared", he writes in Chapter 11 entitled: "The Northern Mountains", "and the soil no longer protected by the leaves and bound together by the roots, it (i.e. soil erosion) would increase at a pace at which we in this temperate zone can form no notion, and the whole mountain-range slide down in deluges of mud, as, even in the temperate zone, the Mount Ventoux and other hills in Provence are sliding now, since they have been rashly cleared of their primeval coat of woodland."

In the valley of our survey the forest has been cleared and the
consequence of this action forms the main problem today. Kingsley's prophesy of the effect of such rash destruction has indeed come true and his words are seen to be no idle exaggeration when you see the rivers of the central plain after torrential rain in the mountains; "deluges of mud" describes them well. They are thick with a suspension of soil, and to the St. Joseph river our valley contributes its full share.

This then is the land we are dealing with. Land that lies on steep mountain sides; land that has been rashly cleared of its forest growth; land that is baked to a powder by the sun and washed away by beating, torrential, rains almost as quickly as it is formed, bringing the bare parent rock to the surface in many places.

History.

It is not difficult to realise what this valley was like before man interfered, for many parts of the Northern Range still contain virgin forest. The photograph below is of a similar valley in the mountains where the forest has not been touched.

(6) Land cleared after a short period in secondary bush and still showing the effects of severe soil erosion.

(7) The natural forest growth of a Northern Range valley.
After the original clearing the land was planted with cacao. Many local people remember well when the valley was all cacao and old cacao trees are still to be found in the bottom of gullies where they have not been felled to make way for cultivation. A few coffee bushes were also found growing in a wild state in the bottom of the main gully.

When the cacao was no longer profitable due to witches broom disease, and also to the age of the trees, the land was rented out at high values to peasant cultivators who felled and burnt the old cacao trees and cashed the stored fertility, obtaining excellent crops in the first instance. This is the present state of the valley, all except the odd tree of cacao having been felled and much of the land now reverted to secondary bush where the provision crops failed to give adequate returns after the stored fertility had been realised. Thus it might well be described as worn out cacao land that has been denuded, cropped heavily for a short time and then left. After varying periods (mostly in the region of three to seven years) the secondary bush is cleared and burned and the land cropped again for a year, or in some cases two, but seldom longer.

**Rents.**

The rents paid for this land are, surprisingly, almost as high as for moderately good land on the flat central plain. This was found to be due to the following factors:

1.) Land for cultivation is scarce and in general demand.

2.) The position this land occupies prevents the heavy pilfering of crops that is common in the more easily accessible areas of the plains.

3.) After several years in bush the first crops are good and the cultivator is under no obligation to rent the land for more than a year.

From a series of questions put to cultivators in the area we found rents to vary between $5.00 and $8.00 an acre. Contrary to expectations the land grew no cheaper in the higher and more inaccessible places. Boundaries were not defined except in a very general way; no fences or permanent marks were used. The areas were very irregular in shape and it seemed that customary understandings played a large part in the contract between landlord and tenant.

**Conformity.**

The degree of slope of some of the cultivated land is almost
unbelievable. The photograph below shows maize and tomatoes planted on a gully side that is actually almost vertical in places, the overall slope being scarcely less than sixty degrees. This is an exceptionally bad case but it underlines what is a very general fault with all the cultivation in the valley.

During the dry season the rank corn grass (see photograph 10) and dry secondary bush is often burnt; fires sweeping the whole mountain side are common. Many fires are started by the cultivators to clear their own small plots of half an acre or so and then spread, uncontrolled, to much larger areas.

Buildings.

Except for one small family group that live in two huts by the main trace a short distance up the valley, no permanent buildings are found. However, small temporary shelters are frequently built by the cultivators, and, when heavy work is necessary at certain times of the year such as during the harvest of hill rice or the picking of pigeon peas, they sleep on the mountain in order to make more time available for productive work.

A typical temporary shelter as built by the Peasant cultivators.
Information from soil samples.

Soil samples were taken from the cultivated and uncultivated land over the entire area and the laboratory findings were not unexpected. A detailed account is given in the appendix.

The conclusions may be summarised here. They all point to a soil, generally very young and immature, that is washed away soon after its formation. The basic rock is mainly mica schist scattered with large veins of quartz. Outcrops of metamorphic limestone occur, causing locally high pH values and even free CaCO₃. The rock rots easily and quickly in the warm wet conditions that prevail and is most readily smashed and fragmented even by light hammer blows. The soil is full of minor fragments of parent rock.

All samples were found to be gravelly and to contain a high proportion of sand. The coarse sand was mainly particles of schist and quartz which suggests that the soils are very immature lithosols.

Reactions were found to vary to extremes due to the free metamorphic limestone in localised areas.

Organic matter showed a wide range among the samples being generally highest in the uncultivated soils.

Phosphate was generally, but not always, inadequate for normal crop growth.

Potash is probably sufficient in the first year due to the burning of the secondary bush over the land after felling. The cultivators are well aware of the value of the ash left after burning though soluble potash is removed very quickly through leaching.

Except that the uncultivated soils showed higher organic matter values no significant differences were observed between the cultivated and uncultivated soils. Moreover, no obvious differences were noted in soils collected high up the mountain side compared to those collected lower down.

3.) THE LANDLORDS.

The land of the survey area is privately owned, on a freehold basis, by a number of individuals. The portions belonging to each are of varying size and irregular in shape. There are maps in the Sherrif's office which mark the boundaries but there is no evidence of these boundaries to be seen in the valley in practice. A few of the landlords live locally but
many do not and the land is, in the majority of cases, rented out by agents
to the various tenants, the former also collecting the rents on commission.
These agents, naturally enough, have no interest in the land itself or in the
methods of cultivation, detrimental or otherwise, and are thus a contributing
factor to the disgraceful condition of the valley. The many disadvantages
of the absentee landlord and agent rent collector are all found in the survey
area.

As the land is owned freehold by private individuals, the
Government have no say whatever in its use or misuse even though this may
directly effect the prosperity of the island; (this valley is representative
of many). The cultivation of these steep slopes turns the once clear and
crystal waters of the St. Joseph river into a mud wash which is much to the
disadvantage of the many people who use it for their domestic washing purposes.
Yet they have no powers to correct this matter; neither have the Government
on their behalf. All of which can be traced back to the system of land
ownership.

Even if the individual landowners wished to make better use of
the land, the fact that the land is owned in small sections and by different
people makes a co-ordinated land policy unpractical. Actually it is doubtful
if any of the landowners have any conception of soil erosion or its importance.
That the land 'costs $x. and draws a rent of $y.' is the more probable
outlook judging by the present situation. It is merely a low grade
investment. From the landlords point of view, however, it is easy to
understand their action. They own the land and its uses are extremely
limited. The replanting of cacao, due, to the prevalence of witches broom
disease, to a very unstable market with no great future prospect inspite of the
present boom in prices, and due to the high cost of labour, is deemed
unprofitable. The difficulty of harvesting such an area of cacao would only
be offset by constant high prices. As building land it is out of the
question. To abandon it to forest brings no returns whatever for many
years to come and little return after its eventual establishment. To plant
valuable forest timber is a very long term investment that would be
instinctively obnoxious to any West Indian and in any case would only be liable
to benefit his children. By renting it at a few dollars an acre to cultivators
a return is achieved; and the soil erosion? That is someone else's problem.
The solution is undoubtedly Government ownership and afforestation of all the land unsuitable for building or cultivation in the island unless the landlords are prepared to undertake an approved afforestation programme themselves. Otherwise individuals are selfishly sacrificing the birthright of future generations and also causing immediate local inconvenience by dirtying the natural water supplies, all for their own present profit.

4.) THE PEOPLE.

The people of this area are very poor, hard working, peasants. Some are East Indians but the majority are mainly of negro extraction though few are racially pure. In this respect the area is distinct from the flat lands of the central plain where the peasant agriculture is almost entirely in the hands of East Indians. The negro type is, it seems, more able to cultivate these remote and difficult lands. He is more willing to put out great effort for small returns provided he is left alone, is not liable to the risk of having his crop pilfered, and is his own master to come and go as he pleases.

We found the peasants friendly, likeable people. Most of them claimed that they cultivated these precipitous slopes, not because they wanted to, but in order to live, i.e., to obtain food for themselves and their families. Questioning revealed that only a small percentage ran their holding as a business and for a cash income, and even these relied on it for their food supply and were really only selling surpluses. Food prices were high, even by European standards, during the period of the survey and many of the peasants...
were men who had formerly had paid work, but now, being out of work, were forced to keep alive as peasant cultivators. They resented the excessive labour involved in reaching their plots but said in effect "what else could one do?"

We always found the feeling that they enjoyed being their own masters and the ability to come and to leave their work at their leisure. We realised that no one would accept this arduous labour at a fixed wage from another but as they were working for themselves they would endure it all for a minimum return.

From a series of questionnaires we can build this general picture:

The peasant is generally a tenant paying rent to a landlord's agent for his plot of land which seldom exceeds an acre in extent and is seldom in cultivation for more than two years. Generally he hires no labour and is helped by his wife and children when there is heavy work on hand. He does seasonal and part time work when he can get it but relies on his plot for the family food supply and a small cash income for surplus crops sold. He has acquired some skill in cultivation and, as he rents the land for only a year or two at the most, has no interest whatever in the long term use of the land. This is a general picture and, of course, each individual presents a variation.

A few, mostly East Indians, work larger areas and have been at it many years, doing no other work. These run their plots as a business and the food consumed is only a fraction of that sold.

Most peasants live within walking distance of their plots, which are referred to locally as gardens. Any livestock that they possess is kept at their house and fed on produce from their mountain garden. The only livestock kept in the survey area belonged to the family living in the permanent dwellings by the main trace. It consisted of a calf, two creole pigs, and a few chicken. The normal possessions in the way of livestock would be: a donkey, one or two goats, six to twelve chicken, and a pig. Actually only about half possess donkeys and those without hire transport for their crops at more or less standard rates per 100 lbs. of produce.

Peasants were invariably married and had generally from five to ten dependant children. Some got far more family help on their plots than others and not a few worked small areas entirely on their own. The only time that outside labour is hired normally is in the original clearing of the bush. Two peasants gave estimates of the cost of clearing by hired labour, one having paid $30.00 for an acre and a half, ($20.00 an acre), another paying $1.50 per
man day.

5.) THE IMPLEMENTS.

The implements employed to cultivate these mountain side gardens were cheap, simple, and capable of many uses. The very nature of the land makes a light, easily carried, general purpose instrument essential. The West Indian cutlass was carried by every cultivator and by some was the only instrument used. With it the bush is slashed down before burning, (most of the large trees having been felled in the original clearing for cacao); with it also the shallow holes are dug to receive seeds or cuttings, the weeds are slashed down once or twice in the growing season and again the cutlass is used at the harvest if required. However, besides the ever useful cutlass, most peasants in the area also possessed a hoe which is used for weeding and general cultivation, such as scraping small mounds of soil together where it was particularly shallow, or building up the soil around young plants, tannias for example, after the effects of heavy rain.

Those few peasants in the area that possess a cow will employ a small tooth edged grass hook to cut fodder on the mountain to carry home. In the evenings, in all the country districts of Trinidad, you will come across children using these grass hooks to collect grass from the wayside for the cow.

The only other instrument of any importance used by the peasants in this area is the coffee spade or push hoe. This is a stout wedged shaped piece of iron fastened at the end of a strong stick and is used for forcing the rocky earth apart and making planting holes in the thin soils of the mountain side. The action is to thrust it in the soil and work it vigourously forwards and backwards and from side to side. The cutting is then inserted and the earth heaped up around it with a hoe. One of the peasants was found to possess a pick which he used in the place of a coffee spade and also to help him to remove small stumps. Another peasant used a garden fork, but these two were exceptions; the standard instruments being nearly always a cutlass and a hoe. Cutlasses could be purchased in Port of Spain for as little as 60¢. They are carried in leather sheaths hung from the belt. These leather sheaths are often highly ornamented and much valued by the owners.

6.) LAND CLEARING.
Bush felling and burning is the primary cultivation in the survey area. The peasant hacks down all he can with a cutlass and tackles the larger shrubs and young trees with an axe. The majority of the big trees having been felled in previous years. Occasionally odd tall trees that do not cause too much shade are allowed to stand. In the dry season the cut bush is fired.

The main point to note as regards felling in the area is that trees, with a little care, could be felled along the slope and made the basis for simple terracing and soil retention. However they are not and photograph 11 shows the normal way of felling trees down the slope. They lie in this position and no further notice is taken of them.

Trees felled down the slope.

Stumps generally are not removed from the soil. They help in preventing erosion by the formation of soil pockets and are beneficial. Photograph 12 shows a cleared plot with the stumps left in position and young maize plants already 8 ins. high.

Stumps are left in the ground.
The crops grown on the mountain side, more or less in order of importance, are as follows:

Pigeon peas, Maize, Cassava, Hill rice, Tannias, Tomatoes, Okras, Salad beans, Bananas, Pumpkins, -cucumbers, -melons, Sweet potatoes.

** PIGEON PEAS. CANJANUS INDIENS. **

The pigeon pea, with its beautiful silky leaves and pretty yellow-red flowers, is easily the most important crop grown in the survey area. It is of first importance as an article of diet for all nationalities living on the island and is widely grown. The sale of pigeon peas provides a large percentage of the cash income of the peasants. A greater area of the mountain side is in pigeon peas than in any other single crop.

It is a perennial shrub, 6 ft. to 8 ft. high, with thin wiry branches and narrow trifoliate leaves, originally coming from India. It resists drought well which is useful as these mountain soils are very free draining and sandy in texture. It is ready for picking at six months from sowing and continues to bear for some time and will last much better if cut back and manured. This however is not practiced in the survey area.

Pigeon peas are planted from seed in little patches of prepared soil. Several seeds are planted and are later thinned to allow 2, 3 or 4 plants to mature. Three is the commonest number but 2 and 4 frequently occur. In this area they are seldom grown as a pure stand but are planted, for example, with maize and tomatoes which are the first harvested, allowing the pigeon peas to dominate later. Once grown, pigeon peas shade out all other plants. Two other combinations are:

(a) Pigeon peas, tomatoes, cucumbers.
They are weeded with a hoe when necessary in the early stages but as they mature this is no longer required.

The peas are harvested by hand, mostly by women and children. They mature at six months after planting which is mostly done in June in this area, i.e. at the start of the rainy season, and go on yielding for up to a year. They are picked both fresh and green as a vegetable, or in the hard mature form.

The crop may yield as much as 800 lbs. an acre as a pure stand or 200 lbs. as a mixed crop. Peasants in the area gave widely varying yields per acre but this is not surprising as they were never sure either of the exact area under the crop or of the amount consumed.

They fetch the Government controlled price of 8ₕₙₜ. lb. retail or 6ₙₜ. lb. wholesale; retail being defined as when sold in bags of less than 75 lbs. Commonly a glut occurs each year and prices fall badly but the peasant is at least able to consume them in his family and to feed them to his stock during these periods.

A type of bee that eats through the main stem near to the ground and kills the entire plant, causes some damage in the survey area. Nothing is done about it. It never spreads like a bad disease or threatens the crop seriously but here and there a few bushes will always be seen that have been cut down by this pest.

MAIZE. ZEA MAYS.

Maize (usually a yellow variety) is very important on this mountain side and is one of the first crops to be taken after the bush is cleared and burnt. Two crops a year are normally taken and harvested in the long dry season, January to May, and in the short dry season in September. As an article of diet for humans and livestock it is of great importance in the peasants economy. Surplus grain can also be readily stored or sold.

It is a coarse, quickly growing annual, monocious grass, 5 ft. to 8 ft. high, with long and broad strap shaped leaves, originally of South America. It is useful as a vegetable before ripe and as a food for animals when ripe; it is also ground for flour for human consumption and used in the manufacture of starch.

Maize is planted in prepared patches of earth scattered irregularly
some 2 ft. x 2 ft. or 3 ft. x 3 ft. apart all over the plot. The seedlings are singled to two or three stems per hole. It is seldom planted as a pure stand on the mountain side. As it grows quickly it is one of the first of the mixed crops to be harvested. Almost every mixed cropping combination involves maize and it is always taken early in the rotation before the cassava, pigeon peas etc., cover the ground effectively.

It can be planted at any time of the year but is mostly planted so that harvesting can be done in the dry season. Cultivation consists of keeping down weeds with a hoe which is not too difficult after the first burning.

At harvest the cobs are broken from the stems and carried down from the mountain for the removal of the grain. Being interplanted at odd distances it was impossible to obtain any useful yields per acre, but on the whole the corn looked well and healthy, and the peasants seemed satisfied. No serious pests was prevalent.

CASSAVA. MANIHOT UTILISSIMA.

Cassava is an important crop in the survey area and is nearly always the last crop to be taken before the land reverts to bush. It is not grown as a pure stand but arranged with other crops so that as they are removed the cassava predominates and finally covers the area. Little late cultivation is performed and the ground tends to get very weedy. After the removal of the cassava the land is often no longer cultivated.

Both types of cassava are planted in the area, bitter and sweet. The bitter variety takes two years to mature, contains the higher proportion of prussic acid, and after cooking to remove the poison is much used as a local vegetable. Sweet cassava is more commonly used for the preparation of starch. Cassava is much used for fattening the peasants pig, (mostly a black, long snouted animal). It is an exhausting crop and this may explain its normal position as last in the rotations of these mountain side gardens.

Cassava is a shrubby perennial, 6 ft. to 7 ft. high, with erect clean stems, palmately divided leaves on long stalks, and large fleshy tuberous roots. It is a native of tropical America. The plant resists drought well and is suited to elevations of up to 2,500 ft.

Cassava is planted in the form of cuttings which are stuck into prepared holes in the soil. They are normally a piece of stem some 10 ins.
Photograph 14 shows a peasant planting cassava cuttings. They are placed 4 ft. x 4 ft. apart approximately, but the planting of anything in the survey area depends on the contour of the land and the other crops being grown in between those being planted. Cassava is commonly planted in November.

Cultivation consists of rough hoeing when necessary. The roots are ready for harvest in nine months but variety makes a big difference. Yields from these irregular areas are impossible to measure due to vast variations even in the number of plants per acre, even assuming that the exact area was known. Five tons per acre on level ground at 3 ft. x 4 ft. spacing is a fair yield though much higher yields are possible.

**HILL RICE. ORYZA SATIVA.**

Hill rice is fairly extensively grown in the area during the rainy season, notably by the East Indian peasants. This rice grows by reason of the high rainfall alone and no terracing or irrigation is attempted. It is harvested in the short dry season in September and thrashed by hand on the holding where it is grown. Although it yields very much less than ordinary lowland rice it is a fairly important food crop and the straw, which is not carried from the plot, is often spread around forming a useful mulch.

Hill rice resembles ordinary lowland rice except in its different habit of growth but the seed, though looking similar, is not interchangeable. It is grown on the mountain side in small bunches of 5 to 15 plants, spaced irregularly, at distances in the range of 1 ft. x 1 ft. or 2 ft. x 2 ft.

Hill rice is planted with the heavy rains of May and June and
matures in four to five months. A yield of 25 bushels per acre is an approximate figure. It is cut by hand and thrashed by beating on a slatted table. The straw is not used except as a mulch. Most of the rice grown will be used for family consumption. A mixed crop of rice, maize, and pigeon peas is a common combination on the mountain side.

TANNIA. COLOCASIA ANTIQUORUM.

The huge leaved tannia plants are to be found in all the gully bottoms in the survey area where the soil is deeper, richer, and always moist. These conditions suit tannias well. It is an important vegetable and is commonly grown wherever conditions are suitable for it. It is of considerable importance in the local diet.

The plant has thick sappy stems and huge arrow shaped leaves. The underground tubers, which are the parts eaten, vary in size from that of a small to a large potato. The tubers, and in some varieties the tender leaves also, are eaten as a vegetable. It is an important and nutritious food resembling artichokes. The plants thrive in moist well manured soils near swamps or streams though some varieties are adapted to drier ground and in dry regions they do well under irrigation.

In the survey area the tubers are planted some 3 ft. x 3 ft. apart, often grown together with bananas in the moist gully bottoms, where erosion has formed beds of deep rich soil. No manures are applied. Planting generally takes place at the start of the rainy season, i.e. May. Mature roots can be harvested from three to nine months after planting, the tubers growing larger if left for a longer period.

Cultivation consists of scraping earth around the young plants with a hoe. An acre might yield from three to five tons. A great many types
and varieties exist.

**TOMATOES. Lycopersicum Esculentum.**

Tomatoes are an important crop of the survey area as the majority are sold for a cash income. Their position is one of a catch crop often taken among the pigeon pea plants before they mature and shut off the light. The fruit is extremely small, much of it going at 16 or so to the pound. However, freedom from bird damage, pilfering, and to an extent from disease, makes them a worthwhile crop.

The plants are similar to the temperate tomato but are a local 'scrub' variety, which however, under the conditions of growth, are very satisfactory, as they produce fruit with no care whatever other than planting and a rough weeding.

Planting takes place during the last rains before the dry season commences, though, on the mountain side, due to cool night temperatures, tomatoes will bear fruit all the year round. Some 10 to 15 seeds are planted in little heaps of earth scraped together, 2 or 3 plants being allowed to grow. The fruit is picked just before it is ripe and carried to the peasants home to ripen.

"Red Rock" was a variety planted by some peasants in the area but most saved their own seed from the local type. Better imported varieties are not really suitable to these rough conditions. Many diseases are apparent in the area especially on the old plants but a yield is obtained in spite of them. Generally they seem more healthy than those grown on the central plain.

**OKRAS. Hibiscus Esculentus.**

The okra is a popular vegetable in Trinidad but is more abundantly grown on the central plain as a dry season crop in the rice fields than on mountain sides such as the survey area. However, though of no great importance it is found growing in many of the gardens. Okra has a high protein content that makes it a nutritious food. It consists of the seed pods plus the immature seeds within.

Okra is an erect annual of the shoe-flower family, 4 ft. to 6 ft. high, bearing large roundish or palmate leaves and erect horn-like pods, 5 ins. to 8 ins. long. These form a mucilaginous vegetable. As the pods approach maturity, they become fibrous and inedible. There are many varieties of the plant. It is not suited to high elevations.
The seeds are sown at the start of the rains. In the survey area it is almost always intercropped with other vegetables though in the central plain it is commonly grown as a pure stand. Plants are spaced at approximately 3 ft. x 1½ ft. when grown as a pure stand. On the mountain side they are scattered about irregularly in suitable places among other plants. The pods are ready for picking from 2½ months onwards; those that get over mature being used as seed for the next crop. A good yield figure for a pure stand under lowland conditions might be 100,000 okras per acre from December to June the following year. Yields on the mountain side are probably very much less but cannot be accurately judged.

SALAD BEANS, or RODRIGUEZ BEANS.

Salad beans are an important green vegetable crop in the area. They are commonly planted immediately after the land is cleared and form a fairly heavy low cover while the taller crops are pushing through. The crop is harvested quickly and they are finished with as the other crops take over.

Salad beans are a dwarf, some 12 ins. to 14 ins. high. It yields a profuse crop in six weeks to two months from sowing. The pods are cylindrical and often streaked with red, being some 4 ins. to 6 ins. long. The pods are sliced green and cooked as a vegetable before they are mature. The seeds are planted about 18 ins. apart towards the end of the wet season so as to give a crop in the drier months. As they are often the first crop taken after clearing and burning, little weeding is necessary. They yield well though it is difficult to give an estimate of the yield in this area. A ready local sale is found.

BANANAS. MUSA SPECIES.

There was one garden in the area where an extensive crop of
bananas mixed with cassava was grown. Generally however, only an odd tree or two, mainly in the gully bottoms where the soil was deep and moist, was found. Bananas do not rank high in importance as a product of the survey area.

The bananas on the mountain side were not luxuriant in growth, being mostly small and stunted, yielding rather poor fruit. They were not growing in ideal conditions. Little care seemed to be taken of them.

**PUMPKINS, CUCUMBERS, MELONS.**

These plants formed quite an important crop on the mountain side but were not grown as major crops or at all systematically. Odd plants were placed in any suitable earth filled pocket on the more rocky parts of the plots and they twined, uncared for, among the other plants, yielding quite well at times.

**SWEET POTATOES. IPOMOEA BATATAS.**

Sweet potatoes are only rarely found in the area and, generally, conditions are totally unsuitable. Like okras they are mostly grown as a dry season crop on the rice fields of the central plain.

**TIMBER.**

The area today is almost entirely devoid of useful timber but occasional dadap trees, distinguished by the large thorns on their bark, are felled, trimmed into large squarish logs and dragged by mules down the main trace to the road where they are removed by lorry transport. Locally it is termed 'coffin wood'. Sometimes wood is carted on donkeys by the peasants for fuel but wood for this purpose is abundant in more easily accessible places.

8.) **THE MARKET.**

Most of the surplus produce of the area is marketed in Port of Spain, being transported direct along the Eastern main road. This is the greatest centre of demand in the island, for only in Port of Spain are there a really large number of people without their own gardens and home grown provisions.

In Port of Spain there is a very large covered provision market, organised by the Government and properly equipped. Some prices are at present controlled by the Government; pigeon peas for example, which are controlled at 6d. lb. wholesale or 8d. lb. retail. As with all produce of the soil, periodic gluts occur, and the peasants are well aware of the simple economic
rules of supply and demand. Sometimes crops are not even harvested due to low prices. We had one example of this during the year in the case of cucumbers which were fetching only 2¢ or 3¢ each wholesale.

Generally however, the demand for food is high due to the very high population on the island which has much increased during the recent war, so that all food grown is fairly easily disposed of at fair prices. A Government publication gives the increase in food prices as 100% between 1939 and 1946. The peasant cultivators have a certain independance of the market in that they and their families and stock can always live from their own produce even if their cash income is low. This results however in their nutrition lacking in protein and being generally unbalanced. Although the Trinidad peasant always has something to eat, malnutrition and tuberculosis are very common in the island.

9.) TRANSPORT.

Transport down from the gardens to the surfaced road is by head load or by donkey. Rather more peasants have not got donkeys than have, so that much of the produce of the area is carried out by human labour. For this reason preparation for sale is done as far as possible on the plots to lessen the weight to be carried. Tomatoes are carried mostly on the head in open circular baskets. Corn is mainly carried in sacks. Careful carrying is essential to avoid damage and on the steep narrow paths this is difficult. All things considered, transport is, in this mountain valley, a task of great labour and difficulty and yet it is this very difficulty, making pilfering too much effort to be worth while for the thief, that makes these remote gardens attractive to the peasant cultivator.

Photograph 17 shows a laden donkey on one of the foot paths in
Once Baja road is reached the surplus produce is taken to Port of Spain, some seven or eight miles, by two wheeled donkey carts. They are slow moving, bearing only small loads, and incidentally give rise to much traffic congestion along the Eastern main road.

Those who own their own carts, which somewhat under 50% do, claim that the double journey, plus the time taken to sell their produce, may well take all day. Those who own no transport carts pay a standard rate of 50¢ to 60¢ per 100 lbs. produce, and, for this fee, the more fortunate peasants cart their produce to market and sell it for them.

10.) THE PRESENT PROBLEM.

The present problem may be very simply stated. Peasants, driven by lack of work, hunger, high food costs, desire to be independant, and perhaps most of all, lack of land, cultivate steep mountain sides in the Northern Range on the wasteful basis of a shifting cultivation. In doing so they destroy a potentially valuable forest growth, spoil the rivers and local water supplies, and cause severe soil erosion. The Government seems either unwilling or is incapable of introducing and enforcing legislation to prevent the cultivation of these places which are entirely unsuitable for cultivation.

Were these people forced to cease to cultivate these unsuitable places:

(a) The reasons for them needing to cultivate them would still remain, causing severe friction, and the problem could by no means be termed
solved.

(b) It seems unlikely that the forestry department has, at present, sufficient funds or staff, to plant valuable forest timbers and thus make economic use of these mountain slopes.

Finally I would add this suggestion: That if all the Government is able to do is to prevent erosion by forcing the people off these lands so that they revert to natural forest, which, when all is considered, yields very low returns, then is it not better that the soil erosion should continue, for at least, then, a not inconsiderable food supply is gained for a very overcrowded island and the only loss is in the form of muddy silt laden streams during the rainy season? This is based on the assumption that cultivation will continue indefinitely on account of land regeneration under secondary bush.

The nature of the people, who, in the hot and humid climate of the island, are not over industrious, and also the nature of the land and crops, together make the terracing of the hillside almost an impossibility in practice.

The real solution is to increase production per unit land area in the flat lowlands of the island and to plant the hillside with an economic timber growth.

Discussion:

Texture.

All the soils (except No. 15) are gravely and all contain a high proportion of sand. (There was not enough soil for the determination of a plastic point). The contained fragments and coarse sand particles consist mainly of andesite and quartz which suggests that the soils are lithosols and of very immature.

Reaction.

This ranges from very highly alkaline to very highly acid: pH above 9.0 to pH below 5.0. The alkaline samples contain varying amounts of...
APPENDIX.

(a) SOIL REPORT.

Northern Range Investigations.

Soil samples submitted by Post graduate students, 4th. Dec., 1947.

Note: (1) All samples represent the top six inches of soil wherever the underlying rocks were not nearer to the surface. Rock was occasionally reached at 3 to 4 ins.

(2) Samples having the highest serial numbers were taken at the highest altitudes.

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Means: 61 52.9 7.0 6.6 3.55 0.283 8.8 30 96

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Means: 58 50.1 6.8 6.3 5.68 0.392 11.3 29 42

Discussion:

Texture. All the soils (except No. 16) are gravelly and all contain a high proportion of sand. (There was not enough soil for the determination of a sticky point). The contained fragments and coarse sand particles consist mainly of schist and quartz which suggests that the soils are lithosols and very immature.

Reaction. This ranges from very highly alkaline to very highly acid: pH above 8.0 to pH below 5.0. The alkaline samples contain varying amounts of...
free calcium carbonate ranging from a trace to 1.7% (in No. 15), in proportion to the degree of alkalinity (except for No. 6, an uncultivated soil, which contains 1.6% CaCO₃ with only pH 7.3).

Organic matter and Nitrogen content. Total O.M. ranges from 6.6% (high) to 1.2% (medium-low) with carbon nitrogen ratio varying between 14.4 and 5.3 being generally highest in soils containing highest amounts of organic matter and vice versa. The differences in organic status are possibly manifestations of the varying degrees of profile truncation by surface erosion.

Available phosphate. This ranges in amount from 6.9 ppm. to 5.0 ppm. Taking 50 ppm. as the lower limit of adequacy for most crops, six samples contain adequate amounts and 15 contain inadequate amounts of available phosphate.

Available Potash. Only four samples were examined for potash (No. 9, 12, 15, 18.). The values range from 161 ppm. to 48 ppm. Taking 100 ppm. as the lower limit of adequacy, then two of the samples (No. 15 and 18.) lie above the border line and two below (No. 9 and 12.). These four soils are all under cultivation.

Comparison of cultivated and uncultivated soils. The laboratory data show no significant differences between these two groups, although the uncultivated soils tend to contain most organic matter and to have the highest carbon nitrogen ratios. The available phosphate content of the uncultivated soils is only medium but slightly above the limit of adequacy, except in one sample (No. 3) which is very deficient in phosphate. (No potash figures are available). This suggests that the uncultivated soils have not been long out of cultivation but are showing signs of recovering their organic status under second growth bush.

Effect of altitude. The data show that no significant differences between soils collected at low and at high altitudes occur.

Effect of limestone outcrops. The presence of small amounts of free calcium carbonate in some of the soils collected at medium altitudes indicates outcrops of metamorphic limestone.

Signed: F. Hardy. (I.C.T.A.)
18/2/48.
The questionnaire used in the Survey area together with a typical set of answers actually obtained in the field.

**NOTE:** Eleven complete sets of answers were obtained while it was estimated that some thirty to forty separate plots of land were cultivated in the area.

**MOUNT TABOR.**

**No. 10.**

**A.**
1. Name?
   - Ram Sutmaran. A Hindu.
2. Address?
   - Lassiva, Tunapuna.
3. Who works the land?
   - Self only.
4. Time spent on the plot?
   - Every day except when marketing in P. of S.
5. Hours worked per day?
   - About 7 am. to 3 pm.
6. Owner or tenant?
   - Tenant.
7. Owners name?
   - Mr. Phelix.
8. Other work if any?
   - No other work.
9. Any previous non agric. work?
   - No.
10. Why he does this work?
    - Likes to be independent.
11. His future plans?
12. Rent?
   - $7.00 per acre per year.
13. To whom is it paid?
   - To the owner, Mr. Phelix.
14. Size of plot?
   - About one acre.

**B.**
1. What crops are grown?
   - Rice, okras, cucumbers, corn, pigeon peas, tomatoes, water melons, tannias, cassava.
2. Any manures? Seed supply?
   - His own seed and some from the Food control office.
3. Seasons of planting?
4. What cultivations?
   - Two weedings.
5. Harvest? preparation? storage?
6. Time of harvest of crops?
7. Any pests or diseases?
   - "Blight" (?) on tomatoes, bee cuts down pigeon peas.
8. Any crops tried and failed?
   - Cannot afford to try new ones.
9. Any yield estimates?
   - Tomatoes, 2,000 lbs. Pigeon peas, 1,600 lbs.
10. Where is the produce marketed? Port of Spain, on his own cart.

11. Any current prices? Tomatoes, 16¢. lb. pigeon peas, 6¢. lb. cucumbers, 2¢. to 5¢. each.

C.
1. What livestock is owned? A donkey, one cock and five hens.
2. How are they fed? Hens on corn, donkey on brought oats.

D.
1. What implements does he use? Hoe, fork, cutlass.
2. Where does he get his water? From stream in main gully.

E.
1. Time land is cultivated? One year, March to March.

Remarks: An old East Indian, poor, illiterate, and work worn.
CONTENTS

1. INTRODUCTION.

AGRICULTURAL THESIS.

2. THE LAND.


4. THE IMPLEMENTS.

5. LIVESTOCK.

6. CROPS AND CULTIVATIONS.

7. THE MARKETS.

8. THE LOWLAND SURVEY.

9. CONCLUSION.

APPENDIX. A questionnaire and answers.

R. Barrie Smith.
1947-1948.
1.) INTRODUCTION.

The area in which this survey takes place is situated on the
flat central plain, to the south of the Northern Range Mountains. The main
features are the absolute flatness and consequent lack of drainage.
The soils of the area are made up of debris and all washed down by streams
from the mountains above, thus the flooding and waterlogging
frequently occur after heavy rains. All the area is cultivated intensively
and only a few areas are present. Sugar cane, rice, and dry season
provision crops are produced in the area by peasants who are, almost entirely,
irregularly employed.

2.) THE LAND.

3.) THE PEOPLE.

4.) THE IMPLEMENTS.

5.) LIVESTOCK.

6.) CROPS AND CULTIVATIONS.

7.) THE MARKETS.

8.) TRANSPORT.

9.) CONCLUSION.

Location in relation to well known places.

The area lies on the north side of the Churchill Roosevelt
Highway, extending as far as the Maragua river in the St. Augustine district.
San Fernando line, runs across the area from the southeast corner in a south
direction.

Climates.

As the area is low lying, flat and without tree cover, it
receives direct sunlight all day. During the dry season the land dries out
and unless some crop is planted as a protective cover will become too hard to
work at all. Also during the dry season the North West Trade winds blow
steadily across the area and accelerate the drying process. It is quite
unsheltered and odd banana plants and garden plots by the ordinary men.

APPENDIX. 

A questionaire and answers.
1.) INTRODUCTION.

The area in which this survey takes place is situated on the flat central plain to the south of the Northern Range Mountains. The main features of the land are its absolute flatness and consequent lack of drainage. The soils of the area are made up of debris and silt washed down by streams from the mountains for countless generations. Flooding and waterlogging frequently occur after heavy rains. All the area is cultivated intensively and only a few solitary trees are present. Sugar cane, rice, and dry season provision crops are produced in the area by peasants who are, almost entirely, racially pure East Indians.

(1)

A general view of the Survey Area.

Location in relation to well known places.

The area lies on the south side of the Churchill Roosevelt Highway, extending as far as the Tacarigua river in the St. Augustine district, some eight miles due east of Port of Spain. The Trinidad Government Railway, San Fernando line, runs across the area from the northwest corner in a south eastly direction.

Climate.

As the area is low lying, flat and without tree cover, it receives direct sunlight all day. During the dry season the land dries out and unless some crop is planted as a protection the soil becomes too hard to work at all. Also during the dry season the North East Trade winds blow steadily across the area and accelerate the drying process. It is quite unsheltered and odd banana plants in garden plots by the houses have their leaves...
stripped to shreds by the wind.

During the wet season the area is subject to the heavy torrential downpours common in the island and also receives water that drains down, laden with silt, from the hills. The rainfall varies between 80 ins. and 100 ins. for the year, falling mostly in the rainy season, May to December. The soil becomes pulverised to dust on the trampas and in the few uncultivated areas looks like soil at all.

2.) THE LAND.

The land here has several features directly contrasting with the land of the mountain area:

(1) It is continuously and intensively cultivated, nearly always two crops and often three being taken from the same piece of land in a year.

(2) It is neatly and regularly laid out and is divided over the entire area by parallel traces, with others at right angles to them.

(3) Exact areas are known and yield values can be better relied upon.

(4) It is cultivated by livestock as well as by hand labour.

(5) It grows the same crops year after year without apparent deterioration.

(6) It is often worked by the same peasant cultivator for periods of up to forty years or more so that a long term interest in the land is taken.

(7) Access is easy and a first class road runs along the border of the area, in direct communication with Port of Spain.

(8) The variety of crops is far less than on the mountain side (excluding the household plots).

(9) No felling or burning has to be done and yet far more labour per unit area is used in the cultivations throughout the year than on the mountain side.

(10) It suffers from the uneconomic sub-division and tenant sub-letting common in peasant communities which is not a problem on the mountain side. 

Soils.

The soil types of the area have been examined and mapped and are
shown in varying colours on the map accompanying this report.

A sample picked up by hand anywhere in the area usually gives a whitish, bleached appearance, showing a lack of organic matter, very poor soil structure and, when dry, has a brick like hardness, while glinting specks of mica and quartz coarse sand grains can be readily seen. In the dry season the soil becomes pulverised to dust on the traces and in the few uncultivated plots scarcely looks like soil at all.

Drainage.

The area slopes very gently southwards to the Tacarigua river and also slightly from northeast to southwest. Because of this the river can be dammed to flood areas to the north of it and the flood water then drains back into the river further west along its course to the sea. A dam already exists at one point and another is planned higher up the river where, at the present, by a rough temporary dam of bamboo and silt, the peasants obtain water for the irrigation of their rice fields. The dam already constructed gives irrigation water over a fairly large area on a well organised distribution system, working to the north of the river. The main problem is the lack of co-ordination of cultivation operations due to the many independent peasants working the area. Trouble is caused, for example, by one peasant flooding his land for planting while his neighbour is still engaged in harvesting. It is impossible for a one foot thick bund of earth to be a perfect water tight barrier between two plots and much inevitable leakage occurs. Co-operation among the peasants using irrigation water, or a central control, is essential.

Rents.

The great majority of peasants are tenants paying a rent. Rents vary from $10.00 an acre to $15.00 an acre. Often the actual area as rented was only a quarter, a half, or three quarters of an acre. The general picture is one of high rents, small land areas and very intensive cultivation. Much sub-letting occurs among the peasants and it is also common to find various relations working fractions of the plot on verbal agreements that give rise to much bitter quarreling. Some land is held from the Government on the basis of 1/2 (24s.) per acre per year land tax.

These rice fields were very often only a part of the land worked by the peasants. In all many had about half an acre around their houses, a
small area of rice, a quarter or a half acre perhaps, and another half acre or so in one of the Northern Range valleys. Due to land fragmentation many had plots that were some distance apart. Many temporary agreements were found, such, for example, as a man working another plot some way from his own during the dry season, growing tomatoes; the real tenant taking over again in the wet season to plant his rice. Sometimes payments were made, sometimes not, the arrangements being made within families or between in-laws.

3.) THE PEOPLE.

The people of the area are almost entirely East Indians. They live in or just north of the area where the land is less damp and less liable to flooding. Their houses are made of mud and tapier grass with thatched roofs, often extraordinarily clean and neat inside, yet very simple. Water is obtained either from a road tap, if one is near by, or from a well. Good cool water is found at two to ten feet from the surface over the entire area throughout the year so that wells are simply and easily constructed.

These peasants have large families and very often more than one family inhabits each homestead. Cows are commonly kept for milk and bullocks for cultivation and transport purposes. The children can mostly read and write and also speak English as well as Hindi. Many of the adults however are illiterate and just a few do not speak English except for an odd word or two. A great many take on part time work on nearby Estates and do not rely on their plots for their entire income.

Generally they are industrious and will stint themselves to a surprising extent in order to save. Exterior personal appearance is no guide whatever to wealth. To a degree they are cunning and quick witted. Ceremony, especially at weddings and funerals, and ‘face keeping’, often lead them into great debt. The Rum shop, the money lender and the local magistrate all feature large in their lives.

4.) THE IMPLEMENTS.

Unlike the people of the mountain valleys these peasants rely more on the hoe than the cutlass and some even 'plough' their rice fields by turning over the earth with a large hoe. However, cattle are mostly used for the heavy cultivation work and pull single furrow ploughs and also a sort
of wooden harrow. The two wheeled cart is very common. A hook for harvesting rice by hand is another instrument always found. A small percentage use European forks and spades for preparing ridges and bunds. The fork is very commonly used when ridges are being made for sweet potatoes and also for opening the ridges when they are being harvested. Also, for harvesting sweet potatoes, a stout iron bar is sometimes used to loosen and throw the ridges over. Generally however the instruments are, as on the mountain side, simple and of a general purpose type. The main differences are that:

(a) There is no bush to be cleared.

(b) Rice growing, on any scale, requires animal draught.

The hoe and hand suffice for the dry season provisions grown after the rice harvest and the cutting of rice and threshing is also a simple hand operation. The paddy was formerly milled by pounding in a mortar by the women but, of late, small power mills have been installed by enterprising East Indians and for a few cents (or a percentage of the grain rendered) the peasants take along their rice, usually a pound or two at a time, to be milled.

5.) LIVESTOCK.

The livestock commonly kept by these lowland peasants are:

(a) Cattle for draught and dairy purposes, (zebu mostly, together with some zebu x holstein which are better for milk.

(b) Goats.

(c) Chicken and occasionally ducks.

The cattle are housed in rough thatched shelters behind the homesteads. They are fed on fresh grass cut by the children from the road sides and any waste areas though occasionally you will find a peasant who grows a small patch of fodder grass especially for his stock. Inquiry made it clear that the reason for this was not that the peasant did not realise the value of planted fodder grass but that, as land was so scarce, it was more profitable to grow provisions and to let the children collect grass from the roadsides.

Cattle are bedded with rice straw and often some attempt is made at composting. The compost is usually placed by hand into holes prepared for seeds or plants, tomatoes for example which get a lot of it, or heaped around young canes before the ridges are broken over them.
The goats are always tethered near the dwellings and fed largely on roughage. The chickens have a free run of the yard and roost either under or in the dwelling itself. The breeds of poultry most represented were Rhode Island Reds with some Leghorns and Plymouth Rocks. As might be expected many of the chicken were by no means pure bred. The climate seemed to suit poultry and generally they looked healthy enough.

6.) CROPS AND CULTIVATIONS.

Fertilisers and manures.

Unlike the cultivators in the mountains these lowland peasants are well aware of the value of manures. Rice, their main crop, receives no manures of any kind, and, it seems, can be grown year after year on the same piece of ground without any ill-effects. The provision crops do, however, get manured, and young sugar canes frequently receive a dressing of compost and artificial before earthing up.

The compost is made by heaping the bedding straw from the cattle pen and all other vegetable refuse together behind the homestead. The peasants are very economical in the use of this compost and it is very important for the successful growth of provision crops during the dry season on these light soils.

An artificial manure going under the local name of "salt" is often used but we were unable to find out exactly what it was. It was whitish in appearance and was mostly soluble in water. It seems likely that it was a compound fertiliser with the nitrogen factor predominating.

Crops.

Main crops: (a) Rice. followed by: Tomatoes, or Okras, or Sweet potatoes.
(b) Sugar cane. followed by: provisions, mainly pigeon peas, at intervals.

On the homestead plots: Salad beans, tomatoes, okras, sweet potatoes, pigeon peas, yams, cassava, bananas, bread fruit, mangoes, maize, pepper, ginger, lettuce, cucumbers, cabbage.

Rice. Oryza Sativa.

Rice is the main crop in this area except to the east where sugar cane is the predominant crop on the somewhat drier land.

The rice is grown on small plots, running at six or eight to the
acre and separated by low earth walls for irrigation purposes. A large area receives proper irrigation water from the Tacarigua river but quite a considerable area relies on flooding only and the continuous rains of the wet season.

The seed is planted out in small nursery beds and the young plants are transplanted into the fields by hand in the early part of the rainy season, May or June. The seed bed is prepared by ploughing with oxen or turning the soil by hand and then flooding it to a depth of six inches or so. A type of harrow is then worked over the area to break down the clods and completely saturate and puddle the soil. The planting of the rice seedlings is a women's task.

Little weeding is performed. The land is dried off as best as possible just before harvest and the rice cut by hand and thrashed on a slatted table of bamboo on the field where the crop is grown, the grain falling on to sacks placed on the ground below.

Sometimes the stubble is allowed to grow to give a second crop; it yields little but to counteract this disadvantage, needs only to be cut and thrashed. The peasants express their yields in "barrels" of rice which are roughly 110 lbs. As for yields, very widely varying ones were given. One peasant claimed 5½ barrels from about a quarter of an acre, the same area yielding ½ barrel as a second crop. Another gave a yield of ten barrels from one and a half acres with one barrel as a second crop from the same area.

The peasants dry the paddy by spreading it thinly on a sack in the sun. Young children are set to guard it and keep chicken from feeding on it. The rice straw is used for thatching the peasants houses, as bedding for their cattle (afterwards for compost) and sometimes as a mulch to conserve soil moisture and check weed growth among provision crops, especially okras, during the dry season.

Dry season uses of the rice fields.

We estimated that about 40% of the rice fields were allowed to give a second, unplanted, crop of rice. The reason for allowing this was in part the scarcity of rice and in part the lack of labour to cultivate the entire area during the dry season. A peasant might be able to manage one and a half acres of rice with his family labour force but could not plant and cultivate more than three quarters to one acre for provisions during the dry season.
Of the remaining 60% of the land some 10% or more was estimated to be put aside for grazing. The peasant's cattle were tethered on the rice stubble and fed on the fairly abundant weed growth that flourished soon after harvest. At the same time they trod and manured the land.

A small proportion of the land was merely left in fallow but peasants avoided this if possible as the soil became like concrete during the dry season and was very difficult to break up again for cultivation. The remainder of the area was cultivated for provisions which were both consumed by the family or sold, either locally, or in Fort of Spain.

Pigeon peas in this area are of little importance but they are often planted on the narrow earth banks that surround the rice plots so that no scrap of land is wasted.

The following crops are the chief ones that are planted on the rice fields in the dry weather: Okras, Tomatoes, Sweet potatoes.

Okras. Hibiscus Esculentus.

The land is hoed over and the seed planted in the little prepared patches of earth. The rice straw is then spread evenly over the area as a mulch. As the young plants push up through the straw it is cleared away around them and they are singled out to one or two plants. The only cultivation consists of light hoeing. The okras are harvested and the field ploughed again during the early rains.

Tomatoes. Lycopersicum Esculentum.

Patches of soil are prepared at intervals with a hoe and seed is planted. When a few inches high the young plants are singled to one or two per hole. They are allowed to straggle and produce large quantities of very small fruit; no pruning is done. When possible they are watered from shallow wells dug on the plot. To give them a better start young plants are sometimes grown in a nursery with shade and water and planted out when a couple of inches high. This enables quick germination and the frequent 'misses' that occur when seed is planted direct are avoided. Mole crickets are an abundant insect pest in the area and destroy many young tomato plants especially in their very early stages of growth.

Sweet potatoes. Ipomoeas Batatas.

After the rice is harvested the earth is forked up into high and thick ridges and the sweet potato vine cuttings are planted in these. The
cuttings are placed about a foot apart along the ridges. Often water lies between the high ridges after rain and in the drier parts the peasants make the ridges so that they will catch and hold what little rain does fall in the dry season. The forking of these ridges is very heavy labour and hired help is sometimes resorted to as it is a work far beyond the women in a peasant family. Sweet potatoes grow best in a dry warm climate on a light soil with irrigation. In this area many varieties are grown including red, yellow and white types.

Household plots.

In the quarter to half acre plots of land around the peasants dwelling houses all manner of provision crops are grown. The land is cropped year after year intensively and watering and manuring with "salt" and compost are common practice. Pure stands of any crop are seldom seen but instead all kinds of ingenious inter-cropping; for example, yams after maize so that the yam vines can use the dead maize stalks as a ready made support. Cassava, pigeon peas, lettuce, tomatoes, cabbage, yams, sweet potatoes, peppers, cucumbers and melons, pumpkins and maize; all the locally grown provisions in fact, will be found in these household plots together with a few coconut palms, bread fruit trees, and wild cotton shrubs for shade and ornament.

Sugar Cane. *Sacharum species.*

To the east of the lowland survey area sugar cane is the predominant crop, taking the place of rice. During the occasional periods when the land is rested from cane growing, provisions are planted, consisting in many cases of pure stands of pigeon peas. On much of the land rice could be grown and many of the peasants would be only too eager to grow it but it is forbidden by the landowners who require the so called "farmers cane" for their factories which have a capacity of dealing with considerably more than the Estate crop alone.

In the cane area rents were in the region of $10.00 an acre. Compost and artificial manures were often used to help the young canes. Second crops or ratoon crops were not taken due to frog-hopper blight which was serious in the area. Peasants managed up to three acres of cane and sold the produce to the factory of the landowners who deducted rents for the previous year from the harvest payments. Yields given were something between twenty to thirty tons of cane per acre, and the price, recently much increased and subject to continual change, was $6.25 per ton. Transport to
the factory cost about $1.00 per ton if a peasant was unable to do it himself. Much general dissatisfaction existed due to the queuing and delay when delivering "farmers cane" to the factory.

Cane was planted as separate cuttings in the hollows formed by deep ridges on which were planted the provision crops. Towards the end of the dry season, as the provisions were removed, compost was placed, a handful at a time, around the young canes and the banks of earth pushed in around the young plants. The cane matured in some eighteen months after planting. The work of building essential drainage ditches was sometimes contracted out at a cost of $1.20 per 100 ft. for a standard trench of $2\frac{1}{2}$ ft. deep x 2 ft. wide.

7.) THE MARKETS.

Rice was very largely consumed by the peasant and his family. Rice, during the time of the survey, was in short supply in the island and was the only food that was rationed. The bulk is normally imported from British Guiana. It formed the basic food of the East Indian peasants and is eaten by them at nearly every meal.

The sugar cane was nearly all sold to the nearest factory at harvest. In spite of much grumbling prices were fairly good. Moreover, peasants could obtain loans on their crop (rent for example was often deducted from the price paid at harvest, representing an eighteen month loan) provided they worked the land belonging to the Estate to whose factory they sold it. Estates helped in other ways such as the provision of planting material.

From the provisions grown the peasants feed themselves and their families and sell the surplus in local residential areas (St. Augustine and the Tunapuna Government market) with a proportion going into Port of Spain.

8.) TRANSPORT.

The traces in the area, along which all produce has to enter and leave, are in very bad repair. In the rainy season large parts are flooded and then turned into mires by the two wheeled bullock carts of the peasants. The landlords fail badly in the upkeep of the traces. Sugar cane haulage especially needs a good road surface or it is killing work for the animals. Once off the area however, to the north, the best road in the island, the Churchill Roosevelt Highway, gives good communication with Port of Spain. Tunapuna also, is readily
reached by surfaced roads.

9.) CONCLUSION.

The problems of this area are not so pressing as the problem of severe soil erosion in the mountains but, even so, need attention. They can be simply stated under three headings:

(a) A great improvement is possible by a bigger and better organised irrigation system under a central control. Plans are already afoot to build another dam in the Tacarigua river and greatly enlarge the area receiving direct and positive irrigation.

(b) A central authority or a co-operative organisation with power to organise cultivators in the area is necessary so as to avoid the present friction caused by one peasant flooding his land to plant rice while his immediate neighbour is trying to dry his plot to enable him to harvest and to thrash his crop.

(c) The avoidance of fragmentation of land is essential for agricultural progress in the area and would require the grouping together of economic land areas with means of preventing their future disintegration among the many sons and male relations of the present tenant.
A QUESTIONNAIRE AND ANSWERS.

The questionnaire as used in the survey area together with a typical set of answers actually obtained in the field.

RICE AREA. No. 6.

1. Name? Arimanaj.
4. Time spent on the plot? Sundays only.
5. Hours worked per day? ---
6. Owner or tenant? Sub-let from lessee.
7. Owners name? Father in-law, (lease holder).
8. Other work if any? Labourer on irrigation scheme.
9. Any previous non agric. work? ---
10. Why he does this work? ---
11. His future plans? ---
12. Rent? $5.00 per year.
13. To whom is it paid? Owner of the lease.

B.
1. What crops are grown? Rice, wet season. ½ second crop rice, ½ in okras in the dry season.
7. Any pests or diseases? ---
8. Any crops tried and failed? ---
9. Any yield estimates? ---
10. Where is the produce marketed? Rice: 1st. crop 5½ barrels, 2nd. crop ½ barrel.
11. Any current prices? ---

C.
1. What livestock is owned? One bull.
2. How are they fed? Grass.
Dj.
1. What implements does he use? Hoe, rice hook, plough, harrow, cart.
2. Where does he get his water? Well at house and road tap.

E.
1. Time land is cultivated? All the year, every year.
2. Method of clearing?

Remarks: The lease holder is taking back the land to cultivate it himself next season.
One barrel of rice is 110 lbs. approximately.