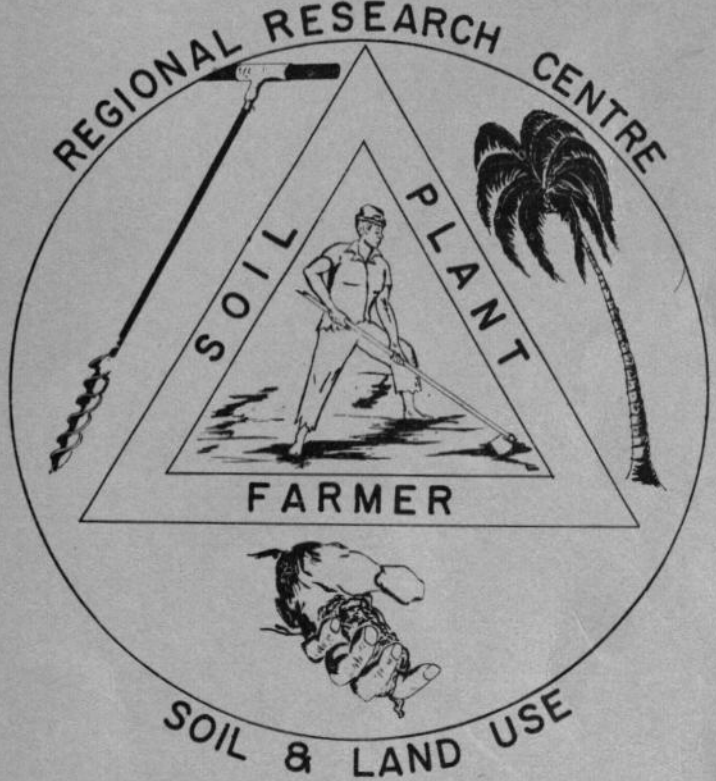
PROFILE DESCRIPTIONS AND ANALYTICAL RESULTS

FOR THE

SOILS OF MONTSERRAT



SOIL & LAND USE SECTION
REGIONAL RESEARCH CENTRE
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PROFILE DESCRIPTIONS AND ANALYTICAL RESULTS FOR THE SOILS OF MONTSERRAT

BY

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SOIL AND LAND USE SECTION

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INTRODUCTION

This report represents a change in the method of presentation of the soil survey data from that which has been followed in the previous Soil & Land Use Survey Reports. It has been decided that more detailed analyses should be carried out on the samples for the survey and that these should be linked with fairly comprehensive descriptions of the soil profiles. This information will not be published in detail in the Soil & Land Use Reports but reference will be made to it and it will be used in interpretation of the soils and their agricultural potential.

The analytical data presented in the report are determined by methods which can be used in a routine laboratory by non-qualified junior staff. Soil data generally determined are : pH, conductivity, $CaC0_3$ (if calcareous), C.E.C., T.E.B., percentage base saturation, exchangeable K, (Na), Ca and Mg, C/N ratio, Truog phosphate, moisture content and loss on ignition.

The measurement of pH is by the glass electrode method using a soil solution ratio of 1:2:5. Conductivity is determined on a 1:5 soil/water suspension and calcium carbonate by the Collins calcimeter. These determinations constitute a preliminary analyses which enables soils to be grouped for specific procedures in cation analyses. Different procedures for the displacement of exchangeable cations and saturation of the exchange complex become necessary if soils are calcareous or saline. The soils are therefore divided into the following groups on the basis of the preliminary analysis :-

		pH	Conductivity (micromhos/rm)	Per cent $CaCO_3$
(i)	Non-calcareous non-saline	<7	<400	<1
(ii)	Calcareous non-saline	>7	<400	1 - 5
(iii)	Calcareous non-saline	>7	<400	>5
(iv)	Non-calcareous saline	<7	>400	<1
(v)	Calcareous saline	>7	>400	1 - 5
(vi)	Calcareous saline	>7	>400	>5
(vii)	Calcareous saline	>7	Very High	Very High

When at all possible one particular procedure is used for all samples from the same soil profile. The standard procedure for determining cation exchange data on non-calcareous, non-saline soils is by leaching 10 gm of soil with 300 ml of N ammonium acetate at pH 7. The leachate is brought to dryness, ignited at 480°C, taken up in 0.2 N HCl and back-titrated with 0.1 N NaOH using methyl red as indicator. This determines the T.E.B. Iron and manganese are removed by diethyldithiocarbamate; Ca Mg and Ca alone are determined by E.D.T.A. using respectively Eriochrome Black T and Cal-Red as specific metal indicators, magnesium being obtained by difference; K and Na are determined by flame photometer. After leaching, the soils are washed with wash alcohol (80 per cent, slightly ammoniacal) followed by 95 per cent ethyl alcohol and the C.E.C. determined by displacing the absorbed NH_4 by sodium and measuring it by distillation in Markham units.

Where the content of $CaCO_3$ is between 1 and 5 per cent the soil is first leached with 0.5 N acetic acid and then with 500 ml ammonium acetate. Where the $CaCO_3$ level exceeds 5 per cent, the soil is leached with 300 ml N sodium acetate at pH 8.2, washed with wash alcohol containing sodium acetate, followed by 95 per cent ethyl alcohol and then leached with ammonium acetate at pH 7. Determination of the displaced Na gives a measurement of the C.E.C. Where the $CaCO_3$ values are between 1 and 5 per cent, corrections are made from these values for T.E.B. and exchangeable Ca. Neither T.E.B. nor exchangeable Ca are determined on soils containing more than 5 per cent $CaCO_3$.

If the conductivity is greater than 400 micro-mhos/cm (2 m.e. per cent soluble salts) the soil is regarded as saline. The standard procedure is used but the quantity of ammonium acetate is increased to 500 ml in order to extract the soluble salts. Exchangeable cations and T.E.B. are corrected for soluble salts determined by leaching the soil with water.

Very saline and calcareous soils present special difficulties in analysing for exchangeable bases and we do not have a satisfactory routine method.

Organic carbon is measured by the Watts wet combustion method and nitrogen by micro-Kjeldahl. The determination of P_2O_5 is by shaking 1 gm of soil with 200 ml of N/500 sulphuric acid, containing 3 gm/litre ammonium sulphate (Truog reagent) and estimating the extracted P by the molybdenum blue method.

All determinations are made on air-dry samples ground to pass a 2 mm sieve but the results are re-calculated to an oven dry basis. Single analyses only are conducted on each sample. Calculations of the co-efficients of variation have shown that the values are below 3 per cent for C.E.C., T.E.B. and exchangeable Ca but are about 10 per cent for K and Mg. The value for K is especially high when exchangeable K is low in relation to other cations.

For a number of reasons mechanical analyses have not been carried out on these soils. Whilst it is agreed that such analyses would be useful it was felt that, in this case, where the number of analyses had to be limited, the surveyor's assessment of texture would be a sufficiently reliable guide to the field behaviour of the soil. Some of the volcanic soils are extremely difficult to disperse; in addition the texture, as determined in the laboratory often bears little relationship to the behaviour of the soils in the field.

In the volcanic soils there is insufficient information for confident use of soil analyses as a basis for fertiliser recommendations. For bananas, the most intensively studied crop, there are indications that there is a good chance of a response to phosphate where the level of P_2O_5 is below 30 p.p.m. in the soil. For the same crop, there is a good chance of a response to potash when the exchangeable K is below 0.40 m.e./100 gm in the soil. At present there is no information on adequate levels of Ca, Mg or N. Where soluble salts and calcium carbonate are absent the C.E.C. and percentage base saturation give a general guide to the fertility of the soil.

The soils have been classified on the basis of maturity, after a method suggested by Lang. This takes into account the type of clay mineral and the amounts of unweathered primary minerals. The latosols are the most mature soils and are ones in which clay development is virtually complete. With the exception of relatively resistant minerals such as quartz and magnetite few primary minerals are normally found. The kandoid latosolics are soils in which the clay fraction is kandoid but in which unweathered primary minerals are commonly found. In the allophanoid latosolics the clay fraction represents a large proportion of the soil material but appears to be mainly of an amorphous type representing an early stage in the weathering sequence. Leaching is usually very well advanced since these very freely draining soils occur in the continuously wet zones. In the "mixed" latosolics the properties of the clay appear to be transitional between those of kandites and smectites. Leaching is normally relatively little advanced since the soils are found only in areas with a marked dry season. The smectites are soils in which the clay fraction may or may not represent a large percentage of the soil material but which are dominated by the expanding lattice clay. Leaching is usually negligible and the soils are confined to areas with a marked dry season. Young soils are immature soils with large quantities of unweathered unresistant primary minerals. The (B) horizon is always and the whole profile is usually weakly developed. Protosols are soils in which virtually no development, except physical weathering, has taken place. Hydrogenic soils are characterised by the presence of a high water table. Polysols are distinguished because some one factor in their development is complicated by having more than one phase, for example, at least two distinctive parent materials or more than one pedogenic process such as will arise from a climatic or drainage change. The soil series is used as the landscape unit for mapping; the differentia for series are similar to those described in the U.S.D.A. Soil Survey Manual (4).

The horizon nomenclature, where used, is a modification of the system proposed by Kubiena(2). The symbol (B) denotes a non-illuvial horizon where the soil forming processes have destroyed the original rock structure and produced a new soil structure. Clay formation and the presence of free iron oxides is very marked in this horizon. Below the (B) horizon is a horizon transitional to parent material which shows less marked weathering and alteration. This transitional horizon occurs even if the soil is so immature that no (B) horizon forms. It is given the symbol (B)/C if the (B) is very dissimilar to the parent material, as in the case of ash or tuff and (B)-C if the parent material is rich in clay and the distinction between horizons is harder to make. The term 'S' is used for the surface horizon when it is not a proper A horizon

but rather one developed under cultivation. The subscripts x, y and z in the horizon nomenclature denote horizons of different genesis i.e. polysols. Subscripts si and ca refer to silica and carbonate cementation. The colours are those of the Munsell colour chart and except where otherwise stated are for the moist soil. The term 'shoal' has been used by Hardy(1) to describe the product of weathering of loose masses of both coarse and fine grained fragmental volcanic rocks when certain of the weathered materials move downward to seal up and cement the substratum into a hard coherent compact mass. This hard compact mass is called 'shoal'; it is frequently exposed by removal of the top soil by erosion. Hardy uses the term "geological shoal" to describe a similar compact material formed during submergence under the sea.

The data on climate are based on the calculations of Smith(3), using the rainfall records of the island for calculations of rainfall probabilities and Thornthwaite's methods for calculation of evapotranspiration, making due allowance for the effect of elevation on temperatures. From these calculations the locations of the soils are split up into five climatic zones : a semi-arid zone with strongly pronounced soil moisture deficit, a rainfall deficit in every month of the year and a low variability from year to year; a sub humid zone (A) with a rainfall deficit for half the year or more, pronounced moisture deficit in the soil and a low rainfall reliability; a sub humid zone (B) with a rainfall deficit for up to half the year, marked moisture deficit in the soil and a moderate rainfall reliability; a humid zone with a rainfall deficit in not more than 2 months of the year, small or no moisture deficit in the soil, moderate rainfall reliability; a per-humid zone with no rainfall deficit and no moisture deficit in the soil.

For this report D.M. Carroll carried out the field sampling and profile descriptions, P. Moss supervised the laboratory analyses and J.K. Coulter was responsible for assembling and checking the data.

REFERENCES

(1) Hardy, F., Rodrigues, G. (1949). Studies in West Indian Soils. XI. The Agricultural Soils of Montserrat I.C.T.A., St. Augustine, Trinidad.

(2) Kubiena, W.L. (1953). The Soils of Europe. Thomas Murby & Company, London.

(3) Smith, G.W. (1960). The Irrigation Needs of St. Kitts and Nevis. Report of the I.C.T.A., St. Augustine, Trinidad.

(4) Soil Survey Manual (1951). United States Department of Agriculture Handbook No.18.

PROFILE No. 22 SOIL UNIT : 28 English's Series CLASSIFIED AS : Protosol (highly organic)

LOCATION At 2,400 ft elevation not far below the peak of the central plug of Soufriere volcano

CLIMATE Humid with an average annual rainfall of over 80 ins

VEGETATION Palms

The soil is developed from an unstable dacitic boulder heap (slope 35° ENE) in an area of broken, straight slopes, on the side of the central plug of Soufriere volcano. The permeability of the soil is very high and the drainage is moderately rapid and free. The area is very stony and very bouldery.

PROFILE DESCRIPTION

I	H	0-9 ins	Very dark brown (10 YR 2/2); humic silt; smeary, wet consistence; weak reaction to H_2O_2; merging, flat boundary to :
II	A_I	9-14 "	Dark brown (10 YR 3/3); gritty, humic silt loam; rudimentary sub-angular blocky structure; smeary, non-plastic, very slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present).
III	C_1	14-18 "	Dark brown (10 YR 3/3); gritty, sandy clay loam; moderately well developed medium sub-angular blocky structure; smeary, slightly plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present).
IV	C_2	18-30 "	Dark brown (10 YR 4/3); gritty, loamy sand with fragments of little weathered dacite; rudimentary sub-angular blocky structure; loose to very friable consistence.
V	C_3	30-48 " plus	Grey brown (10 YR 5/2); gritty, loamy sand with fragments of little weathered dacite; massive structure; loose consistence.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.5	50.8	32.5	22.1	11.2	0.80	3.5	18.3	64	30.5	1.69	18.1	5
II	5.6	12.8	5.0	3.4	2.1	0.15	0.8	7.8	39	6.0	0.42	14.2	23
III	6.0	6.9	2.9	1.9	1.1	0.05	0.4	4.0	42				15
IV	6.3	2.4	1.8	1.2	0.5	0.05	0.2	0.6	75				57
V	6.4	0.9	1.1	0.4	0.5	0.05	0.3	0.0	100				170

NOTES

The high organic matter accumulation is confined to the top 9 ins. Thus the profile differs from the allophanoid latosolics which contain organic matter to greater depths.

PROFILE No. 43 **SOIL UNIT : 28** **English's Series** **CLASSIFIED AS : Protosol (highly organic)**

LOCATION At 2,600 ft elevation on Soufriere Mountain

CLIMATE Humid with an annual average rainfall of over 80 ins

VEGETATION Tree ferns

The soil is developed from loose sandy rubble at the foot of a more or less stable, broken concave slope (15°SE) of the Soufriere plug. The permeability of the soil is very high and the drainage is very rapid and free.

PROFILE DESCRIPTION

I	H	0-2 ins	Very dark brown (10 YR 2/2); humic silt; structure almost crumb-like; smeary consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	A	2-4 "	Dark reddish brown (5 YR 3/2); humic silt; well developed fine angular blocky structure; non-plastic, non-sticky, slicking, smeary consistence; weak reaction to H_2O_2; merging, flat boundary to :
III	C_1	4-9 "	Dark brown (7.5 YR 4/2); very fine sand; well developed fine angular blocky structure; non-plastic, non-sticky, slicking, smeary consistence; weak reaction to H_2O_2; on :
IV	C_2	9-15 "	Dark brown (7.5 YR 4/2); loamy sand; weakly developed fine sub-angular blocky structure; slightly smeary, very friable to loose consistence; moderate reaction to H_2O_2 (MnO_2 present); on:
V	C_3	15-30 " plus	Brown (7.5 YR 5/2); coarse sand; single grain structure; loose consistence; sand only weathered physically; weak reaction to H_2O_2.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.2	39.3	33.2	25.2	10.5	0.70	1.8	6.1	84	23.4	0.73	32.1	27
II	6.3	19.3	14.8	12.2	2.7	0.20	0.9	4.5	77	9.0	0.50	18.0	26
III	6.5	10.0	7.2	5.6	0.9	0.15	0.7	2.8	72	4.2	0.28	15.0	38
IV	6.4	3.4	3.8	1.3	0.2	0.05	0.3	0.0	100	1.2	0.07	17.0	44
V	6.3	0.7	1.9	0.4	0.3	0.05	0.2	0.0	100				245

NOTES

The marked drop in C.E.C. corresponds with the decrease in organic matter

PROFILE No. 32 SOIL UNIT : 15 Grove-Farm-Trants Series CLASSIFIED AS : Protosol

LOCATION At 150 ft elevation, 300 yds west of the Poor House at Kinsale and 200 yds from the sea

CLIMATE Sub-humid (A) with an average annual rainfall of 50 ins

VEGETATION Coarse grass fallow (former cotton land)

The soil is developed from fairly coarse dacitic ash on gentle slopes (3°W) just above a sea-cliff at the lower end of a ridge of the dissected glacis of Soufriere. The slopes are naturally smoothly convex, but have acquired a step like appearance by terracing. The permeability of the soil is probably moderate and the drainage is moderately rapid and moderately free. This area was extremely droughty (although the pit was dug towards the end of the wet season) and appeared to be 'baked' throughout. There are few roots below 6 ins.

PROFILE DESCRIPTION

I	A	0-8 ins	Brown (7.5 YR 5/2); gritty fine sand; well developed medium granular structure passing into moderately well developed sub-angular blocky structure; loose, hard consistence; weak reaction to H_2O_2; fairly sharp, flat boundary to :
II	C_1	8-20 "	Dark brown (7.5 YR 4/2); slightly gritty sand; weakly developed fine sub-angular blocky structure; very hard, cemented consistence, becoming very friable when removed from the pit; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	C_2	20-40 " plus	Brown (10 YR 5/3); slightly gritty sand; more or less massive structure of the original tuff which is possibly less cemented towards its base; very hard, cemented consistence, becoming very friable on removal from the pit; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	p. p. m.
		C. E. C.	T.E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	8.4	9.0	7.0	2.2	0.20	0.4	0.0	100	1.4	0.10	13.4	25
II	6.4	10.2	10.2	7.9	4.3	0.10	0.5	0.0	100	0.7	0.08	8.9	19
III	7.0	7.6	7.3	5.4	2.1	0.10	0.4	0.3	96				16
III	6.4	6.2	5.9	4.0	1.8	0.10	0.5	0.3	95				24

NOTES

PROFILE No. 42 SOIL UNIT : 15 Grove-Farm-Trants Series CLASSIFIED AS: Protosol

LOCATION At 250 ft elevation in Taman Ghaut field, on Richmond Estate

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 60 ins

VEGETATION Coarse grass (former crop required ridges)

The soil is developed from deep coarse textured alluvium from St. George's Hill at the middle of a gentle depression (with no external drainage way) surrounded by gentle concave slopes. The permeability of the soil is moderately high and the drainage is moderately rapid and free. This soil was taken as representative of a number of 'basin' phases (of net accumulation) of youthful soils.

PROFILE DESCRIPTION

I	S	0-9 ins	Dark brown (7.5 YR 3/3); sandy loam; moderately well developed crumb over well developed fine sub-angular blocky structure; very friable to loose, very slightly plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	C_I	9-13 "	Dark yellowish brown (10 YR 4/4); sand; single grain structure; loose consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
III	C_I	13-28 "	Dark brown (7.5 YR 3/3); sandy loam; moderately well developed fine angular blocky structure; friable, very slightly plastic, very slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging boundary to :
IV	C_{II}	28-37 "	Dark grey brown (10 YR 4/2); clay loam; moderately well developed fine angular blocky structure; plastic, slightly sticky, slightly friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging boundary to :
V	C_{II}	37-54 " plus	Dark yellowish brown (10 YR 4/4); sandy clay loam; moderately well developed medium angular blocky structure; plastic, slightly sticky, slightly friable consistence; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	P_2O_5 p. p. m.
		C. E. C.	T. E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.4	8.7	8.6	6.1	2.8	0.20	0.5	0.1	99	1.0	0.10	10.1	45
II	6.8	4.8	5.2	3.2	1.1	0.20	0.2	0.0	100	0.3	0.04	9.6	33
III	6.6	12.4	11.9	9.2	3.2	0.25	0.5	0.5	96				5
IV	6.9	16.3	15.3	11.4	4.0	0.15	0.8	1.0	94				7
V	6.7	12.6	12.2	9.6	3.0	0.10	0.6	0.4	97				8

NOTES

PROFILE No. 54 SOIL UNIT : 15 Grove-Farm-Trants Series CLASSIFIED AS : Protosol

LOCATION At 100 ft elevation just west of the road at Grove

CLIMATE Sub-humid (A) with an annual rainfall of approximately 60 ins

VEGETATION Coarse grass and low shrubby weeds

The soil is developed from layered alluvium consisting of coarse, little weathered, pyroclastic material on the lower slopes of Grove Flat (an old marine terrace) just above the point where the slope (2°W) is broken by an old sea cliff, now rather degraded. The slopes, although generally smooth are ridged by cotton cultivation banks (abandoned). The permeability of the soil is moderately high and the drainage is rapid and free except where puddled by cattle. There are not many stones in the profile. Some erosion of the surface horizon has obviously taken place and organic matter development is insignificant in this profile. Root development is found throughout the top 20 ins.

PROFILE DESCRIPTION

I	$(A)_1$ & C_I	0-12 ins	Dark yellowish brown (10 YR 4/4); loamy sand; weakly developed medium sub-angular blocky structure; non-plastic, slicking consistence; moderate reaction to H_2O_2; merging to :
II	C_2	12-20 "	Dark brown (10 YR 4/3); gritty loamy sand; weakly developed medium sub-angular blocky structure; non-plastic, slightly sticky consistence; weak reaction to H_2O_2; merging to :
III	C_3	20-29 "	Very dark grey brown (10 YR 3/2); gritty loamy sand; very weakly developed medium sub-angular blocky structure; non-plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging to :
IV	C_4	29-42 "	Brown (10 YR 5/3); coarse sand; single grain structure; very friable loose consistence; strong reaction to H_2O_2 (MnO_2 present); merging to :
V	C_5	42-54 "	Dark brown (10 YR 4/3); loamy fine sand; very weakly developed medium sub-angular blocky structure; rather compact, non-plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present).
VI	C_6	54-60 " plus	Very dark grey brown (10 YR 3/2); loamy fine sand; very weakly developed medium sub-angular blocky structure; rather compact, non-plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.4	7.7	9.6	6.9	1.9	0.15	0.4	0.0	100	0.6	0.04	13.5	163
II	6.6	6.1	7.7	5.6	1.4	0.30	0.3	0.0	100	0.7	0.06	11.9	288
III	6.6	6.6	7.9	6.0	1.5	0.05	0.3	0.0	100				141
IV	6.8	4.1	6.3	3.9	1.4	0.10	0.2	0.0	100				177
V	6.9	8.8	10.4	9.1	1.4	0.10	0.4	0.0	100				158

NOTES

All boundaries are horizontal (bedding). There are many small MnO_2 concretions throughout the profile

PROFILE No. 41 SOIL UNIT : 33 O'Garro's Complex CLASSIFIED AS : Protosol (severely eroded)

LOCATION At 1,100 ft elevation near the main path and $\frac{1}{4}$ mile inland from Roache's Estate Mill

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 50 ins

VEGETATION Coarse grass and guava scrub

The soil is developed from pyroclastic material on the half consolidated rubble mass at the foot of the Soufriere volcanic pile on a stable pediment slope (12°SE) in an area of smooth straight slopes. The permeability of the soil is moderate and the drainage is moderately rapid and free. Roots are confined mainly to the surface horizon.

PROFILE DESCRIPTION

I A 0-5 ins Dark brown (10 YR 3/3); loam; moderately well developed fine crumb structure; very friable, moderately plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :

II $(B)_I$ 5-11 " Dark brown (10 YR 4/3); sandy loam; moderately well developed fine angular blocky structure; very friable, slightly plastic, slightly sticky, locally slightly compact consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :

III $(B)_{II}$ 11-17 " Brown (10 YR 5/3); fine sandy clay loam with some fragments of unweathered material; moderately well developed medium angular blocky structure; very friable, moderately plastic, slightly sticky, slightly compact consistence; moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

IV $(B)/C_I$ 17-25 " Brown (10 YR 5/3); gritty fine sandy clay loam with many fragments of nearly unweathered material; weakly developed medium sub-angular blocky structure; friable, moderately plastic, slightly sticky, slightly compact consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

V $(B)/C_{II}$ 25-40 " plus Similar material to that of the above horizon, comprises perhaps 10-30 per cent of total material, the remainder being little weathered rock fragments, (percentage increasing downwards); strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	9.3	10.7	6.7	1.3	0.15	0.5	0.0	100	2.4	0.15	16.7	4
II	6.5	11.0	10.0	7.3	2.3	0.15	0.8	1.0	91	1.0	0.12	8.0	8
III	6.8	14.2	12.7	10.4	1.8	0.10	1.6	1.5	89	0.4	0.06	6.9	1
IV	6.7	12.4	12.1	9.0	2.7	0.10	1.9	0.3	98				5
V	7.1	13.2	12.4	9.7	2.0	0.15	1.9	0.8	94				0

NOTES

PROFILE No. 46 SOIL UNIT : 33 O'Garro's Complex CLASSIFIED AS : Protosol (severely eroded)

LOCATION At 50 ft elevation near the road and the bridge at O'Garro's

CLIMATE Semi-arid to sub-humid with an average annual rainfall of about 45 ins

VEGETATION Cotton

The soil is developed from very little weathered volcanic bouldery sand alluvium, on gentle slopes (< 1°) in the middle of an old flood plain 20 ft above the present ghaut level. The permeability of the soil is high and the drainage is free and very rapid.

PROFILE DESCRIPTION

I (A) 0-9 ins Pale brown (10 YR 6/3, dry); gritty sandy loam; weakly developed medium sub-angular blocky structure and single grain structure; slightly sticky, non-plastic, very friable to loose consistence; weak reaction to H_2O_2; sharp, flat boundary to :

II C_I 9-19 " Pale brown (10 YR 6/3, dry), dark grey brown (10 YR 4/2, moist); gritty sandy clay loam; moderately well developed fine sub-angular blocky structure; plastic, sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

III C_{II} 19-32 " Pale brown (10 YR 6/3, dry), dark grey brown (10 YR 4/2, moist); loamy sand; very weakly developed medium sub-angular blocky structure; slightly sticky, non-plastic, very friable to loose consistence; weak reaction to H_2O_2; flat boundary, merging over 4 ins to :

IV C_{III} 32-54 " Very pale brown (10 YR 8/4, dry), light yellowish brown (10 YR 6/4); loamy sand; single grain structure; slightly sticky, non-plastic, very friable to loose consistence; weak reaction to H_2O_2.

ANALYSES

Horison	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.7	11.9	13.9	11.0	2.8	0.90	0.6	0.0	100	0.9	0.08	11.0	210
II	6.7	17.5	18.1	15.6	3.0	0.85	0.7	0.0	100	0.7	0.07	9.3	60
III	6.9	10.7	10.6	8.4	2.7	0.20	0.7	0.1	99				49
IV	6.7	22.0	23.1	19.7	3.8	0.15	1.3	0.0	100				40

NOTES

PROFILE No. 47 SOIL UNIT : 34 South Soufriere Complex CLASSIFIED AS: Protosol (eroded)

LOCATION At 80 ft elevation beside the main road to O'Garro's

CLIMATE Semi-arid to sub-humid with an average annual rainfall of about 45 ins

VEGETATION Drought resistant weeds (area slightly terraced under former cultivation), cover a small proportion of the area

The soil is developed from almost unweathered tuffy agglomerate on a valley side bluff with straight unstable slopes of 25° in a position of slight net erosion at the foot of the fairly maturely dissected glacis of South Soufriere volcano. The permeability of the soil is very high and the drainage is very rapid and very free. The whole hillside is somewhat eroded, and the A horizon has obviously mostly gone from this profile (erosion stage 2).

PROFILE DESCRIPTION

I	A/C	0-10 ins	Grey brown (10 YR 5/2, dry), dark brown (7.5 YR 4/2); sand; single grained to weakly developed medium sub-angular blocky structure; extremely friable to loose, non-plastic, non-sticky consistence; weak reaction to H_2O_2; boundary horizontal, merging over 6 ins to :
II	C	10" plus (virtually no change to 54")	Light grey (2.5 Y 7/1, dry); bouldery, stony gritty sand; single grain structure; loose consistence; weak reaction to H_2O_2.

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	P_2O_5 p. p. m.
		C. E. C.	T. E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.3	5.8	7.3	5.1	1.6	0.20	0.4	0.0	100	0.8	0.08	9.4	66
II	6.9	2.1	3.3	2.1	0.9	0.10	0.4	0.0	100				89
II	7.2	1.8	3.3	1.3	1.0	0.05	0.3	0.0	100				195

NOTES

The very high P_2O_5 value in the weathering sand is to be noted

PROFILE No. 28 SOIL UNIT : 15 Grove-Farm-Trants Series CLASSIFIED AS : Protosol

LOCATION At 40 ft elevation near the road passing through Bethel Estate

CLIMATE Sub-humid to semi-arid with an average annual rainfall of approximately 45 ins

VEGETATION Coarse grass (formerly cotton)

The soil is developed from stony andesitic tuff or a derived colluvium at the seaward end of a ridge of the youthfully dissected Soufriere glacis, sloping 3° to 4°E, an an area of very gently undulating topography. The permeability of the soil is moderately low and the drainage is moderately rapid and free. The whole surface is very stony.

PROFILE DESCRIPTION

I A 0-10 ins Grey brown (10 YR 5/2, dry), very dark grey brown (10 YR 3/2); loamy sand; moderately well developed granular passing into weakly developed sub-angular blocky structure; non-plastic, non-sticky consistence (though somewhat baked in place); strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

II C_I 10-24 " Grey brown (10 YR 5/2, dry), very dark grey brown (10 YR 3/2, moist); gritty loamy sand to sand; very weakly developed large sub-angular blocky structure; non-plastic, non-sticky, extremely friable consistence (slightly harder in place than horizon I); moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

III C_{II} 24-52 " Brown (10 YR 5/3, dry), dark brown (10 YR 4/3, moist); gritty passing to stony gritty sand; virtually massive structure; non-plastic, non-sticky, very friable, locally rather hard (cemented) consistence; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.7	7.0	7.6	4.6	2.2	0.50	0.8	0.0	100	0.8	0.06	12.9	13
II	6.8	6.1	7.0	3.6	2.5	0.10	0.9	0.0	100	0.3	0.04	9.6	9
III	7.2	6.1	6.6	3.1	2.2	0.15	1.0	0.0	100				61

NOTES

PROFILE No. 21 SOIL UNIT : 17 Amersham Series CLASSIFIED AS : Young Soil

LOCATION At 1, 300 ft elevation amongst small holdings $\frac{1}{4}$ mile above Paradise Estate House

CLIMATE Sub-humid (B) with an average annual rainfall of approximately 70 ins

VEGETATION Bananas and dasheen (regrowths on fallowed land)

The soil is developed from coarse, dacitic ash or weak tuffy agglomerate in a stable position (12° ENE slope) at the middle of the broad gently undulating end of a ridge of the youthfully dissected Soufriere glacis. The permeability of the soil is moderate and the drainage is moderately slow and imperfect.

PROFILE DESCRIPTION

I	A	0-11 ins	Dark brown (7.5 YR 3/2); silt loam to silty clay loam; moderately well developed medium angular blocky structure; very friable consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II	$(B)_I$	11-17 "	Dark brown (7.5 YR 4/3); silty clay loam; composite peds: moderately well developed medium angular blocky in large prismatic structure; compact, plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); flat, merging boundary to :
III	$(B)_{II}$	17-26 "	Dark brown (7.5 YR 4/3); silty clay or clay; composite peds: moderately well developed medium angular blocky in large prismatic structure; friable, compact, plastic, slightly sticky to very sticky consistence; strong reaction to H_2O_2 (MnO_2 present); flat, merging boundary to :
IV	(B)/C	26-50 " plus	Yellowish brown (10 YR 5/4); silty clay; weakly developed large angular blocky structure; plastic, sticky, fairly friable to very friable consistence; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m. e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p. p. m.
		C. E. C.	T. E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.8	13.5	9.4	7.6	2.5	0.15	0.6	4.1	70	2.4	0.21	11.0	10
II	6.2	14.0	10.7	6.9	2.7	0.15	2.1	3.3	76	0.9	0.08	11.8	0
III	6.0	16.3	13.3	8.5	2.7	0.10	3.4	3.0	82				0
IV	6.3	18.1	14.6	9.3	2.6	0.10	4.1	3.5	81				0
IV	6.4	17.5	14.7	9.7	3.0	0.40	3.3	2.8	84				1

NOTES

PROFILE No. 24 SOIL UNIT : 17 Amersham Series CLASSIFIED AS : Young Soil

LOCATION At about 1,100 ft elevation, to the south of Paradise Estate House

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 65 ins

VEGETATION Rough grazing

The soil is developed from somewhat weathered, consolidated dacitic tuff on the middle part of a broad glacis slope (5°SE) in an area of very gently undulating slopes. The permeability of the soil is moderately low and the drainage is moderately slow (slightly impeded). The area is very stony. Few roots extend below 9 ins.

PROFILE DESCRIPTION

I	A	0-10 ins	Brown (10 YR 5/3); fine sandy loam; moderately well developed medium sub-angular blocky structure below a few inches of crumbs; non-plastic, non-sticky, hard (when dry), very slightly friable (very friable when moist) consistence; moderate reaction to H_2O_2; merging, flat boundary to :
II	(B)	10-26 "	Light yellowish brown (10 YR 6/4), yellowish brown (10 YR 5/4), with white and yellow flecks; gritty, fine sandy clay loam; weakly developed large angular blocky structure; very hard, slightly plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	(B)/C	26-38 "	Yellowish brown (10 YR 5/4), with many colours of weathering minerals (little weathered material); fine sandy clay loam; original tuff structure, with slight tendency to sub-angular blocky; hard, slightly plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); sharp boundary to :
IV	Bh	At 38 "	A layer of dark grey organic clay loam on a rusty panlike layer; strong reaction to H_2O_2 (MnO_2 present); very sharp boundary to :
V	C	38-54 " plus	Almost unchanged slightly weathered andesitic tuff.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil						Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	11.3	10.7	7.1	3.1	0.75	0.7	0.6	95	1.5	0.12	12.0	7
II	6.1	13.4	13.0	9.3	3.4	0.05	1.4	0.4	97	0.3	0.5	5.4	6
II	6.1	15.3	14.2	10.2	4.0	0.05	1.5	1.1	93				3
III	6.6	16.6	16.4	10.5	4.6	0.05	3.2	0.2	99				3
IV	6.4	18.7	17.8	10.4	6.0	0.10	3.3	0.9	95				2
V	6.6	16.2	14.5	8.8	4.0	0.10	2.8	1.7	90				2

NOTES

Although horizon IV appears to have a higher organic matter content the analyses show that there is, in fact, very little

PROFILE No. 52 SOIL UNIT : 17 Amersham Series CLASSIFIED AS. Young Soil

LOCATION At 1,180 ft elevation at the top end of Amersham ridge

CLIMATE Sub-humid to humid with an average annual rainfall of nearly 80 ins

VEGETATION Coarse grass and guava scrub

The soil is developed from dacitic to andesitic tuffs on the middle of a broad ridge (smooth slopes 5° WSW) of the youthful slightly dissected glacis of Soufriere volcano. The permeability of the soil is moderate and the drainage is moderately slow, being impeded below about 24 ins. This soil has some stones and is very bouldery. The weathering stage is about 2. Fine roots are found throughout the profile.

PROFILE DESCRIPTION

I	A	0-8 ins	Dark brown (7.5 YR 4/2); fine sandy clay loam; ½ inch of surface crumb above well developed fine sub-angular blocky structure; slightly plastic, almost non-sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	(B)	8-14 "	Dark brown (7.5 YR 4/4); light clay to clay loam; moderately well developed fine angular blocky structure; plastic, very slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); flat boundary, merging over 1 inch to :
III	$(B)/C_I$	14-27 "	Strong brown (7.5 YR 5/8) and brown (7.5 YR 5/4), with MnO_2 stains; variable texture: gritty fine sand to gritty clay loam; tendency to original platey rock structure; moderately smeary, slightly sticky, very slightly plastic consistence; moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
IV	$(B)/C_{II}$	27-50 " plus	Colour, texture and structure similar to horizon III, but also lightish grey areas in horizontal bands; slightly sticky, non-plastic, more smeary (grey areas especially smeary) consistence; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.7	11.1	9.9	7.7	2.0	0.20	0.7	1.2	89	2.4	0.20	11.9	5
II	5.6	13.4	14.3	7.6	2.5	0.25	1.6	0.0	100	0.8	0.10	8.0	3
III	5.9	14.1	14.4	7.4	2.5	0.25	2.8	0.0	100				2
IV	6.0	15.4	13.7	8.2	2.7	0.20	3.7	1.7	89				6

NOTES

PROFILE No. 53 SOIL UNIT : 17 Amersham Series CLASSIFIED AS : Young Soil

LOCATION At 600 ft elevation near the road and just above Amersham

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 65 ins

VEGETATION Coarse grass, guava and a few cossie bushes

The soil is developed from andesitic-dacitic weathering tuff on the gentle slopes (3°NSW) of the middle of a ridge of the youthfully dissected glacis of Soufriere volcano, in a smoothly undulating area covered with boulders, some of which are massive. The permeability of the soil is moderately low. Drainage is moderately rapid and moderately free being slightly impeded at the base of the profile. The erosion stage of the area is about 1, i.e. some of the topsoil has been lost. Roots are distributed uniformly throughout the profile.

PROFILE DESCRIPTION

I	A	0-10 ins	Dark yellowish brown (10 YR 3/4); fine sandy loam; 1 inch well developed fine crumb over moderately well developed fine sub-angular blocky structure; slightly plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II	$(B)_I$	10-17 "	Brown (7.5 YR 5/3) and strong brown (7.5 YR 5/8) with rusty stains; clay loam; moderately well developed large angular blocky structure; plastic, very slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	$(B)_{II}$	17-31 "	Similar colours to horizon II, but also some dark greys; stony sandy clay loam; weakly developed large angular blocky structure; plastic, very slightly sticky consistence; (grey areas rather sticky and plastic, but not smeary); moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
IV	(B)/C	31" plus	Much less weathered material predominates.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	9.5	10.1	6.4	2.2	0.10	0.4	0.0	100	1.5	0.16	9.6	3
II	6.3	14.2	15.5	9.3	3.2	0.05	1.6	0.0	100	0.6	0.10	6.2	1
III	6.2	14.1	15.0	9.7	3.3	0.10	1.7	0.0	100				2
III	6.4	16.0	16.4	10.5	3.8	0.10	2.1	0.0	100				4

NOTES

PROFILE No. 1 **SOIL UNIT : 16** **Bethel Series** **CLASSIFIED AS : Young Soil**

LOCATION At 180 ft elevation near the road to Parson's

CLIMATE Sub-humid (A) with an average annual rainfall of about 70 ins.

VEGETATION Grass fallow

The soil is developed from tuff containing boulders of olivine-dacite (pumiceous) on a long gentle convex glacis slope (8°W) which is terraced (slope 3°), near a break in slope to the sea (an old sea cliff level possibly). The area is very bouldery. The permeability of the soil is moderately high and the drainage is moderately rapid. There are few roots below 9 ins.

PROFILE DESCRIPTION

I	S_1	0-6 ins	Dark brown (7.5 YR 4/2); pale brown (10 YR 6/3 dry); slightly gritty fine sandy loam; moderately well developed large granular structure; moderately hard when dry, very slightly sticky, virtually non-plastic consistence; moderate reaction to H_2O_2; fairly sharp, flat boundary to :
II	S_2	6-14 "	Dark brown (7.5 YR 3/2); gritty fine sandy loam; weakly developed large angular blocky structure (fairly high porosity); hard when dry, moderately plastic, slightly sticky, slightly polishing consistence; strong reaction to H_2O_2 (MnO_2 present).
III	(B)	14-24 "	Dark brown (7.5 YR 3/2); fine sandy clay loam; stones and boulders with rusty, hard coatings; moderately well developed large angular blocky structure; hard when dry, plastic, sticky, polishing consistence; moderate reaction to H_2O_2 (MnO_2 present); undulating boundary, merges over three inches to :
IV	(B)/C	24-31 "	Variegated dark yellow brown, rust and MnO_2 colours; gritty sandy loam with some clayey material from horizon III; rock structure; friable, non-plastic, non-sticky, slightly mealy consistence; moderate reaction to H_2O_2 (MnO_2 present).
V	C	31-42 " plus	Yellowish, weathering, slightly cemented tuff with many unweathered dacite stones and boulders.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.8	10.5	10.4	7.8	3.3	0.45	0.5	0.1	99	1.0	0.11	9.6	57
II	6.3	12.8	11.2	8.9	3.7	0.10	0.6	1.6	88	0.7	0.09	7.3	14
III	6.1	24.4	20.9	20.2	1.7	0.15	1.2	3.5	86	-	-	-	9
IV	6.2	19.5	16.6	10.7	6.7	0.10	1.2	2.9	85	-	-	-	12

NOTES

PROFILE No. 25 SOIL UNIT : 16 Bethel Series CLASSIFIED AS : Young Soil

LOCATION At 300 ft elevation, 50 yds below Bethel Church

CLIMATE Sub-humid to semi-arid with an average annual rainfall of approximately 50 ins

VEGETATION Coarse grass in a former cotton field

The soil is developed from stony, weathered andesitic tuff on the middle of a flat (slope 2°E) at the lower end of the dissected glacis of Soufriere volcano in an area of smooth slopes. The permeability of the soil is low and the drainage is moderately slow, being impeded below about 23 ins. This is probably a much eroded soil but it is difficult to estimate the exact erosion state because of the rather skeletal nature of the soil and its vary dry state. Roots extend to about 10 ins

PROFILE DESCRIPTION

I	S_1	0-5 ins	Dark brown (10 YR 3/3); loamy sand; some fine granular above moderately well developed large angular blocky structure; slightly sticky, non-plastic, friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging boundary to :
II	S_2	5-11 "	Dark brown (10 YR 3/3); sandy loam; weakly developed large angular blocky structure; slightly sticky, non-plastic, friable consistence; strong reaction to H_2O_2 (MnO_2 present); fairly sharp boundary to :
III	$(B)_1$	11-23 "	Dark yellowish brown (10 YR 4/4), generally variegated red brown with darker brown (manganese included) pore stains; stony gritty sandy clay loam, weakly developed large sub-angular blocky structure (almost that of the tuff); slightly plastic, slightly sticky, hard consistence (but friable when taken out); moderate reaction to H_2O_2 (MnO_2 present).
IV	$(B)_2$	23-42 " plus	Dark yellowish brown (10 YR 4/4), with variegated light to dark browns as in horizon III; stony gritty sandy clay loam; weakly developed large sub-angular blocky structure; slightly plastic, slightly sticky, hard consistence; strong reaction to H_2O_2 (MnO_2 present). At 42", soil becomes moist and loose.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.2	8.2	8.6	5.6	2.0	0.45	0.5	0.0	100	0.7	0.07	10.8	35
II	6.4	8.0	9.4	6.1	2.3	0.55	0.7	0.0	100	0.7	0.06	12.2	11
III	6.4	14.4	15.0	10.9	4.4	0.15	0.8	0.0	100				11
IV	6.7	17.3	17.3	12.4	5.3	0.10	1.3	0.0	100				15

NOTES

PROFILE No. 26 SOIL UNIT : 16 Bethel Series CLASSIFIED AS : Young Soil

LOCATION At 700 ft elevation, 200 yds above Tuitt's Village

CLIMATE Sub-humid (A) with an average annual rainfall of about 55 ins

VEGETATION Coarse grass (ridged, former cotton land)

The soil is developed from weathered stony andesitic tuff on a broad ridge of the dissected glacis of Soufriere (slope 3°ENE) near a ghaut edge, in a gently undulating area. The permeability of the soil is moderate and the drainage is moderately rapid. The whole profile is very stony with numerous large and small boulders. There are few roots below 10 ins

PROFILE DESCRIPTION

I	S/A	0-11 ins	Dark exteriors to structures, very dark grey brown (10 YR 3/2), yellowish interiors; sandy loam; a few granules above well developed medium sub-angular blocky structure (worked layer only about 5 ins in depth); very slightly plastic, very slightly sticky, friable consistence; strong reaction to H_2O_2 present; boundary merging over 2 ins to :
II	(B)	11-25 "	Dark yellow brown (10 YR 4/4) - with darker root pores and ped exteriors; stony; loam to sandy clay loam; porous, weakly developed medium sub-angular blocky structure; slightly plastic, slightly sticky, friable or very friable consistence; weak reaction to H_2O_2; merging, flat boundary to :
III	$(B)/C_I$	25-42 "	Yellowish brown (10 YR 5/4), with more yellow and orange and less dark areas; stony loam; porous, very weakly developed medium sub-angular blocky structure; very slightly plastic, very slightly sticky; friable to very friable, very slightly compact consistence; weak reaction to H_2O_2; merging, flat boundary to :
IV	$(B)/C_{II}$	42 " to at least 54 "	Similar to horizon III, but of a looser consistence.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	10.2	11.0	8.7	2.8	0.10	0.6	0.0	100	1.0	0.10	9.8	11
II	6.3	15.5	14.8	11.2	4.1	0.05	0.6	0.7	95	0.6	0.04	15.3	2
III	6.4	18.0	16.1	12.5	5.4	0.05	1.1	1.9	89				5

NOTES

PROFILE No. 27 SOIL UNIT : 16 Bethel Series CLASSIFIED AS : Young Soil

LOCATION At 120 ft elevation near the road from Hollanders Farm House to Trants

CLIMATE Sub-humid to semi-arid with an average annual rainfall of approximately 45 ins

VEGETATION Coarse grass(ridged, former cotton land)

The soil is developed from stony slightly weathered andesitic tuff near the bottom end of the dissected glacis slope of Soufriere Mountain in an area of gently undulating slopes (3°-4°E). The permeability of the soil is moderately low and the drainage is slow below the cultivated layer. The whole area is now countour-bunded with Gliricidia; obviously erosion has been a serious problem in the past since sheet wash takes place quite readily. It is questionable how much of the present soil has developed in situ. Few roots below 6 ins.

PROFILE DESCRIPTION

I S 0-15 ins Light brown grey (10 YR 6/2, dry) very dark grey brown (10 YR 3/2); sandy loam to loamy sand; moderately well developed granular structure in top 2 ins to 3 ins, then moderately well developed medium sub-angular blocky structure; non-plastic, non-sticky, baked hard consistence (but slightly friable, especially in top 6 ins); strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :

II (B) 15-28 " Light yellowish brown (10 YR 6/4, dry) ped interiors with dark reddish brown (5 YR 2.2, dry) and manganese coatings, dark brown (10 YR 4/3); stony, gritty clay loam; weakly developed medium sub-angular blocky structure; plastic, sticky, very hard, somewhat cemented consistence; moderate reaction to H_2O_2 (MnO_2 present).

III (B)/C 28-48 " Yellowish brown (10 YR 5/6, dry) and dark reddish brown (5 YR 2/2, dry) stains, yellowish brown (10 YR 5/4); stony gritty loam; nearly massive structure - the original rock structure; slightly sticky, non-plastic, very hard, very slightly plastic consistence; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.5	9.2	9.4	6.7	2.2	0.75	0.8	0.0	100	0.9	0.09	10.7	49
I	6.6	8.5	9.6	6.2	2.6	0.75	0.7	0.0	100	0.6	0.07	8.3	28
II	6.6	15.9	16.3	10.2	6.0	0.40	0.9	0.0	100				7
III	6.8	16.9	17.2	10.5	7.7	0.45	1.1	0.0	100				24

NOTES

PROFILE No. 44 SOIL UNIT : 16 Bethel Series CLASSIFIED AS : Young Soil

LOCATION At 700 ft elevation by the path to the sea from Osborne's House

CLIMATE Sub-Humid to semi-arid with an average annual rainfall of approximately 40 ins

VEGETATION Grass fallow (field ridged for cotton crop)

The soil is developed from a rubbly lahar-like deposit of dacitic material from Soufriere volcano on the gentle smooth straight slope (8°S) of a terrace high on a valley side. The permeability of the soil is moderate and the drainage is moderately rapid and free. The erosion stage of this profile is 1 to 2, that is, between 50 per cent and 100 per cent of the topsoil has gone. The origin of the whole profile is dubious and may be largely colluvial.

PROFILE DESCRIPTION

I	A	0-7 ins	Yellowish brown (10 YR 5/4, dry), dark yellowish brown (10 YR 4/4, moist); sandy loam; weakly developed fine crumb to sub-angular blocky structure; non-plastic, non-sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present).
II	$(B)_I$	7-15 "	Yellowish brown (10 YR 5/4, dry); loam; weakly developed fine sub-angular blocky structure; friable, compact, non-plastic, non-sticky consistence; strong reaction to H_2O_2 (MnO_2 present).
III	$(B)_{II}$	15-35 "	Dark brown (10 YR 3/3, dry), very dark grey brown (10 YR 3/2, moist); stony gritty fine sandy clay loam; weakly developed medium sub-angular blocky structure; slightly sticky, moderately plastic to plastic, slightly friable consistence; strong reaction to H_2O_2 (MnO_2 present).
IV	(B)/C	35-50 " plus	Yellowish brown (10 YR 5/6-8); sandy loam; composite peds: weakly developed granular in almost platey angular blocky structure; slightly sticky, very slightly plastic, friable consistence (very compact at base); moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	16.5	15.2	11.7	4.0	0.75	0.4	1.3	92	1.9	0.10	18.6	7
II	6.3	16.3	15.3	11.6	4.6	0.10	0.4	1.0	94	0.8	0.08	10.3	29
III	6.3	17.0	17.1	13.4	4.7	0.10	0.5	0.0	100	0.8	0.07	11.1	25
III	6.2	18.5	18.2	14.5	4.7	0.05	0.5	0.3	98				10
IV	6.2	23.3	24.6	19.3	6.6	0.10	0.7	0.0	100				7
IV	6.1	22.5	22.8	17.9	5.2	0.10	0.6	0.0	100				18

NOTES

PROFILE No. 50 SOIL UNIT : 19 Lees Series CLASSIFIED AS: Young Soil

LOCATION At 1,000 ft elevation in Long-field, between Riley's and Lees'

CLIMATE Sub-humid (B) with an average annual rainfall of approximately 75 ins

VEGETATION Tall, coarse grass (foxtail)

The soil is developed from dacitic or andesitic agglomeratic ash on the middle of a ridge (slope 3°-4°N) of the slightly dissected Soufriere glacis in an area of gentle convex slopes. Underlying the present soil development is a red kandoid latosolic developed on agglomerate. The permeability of the soil is moderately high and the drainage is moderately free and moderately rapid. The erosion stage of this profile is about 1, some but less than 50 per cent of the topsoil lost. There are incipient (Fe-Mn) concretions in the upper horizons of this profile. This profile is near the more obvious polysoil described in profile 51. Roots are concentrated in the A horizon.

PROFILE DESCRIPTION

I	A	0-9 ins	Dark grey brown (10 YR 4/2), with incipient iron-manganese concentrations; clay; 3 ins of crumb above well developed medium angular blocky structure; slightly plastic, slightly sticky, slightly smeary, friable consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II	$(B)_I$	9-17 "	Dark yellowish brown (10 YR 4/4), with brown, variegated orange brown and dark (MnO_2) stains; gritty clay; moderately well developed medium angular blocky structure; slightly plastic, slightly sticky, slightly smeary, friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	$(B)_{II}$	17-24 "	Dark yellowish brown (10 YR 4/4), similar colours to previous horizon, but with more MnO_2 stains; gritty clay; moderately well developed fine angular blocky structure; slightly plastic, slightly sticky, slightly smeary, friable consistence; strong reaction to H_2O_2 (MnO_2 present); fairly sharp, flat boundary to :
IV	(B)/C	24-44 "	Dark yellowish brown (10 YR 4/4), with similar staining to that of horizon III; stony gritty clay; moderately well developed fine angular blocky structure; friable, slightly plastic, sticky (slightly smeary, at first - disappearing when stickiness appears) consistence; strong reaction to H_2O_2 (MnO_2 present).
V	C_1	44" plus	As horizon IV, but less stony and more sandy with an increasing number of rusty stains; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horison	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		p.p.m.
I	6.1	10.8	14.9	7.9	5.4	0.15	3.7	0.0	100	1.5	0.13	11.6	0
II	6.2	12.5	9.9	6.0	2.8	0.15	1.0	2.6	79	0.4	0.04	9.4	2
III	6.4	13.5	13.2	7.2	2.4	0.15	3.9	0.3	98				5
IV	6.5	12.7	11.8	6.6	2.7	0.20	3.4	0.9	93				15
V	6.5	10.1	9.5	5.8	1.4	0.15	2.7	0.6	94				17
V	6.1	10.1	9.8	5.7	2.5	0.20	5.5	0.3	97				3

NOTES

PROFILE No. 2 SOIL UNIT : 19 Lees Series (Polysoil) CLASSIFIED AS : Young Soil

LOCATION At 1,290 ft elevation and uphill from Amersham Estate House

CLIMATE Humid with an average annual rainfall of approximately 80 ins

VEGETATION Tall, coarse grass fallow

The soil is developed from ash overlying an agglomerate near the top-end of a ridge, (slope 12°E), part of the youthfully dissected broad glacis of Soufriere Mountain, in an area of gently convex slopes. The permeability of the soil is moderately high and the drainage is moderately rapid, being slightly impeded. Erosion stage of this profile is about 1, less than 50 per cent of the topsoil lost. There are no physical restrictions to root development.

PROFILE DESCRIPTION

I_y	A	0-8 ins	Dark brown (10 YR 4/3), with occasional rusty streaks, silt loam; moderately well developed medium granular structure; friable, slightly plastic, slightly sticky consistence; weak reaction to H_2O_2; flat boundary merging over 3" to :
II_y	$(B)_1$	8-18 "	Dark yellowish brown (10 YR 4/4), with small mottles of reddish yellow (7.5 YR 6/8) and weathering stones, silt loam; composite peds: weakly developed very fine angular blocky structure in medium to large angular blocky structure; very friable; slightly plastic, very slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
III_z	$(B)_2$	18-29 "	Dark brown (10 YR 3/3); silty clay loam; weakly developed large angular blocky structure tending to prismatic; moderately friable, plastic, sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
IV_z	(B)/C	29-42 " plus	Soft, little weathered grey brown tuff matrix with rusty streaks and more solid stones of dacite, unweathered but for an exterior clay coating.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	N_a	H	Base Saturation	C	N		
I	5.7	16.3	8.9	6.7	2.7	0.25	0.7	7.4	55	1.6	0.24	6.6	7
II	6.2	12.8	9.5	7.4	2.8	0.10	0.7	3.3	74	0.8	0.11	6.8	8
III	6.0	15.6	11.7	8.7	2.9	0.20	0.9	3.9	75	-	-	-	4
IV	6.0	11.3	8.2	5.8	1.9	0.10	1.3	3.1	73	-	-	-	3

NOTES

PROFILE No. 51 SOIL UNIT : 19 Lees Series CLASSIFIED AS: Young Soil

LOCATION At 900 ft elevation at the bottom end of a Longfield ridge near Dyers

CLIMATE Sub-humid (B) with an average annual rainfall of over 70 ins

VEGETATION Tall, coarse grass and scrubby, white cedar

The soil is developed from dacitic or acid andesitic ash above agglomerate on a 15°E slope at the upper edge of a steep straight valley side slope of the dissected Soufriere glacis. The permeability of the soil is moderately high and the drainage is moderately rapid and moderately free. Just above the junction between x and y parent materials is a zone of distinctly poor drainage, with greyish colours; water passes along the surface of contact between the two materials. Roots are mainly confined to the topsoil.

PROFILE DESCRIPTION

I_x	A	0-11 ins	Dark yellowish brown (10 YR 3/4), with rather more yellowish ped interiors and some MnO_2 stains; loam; thin crumb layer above well developed medium sub-angular blocky structure; very friable, slightly sticky, very slightly plastic, very slightly smeary consistence; moderate reaction to H_2O_2.
II_x	(B), to(B)G at base	11-27 "	Dark yellowish brown (10 YR 3/4), with MnO_2 stains; loam; well developed medium sub-angular blocky structure; very friable, slightly sticky, slightly plastic, moderately smeary consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
III_y	$(B)_I$	27-36 "	Strong brown (7.5 YR 4/6), with slightly greyer brown ped exteriors; clay; well developed medium angular blocky structure; sticky, moderately plastic consistence; strong reaction to H_2O_2 (MnO_2 present).
IV_y	$(B)_{II}$	36-51 "	Yellowish red (5 YR 4/6); clay; well developed medium angular blocky structure; sticky, plastic, very friable (but rather compact in places) consistence; weak reaction to H_2O_2.
V_y	(B)/C	51-65 " plus	Strong brown (7.5 YR 5/6); silty clay loam; very weakly developed fine angular blocky structure; extremely friable, slightly plastic, slightly sticky consistence; many little weathered fragments; weak reaction to H_2O_2.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	9.6	8.8	5.7	2.7	0.10	0.6	0.8	92	1.5	0.13	11.9	4
II	6.0	15.1	14.1	8.8	5.3	0.30	1.5	1.0	93	1.2	0.12	9.9	2
III	6.1	10.0	11.1	6.6	2.0	0.10	2.9	0.0	100				2
IV	6.0	12.0	10.2	6.9	3.0	0.10	0.7	1.8	85				6
V	5.4	17.7	8.7	6.0	2.5	0.15	0.7	9.0	49				6

NOTES

PROFILE No.11. SOIL UNIT: 25 Lookout Series CLASSIFIED AS : Young Soil

LOCATION At 1,050 ft elevation on the eastern part of the summit of St. George's Hill

CLIMATE Sub-humid (B) with an average annual rainfall of approximately 70 ins

VEGETATION Fallow

The soil is developed from stony, somewhat weathered tuff on a stable flat (St. George's Hill summit plateau) surrounded by steep, convex slopes. The permeability of the soil is moderate to moderately low and the drainage is moderately rapid and more or less free. In this area, even slight slopes which are cultivated show signs of very strong erosion - no doubt partly the result of downhill hoeing. Stage 5 erosion (reaching the almost impervious parent material) is to be seen in each field. No restriction of root development in non-eroded parts.

PROFILE DESCRIPTION

I	S	0-10 ins	Dark brown (7.5 YR 3/2); loam; 3 ins of moderately well developed medium crumb above well developed medium sub-angular blocky structure; slightly plastic, very slightly-sticky, very friable consistence; no reaction to H_2O_2 at surface though moderate reaction towards base of horizon; sharp, flat boundary to :
II	$(B)_I$	10-18 "	Dark brown (7.5 YR 4/3); with numerous small stones, usually with iron and manganese coatings; clay loam; moderately well developed medium sub-angular blocky structure; moderately plastic, slightly sticky, friable consistence; moderate reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	$(B)_{II}$	18-35 "	Dark brown (7.5 YR 4/3), with many streaks of lighter brown, becoming yellowish brown (10 YR 5/4) below 22 ins, fine sandy clay loam; moderately well developed medium sub-angular blocky structure; friable, plastic; slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
IV	C	35" plus	Ferrocreted surface of weathered cemented hard tuff with many MnO_2 stains.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.2	9.6	8.4	6.1	2.1	0.10	0.4	1.2	88	0.7	0.09	8.2	0
II	6.3	11.8	9.5	7.1	2.2	0.10	0.6	2.3	81	0.5	0.06	8.5	4
III	6.2	14.6	12.4	8.9	2.9	0.05	0.9	2.2	85				3
IV	6.2	19.9	17.5	12.8	4.4	0.10	1.1	2.4	88				7

NOTES

PROFILE No. 48 SOIL UNIT : 27 Richmond Series CLASSIFIED AS : Young Soil

LOCATION At 250 ft elevation near Richmond Hill

CLIMATE Sub-humid (A) with an average annual rainfall of about 50 ins

VEGETATION Acacia scrub recently cut over

The soil is developed from dacitic tuffs of the Garibaldi Volcanic Centre on gentle slopes (3°-4°N) where nearly horizontal bedding is found on the smooth top of Richmond Hill. The soil is very permeable to 36 ins and the drainage is free to that depth, but slightly impeded below. There is a dense surface layer of roots and there are few stones.

PROFILE DESCRIPTION

I	A	0-7 ins	Dark brown (7.5 YR 3/2); sandy loam to loam; well developed fine crumb structure; loose, moderately plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); fairly sharp, flat boundary to :
II	$(B)_I$	7-23 "	Dark brown (7.5 YR 3/2); sandy loam to loam; moderately well developed fine to medium angular blocky structure; moderately plastic, slightly sticky, extremely friable consistence; weak reaction to H_2O_2; boundary merging over several inches :
III	$(B)_{II}$	23-40 "	Brown (7.5 YR 5/3) with many unweathered coloured minerals and a few MnO_2 stains; clay loam; moderately well developed fine angular blocky structure; plastic, sticky, very friable consistence; strong reaction to H_2O_2 (MnO_2 present).
IV	(B)/C	40-50 " plus	Brown (7.5 YR 5/4); loam; nearly single grain structure; moderately plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); presumably passes to unweathered tuff through a cementation horizon.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	12.0	12.1	9.8	2.6	0.35	0.8	0.0	100	1.7	0.18	9.3	9
II	6.3	12.0	12.6	9.5	3.4	0.10	0.9	0.0	100	1.1	0.08	14.2	7
III	6.5	16.9	17.6	10.2	7.2	0.10	1.8	0.0	100				2
IV	6.6	18.9	19.5	10.5	8.5	0.15	2.7	0.0	100				4

NOTES

PROFILE No. 49 SOIL UNIT : 27 Richmond Series CLASSIFIED AS : Young Soil

LOCATION At 250 ft elevation near the site of Profile 48

CLIMATE Sub-humid (A) with an average annual rainfall of about 50 ins

VEGETATION Acacia scrub recently cut over

The soil is developed from horizontally bedded dacitic tuffs of the Garibaldi Hill Volcanic Centre on gentle slopes (5°N) of the smooth top of Richmond Hill. The soil is very permeable to 36 ins and the drainage is free to that depth, but slightly impeded below. There is a dense surface layer of roots and there are few stones.

PROFILE DESCRIPTION

I	A	0-5 ins	Dark brown (10 YR 4/3); sandy loam; moderately well developed fine to medium angular blocky structure; friable, moderately plastic, slightly sticky consistence; weak reaction to H_2O_2; sharp boundary to :
II	(B)/C	5-17 "	Dark brown (10 YR 4/3); with MnO_2 stains and many unweathered minerals; gritty clay loam; moderately well developed fine angular blocky structure; plastic, sticky, very friable consistence; weak reaction to H_2O_2; sharp boundary to :
III	C	17" plus	Light yellowish brown (10 YR 6/5); consolidated (but not well cemented) "shoal" horizon; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.3	15.3	16.5	12.7	4.3	0.30	0.8	0.0	100	1.9	0.18	10.6	12
II	6.0	20.8	21.4	13.4	7.8	0.20	1.2	0.0	100	0.6	0.08	8.1	1
III	6.1	20.9	14.3	8.7	4.7	0.35	2.1	6.6	68				4

NOTES

PROFILE No. 10 SOIL UNIT : 24 St. George's Hill Series CLASSIFIED AS : Young Soil

LOCATION At 550 ft elevation at Harigot to the east side of St. George's Hill and 300 yds from the main road.

CLIMATE Sub-humid (B) with an average annual rainfall of about 70 ins

VEGETATION Coarse grass and white cedar bushes

The soil is developed from stony weathered tuff on an unstable hill slope (25°ENE) in an area of straight slopes, which are dissected by recent gullies. The permeability of the soil is moderately high and the drainage is free. Although this particular profile is only slightly eroded, a little of the topsoil having been washed away, erosion on these slopes is generally quite advanced; many gullies can be observed and control measures are obviously required.

PROFILE DESCRIPTION

I A 0-9 ins Dark yellowish brown (10 YR 3/4); fine sandy clay loam with many fine MnO_2 concretions; well developed medium granular structure; slightly sticky, slightly plastic, friable consistence; none to moderate reaction to H_2O_2; sharp, flat boundary to :

II $(B)_1$ 9-22 " Dark reddish-brown (5 YR 3/3); gritty clay loam; moderately well developed medium angular blocky structure; plastic, slightly sticky, friable consistence; none to weak reaction to H_2O_2; sharp, flat boundary to :

III $(B)_2$ 22-31 " Dark brown (7.5 YR 4/3); gritty clay loam to clay; moderately well developed medium angular blocky structure; plastic, sticky, friable consistence; no reaction to H_2O_2; merging, flat boundary to :

IV $(B)_3$ 31-44 " Predominantly yellowish brown (10 YR 5/8), with rusty stains and black patches; loam to clay loam; moderately well developed medium angular blocky structure; slightly plastic, sticky, friable to very friable consistence; weak reaction to H_2O_2 (MnO_2 present).

V C_1 44" plus More or less solid (cemented) tuff, very little weakened, although somewhat weathered. Many unweathered minerals.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	11.0	9.0	5.9	2.9	0.15	0.6	2.0	82	0.9	0.09	9.4	9
II	6.5	14.2	12.5	8.6	3.8	0.10	1.0	1.7	88	0.7	0.06	11.6	3
III	6.3	13.7	12.1	7.6	4.1	0.15	1.3	1.6	88				3
IV	6.9	18.9	16.6	9.7	6.5	0.15	1.7	2.3	88				0
V	6.1	18.0	16.9	10.1	6.5	0.15	2.5	1.1	94				5

NOTES

PROFILE No. 38 SOIL UNIT : 9 Tank Loam CLASSIFIED AS : Young Soil

LOCATION At 900 ft elevation on the hill overlooking Lucas Valley from the north side

CLIMATE Sub-humid (A) with annual rainfall of approximately 55 ins

VEGETATION Coarse grass (fallow); ridged former cotton land.

The soil is developed from rotting dacitic lava or agglomerate on the stable (smooth convex) slope (10°N) of a hillside below a ridge, part of the old dissected volcanic pile of Centre Hills. The permeability of the soil is high and the drainage is moderately rapid and free. The profile is bouldery and extremely stony. Typically, the development of this soil is shallow. The erosion stage indicated is 2, but this may be an under-estimate, as the clay development is normally greater than observed here.

PROFILE DESCRIPTION

I	S	0-9 ins	Dark reddish brown (5 YR 3/2); fine sandy loam to loam; moderately well developed fine crumb passing to well developed fine sub-angular blocky structure; slightly plastic, non-sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	(B)/C	9-18 "	Dark reddish grey (5 YR 4/2); fine sandy loam with fragments of weathering rock; well developed fine sub-angular blocky structure; slightly plastic, non-sticky, very slightly feathery consistence; strong reaction to H_2O_2 (MnO_2 present); undulating, sharp boundary to :
III	C	18" plus	Rotting rock; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		p.p.m.
I	7.1	10.9	12.5	11.2	2.4	0.30	1.2	0.0	100	1.9	0.16	12.1	7
II	7.1	6.9	6.4	4.7	2.0	0.20	1.5	0.5	93	0.6	0.06	9.7	2
III	6.9	6.1	6.3	3.3	1.5	0.25	1.6	0.0	100				7

NOTES

PROFILE No.17 SOIL UNIT : 9 Tank Series CLASSIFIED AS : Young Soil

LOCATION At 1,100 ft elevation, at the junction of two ridges above St. Peter's

CLIMATE Sub-humid (B) with an average annual rainfall of approximately 70 ins

VEGETATION

The soil is developed from colluvial material on a smooth straight unstable side slope (40°N, position of slight net erosion) of a ridge, part of the dissected glacis of Centre Hills Volcano. The permeability of the soil is moderately high and the drainage is moderately rapid and free. The whole profile is extremely stony and bouldery - mainly angular (hexagonal tendency) little weathered andesite. On the gently sloping surface of the ridge itself smectoid clay and "other" clay soils on a well cemented pavement are strongly eroded.

PROFILE DESCRIPTION

I A 0-7 ins Dark brown (7.5 YR 4/2); stony, gritty loam or fine sandy loam; moderately well developed crumb passing into sub-angular blocky structure; loose to very friable, non-sticky, non-plastic to slightly plastic, non-slicking consistence; merging, flat boundary to :

II (B) 7-30 " plus Dark brown (7.5 YR 4/3); with very distinct purplish cast; gritty clay loam; moderately well developed fine sub-angular blocky (with some crumb) structure; friable, plastic, slightly sticky consistence.

The amount of both well weathered and unweathered rock fragments increases rapidly below about 2 ins, probably passing into little weathered slowly moving rubble not far below 30 ins. However this depth was not reached because of the difficulty of penetrating the bouldery material.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.6	16.6	19.8	16.8	3.0	1.05	0.7	0.0	100	2.0	0.20	10.4	28
II	6.7	11.1	10.2	7.5	2.4	0.75	0.4	0.9	92	0.3	0.06	5.6	45

NOTES

PROFILE No. 14 SOIL UNIT : 12 Olveston Series CLASSIFIED AS : Kandoid Latosolic

LOCATION On a ridge above the abandoned mill near the Pilgrim Holiness Church

CLIMATE Humid with an annual rainfall of over 80 ins

VEGETATION Low, possibly secondary, montane rain forest

PROFILE DESCRIPTION

I	L		Usual 1 inch layer of dry, rotting leaves and dense roots of forest
II	A/(B)	0-3 ins	Dark brown (7.5 YR 4/2); silty clay loam; well developed fine crumb structure; loose, slightly sticky, non-plastic, slightly smeary consistence; merging, flat boundary to :
III	(B)	3-15 "	Dark brown (7.5 YR 4/3); silty clay loam; composite peds; moderately well developed medium sub-angular blocky breaking to fine crumb structure; slightly plastic, slightly sticky consistence; merging, flat boundary to :
IV	(B)/C	15-48 " plus	Yellowish red (5 YR 5/8), flecked with many small areas of red (10 YR 4/8) - feldspar-like shapes; silty clay loam to silty clay; composite peds: fine crumbs within an angular blocky structure, becoming well developed medium angular blocky structure with depth; slightly sticky, plastic, friable consistence; many large fragments of rotting rock throughout this horizon.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
II	4.4	22.0	7.7	2.8	7.7	0.40	0.8	14.3	35	1.5	0.24	6.3	20
III	4.3	16.7	2.6	0.9	3.2	0.15	0.7	14.1	16	0.2	0.05	4.3	1
IV	4.6	16.3	3.3	0.4	2.2	0.15	2.1	13.0	20				2
IV	4.8	15.8	0.7	0.9	1.9	0.05	1.1	15.1	4				1
IV	4.7	17.4	2.1	0.3	2.4	0.15	1.9	15.3	12				1

NOTES

The base saturation is lower than average for this group of soils, whilst the exchangeable Mg considerably exceeds the exchangeable Ca

PROFILE No.15 SOIL UNIT: 12 Olveston Series CLASSIFIED AS: Kandoid Latosolic

LOCATION At 1,650 ft elevation a little below the top of the ridge on which profile 14 was dug

CLIMATE Humid with an average annual rainfall over 80 ins

VEGETATION Poor bananas among grass fallow after clearing; they are very stunted, which is probably partly due to wind-blast.

The soil is developed from dacitic tuff or agglomerate on the steep slope (25°E) of a ridge of Centre Hills in an area of convexo-concave slopes. The permeability of the soil is moderately high and the drainage is moderately rapid and free. There is a dense surface mat of coase and fine roots, but few roots below.

PROFILE DESCRIPTION

I	A	0-10 ins	Dark brown; silty clay; fairly well developed granular in top inch merging to well developed large sub-angular blocky structure; friable, slightly plastic, slightly sticky, non-smeary consistence; strong reaction to H_2O_2 (MnO_2 present); boundary merging over 3 ins to :
II	(B)	10-32 "	Brown; silty clay; well developed medium and large angular blocky structure; friable, plastic, sticky consistence; moderate reaction to H_2O_2 (MnO_2 present).
III	(B)/C to C	32-48 " plus	Brown; silty clay loam and fine sandy clay loam (passing to lighter texture with passage into rotting rock); well developed medium angular blocky structure; very friable, slightly sticky, almost non-plastic consistence; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per Cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	15.9	14.1	9.5	4.2	0.85	0.7	1.8	89	2.5	0.28	8.9	11
II	5.3	15.5	10.3	4.6	5.0	0.65	1.6	5.2	66	0.7	0.10	7.2	26
II	4.7	15.6	5.7	2.2	2.9	0.15	1.8	9.9	37				4
III	4.5	15.3	4.1	1.4	2.9	0.10	1.3	11.2	27				5
C	4.6	10.8	2.9	1.2	1.5	0.15	1.7	7.9	27				2

NOTES

The sample from the C horizon consisted of rotting rock

PROFILE No. 16 SOIL UNIT : 12 Olveston Series CLASSIFIED AS : Kandoid Latosolic

LOCATION At 1,300 ft elevation, at the highest point of cultivation on the ridge north of the Pilgrim Holiness Church at St. Peter's.

CLIMATE Humid with an average annual rainfall of approximately 80 ins

VEGETATION Bananas and dasheen with much coarse grass

The soil is developed from dacitic agglomerate colluvium on an old terrace flat high on the side of a large ghaut penetrating deep into the well dissected reduced volcanic pile of Centre Hills. The permeability of the soil is moderately high and the drainage is moderately rapid and free. Roots are confined mostly to the surface though some go down to 24 ins.

PROFILE DESCRIPTION

I S 0-8 ins Dark brown (7.5 YR 3/2), with a slightly purplish cast; silty clay loam; well developed fine crumb passing downwards to well developed sub-angular blocky structure; friable, moderately plastic, slightly sticky consistence; weak or no reaction to H_2O_2; sharp, flat boundary to :

II S (B) & $(B)_I$ 8-31 " Dark brown (7.5 YR 3/3), with a more purplish cast; silty clay loam; composite peds; moderately well developed fine crumb incorporated in sub-angular blocky structure; moderately plastic, sticky, friable consistence; moderate reaction to H_2O_2 (MnO_2 present) at base of horizon only; flat boundary merging over 2 ins to:

III $(B)_{II}$ 31-50 " plus Yellowish red (5 YR 4/8); silty clay; well developed fine and medium angular blocky structure; plastic or moderately plastic, sticky, very friable consistence; boundary merging at over 50 ins depth:

IV $(B)_{III}$ 50-54 " As above, but an increase in the amount of unweathered material, and some browning of the exterior of peds.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.7	17.3	13.4	9.4	4.4	1.00	0.6	3.9	77	2.5	0.31	8.1	5
II	5.3	13.9	6.3	5.3	2.6	0.30	0.5	7.6	45	0.7	0.11	6.1	0
III	5.5	14.3	8.4	5.2	3.5	0.25	1.5	5.9	59				2
IV	5.7	16.0	10.7	6.3	4.3	0.50	2.0	5.3	67				0

NOTES

PROFILE No. 33 SOIL UNIT : 12 Olveston Series CLASSIFIED AS : Kandoid Latosolic

LOCATION At 800 ft elevation near the main Olveston Estate road

CLIMATE Sub-humid to humid with an annual rainfall of approximately 75 ins

VEGETATION Bananas (formerly old lime trees)

The soil is developed from reddish, slightly weathered dacite near the middle of a ridge (sloping 10°WNW) of a dissected volcanic pile (part of Centre Hills) in an area of smooth, convex slopes. The permeability of the soil is moderate and the drainage is moderately rapid and moderately free. Old tree roots are fairly abundant to 12 ins. Much topsoil has been lost from this particular profile.

PROFILE DESCRIPTION

I	A	0-7 ins	Dark brown (7.5 YR 3/2); silty clay loam; moderately well developed fine crumb passing to sub-angular blocky structure; slightly plastic, non-sticky, friable to loose consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	A/(B)	7-12 "	Reddish brown (5 YR 4/3); clay loam; well developed fine sub-angular blocky structure; slightly plastic, slightly sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	(B)	12-28 "	Yellowish red (5 YR 3/6), with some greyish root channels at the base of the horizon and rusty weathering fragments of rock; silty clay; well developed large angular blocky to prismatic structure; plastic, slightly sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present); boundary merging to :
IV	C_I	28-36 " plus	Yellowish red (5 YR 4/8); rotting rock fragments, angular blocky in places, of somewhat friable gritty dacite.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.3	11.0	8.0	6.1	2.2	0.55	0.6	3.0	73	3.1	0.23	13.0	59
II	5.3	9.0	5.4	3.0	2.4	0.15	0.6	3.6	60	0.7	0.09	8.4	2
III	5.1	12.2	9.4	4.9	4.2	0.15	1.6	2.8	77				3
III	4.9	15.4	12.4	6.3	5.1	0.15	2.9	3.0	81				4

PROFILE No. 34 SOIL UNIT : 12 Olveston Series CLASSIFIED AS: Kandoid Latosolic

LOCATION At 1,100 ft elevation near the higher end of Olveston Estate

CLIMATE Sub-humid to humid with an average annual rainfall of approximately 75 ins

VEGETATION Secondary bush (coffee species) and taller trees

The soil is developed from dacitic autobrecciated lava or agglomerate high on the side of the dissected volcanic pile of Centre Hills in an area of smooth convex slopes (5°W). The permeability of the soil is moderately high and the drainage is moderately rapid and free. Roots are found to 12 ins and are densely packed in the surface horizons.

PROFILE DESCRIPTION

I	A	0-6 ins	Dark brown (7.5 YR 3/2); silty clay loam; moderately well developed fine granular structure; slightly smeary, slightly plastic, slightly sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
II	A/(B)	6-10 "	Dark brown (7.5 YR 4/2); clay loam; moderately well developed fine angular blocky structure; moderately plastic, slightly sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	(B)	10-27 "	Yellowish red (5 YR 4/6); silty clay; well developed fine angular blocky structure; plastic, slightly sticky, friable or very friable consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
IV	(B)/C	27-54 " plus	Rotting rocks with thin layers of silty clay around and between them; purplish, red, rusty and yellow weathering colours; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.7	16.5	13.5	8.7	5.7	0.60	0.6	3.0	82	2.6	0.30	8.6	11
II	5.8	11.9	9.1	5.4	3.6	0.55	0.9	2.8	76	0.9	0.16	5.7	0
III	4.9	13.1	6.7	4.7	1.8	0.10	1.0	6.4	51				4
IV	4.9	12.2	6.4	3.1	2.5	0.10	1.5	5.8	52				5

NOTES

PROFILE No. 36 SOIL UNIT : 30 Pen Series CLASSIFIED AS: Kandoid Latosolic

LOCATION At 2,000 ft elevation at Pen, at the top of Roche's Estate but not in the crater.

CLIMATE Sub-humid (B) with an annual rainfall of approximately 70 ins. The whole area is very windswept

VEGETATION Coarse grass with some very poor bananas

The soil is developed from dacitic tuff on the flat top (slopes 2°W) of a hill, part of the slightly dissected volcanic pile of South Soufriere, in an area of smooth convex slopes. The permeability of the soil is moderate and the drainage is only moderately rapid, being imperfect. The soil has been worked in the past and has obviously lost some of the original top soil but less than 50% (erosion stage 1). Root distribution is unrestricted by physical features but the majority is found in the top 3 ins.

PROFILE DESCRIPTION

I	A	0-6 ins	Dark yellowish brown (10 YR 3/4); clay loam; moderately well developed medium granular passing to moderately well developed fine angular blocky structure; friable, non-sticky, slightly plastic consistence; MnO_2 nodules; strong reaction to H_2O_2 (MnO_2 present).
II	A/(B)	6-9 "	Strong brown (7.5 YR 4/6); clay loam to clay; moderately well developed medium angular blocky structure; friable, plastic, slightly sticky consistence.
III	$(B)_1$	9-22 "	Yellowish brown (10 YR 5/8); clay; moderately well developed fine angular blocky structure; friable, plastic, slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present).
IV	$(B)_{2-I}$	22-27 "	Brownish yellow (10 YR 6/8), speckled with browns and dark greys of MnO_2; fine sandy loam to fine sandy clay loam; weakly developed fine angular blocky structure; friable, very slightly plastic, slightly sticky, smeary consistence; strong reaction to H_2O_2 (MnO_2 present).
V	$(B)_{2-II}$	27-39 "	Yellowish brown (10 YR 5/8), similar to the previous horizon, but colour is even more variegated; fine sandy clay loam; weakly developed fine angular blocky structure; sticky, slightly plastic, somewhat smeary consistence; strong reaction to H_2O_2 (MnO_2 present).
VI	C_1	39-53 "	Colour as horizon V; gritty sandy clay loam; very weakly developed medium angular blocky structure; friable, moderately plastic, sticky consistence; strong reaction to H_2O_2 (MnO_2 present).
VII	C_2	53-60 "	Dark brown (7.5 YR 4/4), with small red, blue and grey patches; loamy sand; massive structure; loose, non-plastic, non-sticky consistence; weak reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.6	21.2	13.1	8.7	4.2	0.80	1.0	8.1	62	4.3	0.37	11.7	2
III	5.3	18.9	9.7	4.7	3.7	0.10	3.5	9.2	51	0.7	0.07	9.6	4
IV	5.5	16.6	8.9	3.4	3.2	0.10	3.4	7.7	54				2
V	5.9	15.4	11.2	5.4	2.5	0.15	3.3	4.2	73				2
VI	6.9	8.3	8.0	3.8	2.6	0.10	1.9	0.3	96				6
VII	7.4	9.2	9.1	5.5	3.1	0.10	1.5	0.1	99				189

NOTES

PROFILE No. 37 SOIL UNIT : 30 Pen Series CLASSIFIED AS: Kandoid Latosolic

LOCATION At 1,930 ft elevation near Pen at the top end of Roache's Estate

CLIMATE Sub-humid to humid with an average annual rainfall of approximately 75 ins

VEGETATION Coarse grass for rough grazing after ridged crops

The soil is developed from sandy dacitic tuff on a steep unstable slope (25°W) part of the slightly dissected volcanic pile of south Soufriere, in an area of smooth convex slopes. The permeability of the soil is moderate and the drainage is moderately rapid to free. Unweathered minerals are fairly common throughout.

PROFILE DESCRIPTION

I	A	0-7 ins	Dark brown (7.5 YR 4/2); clay loam; moderately well developed medium granular structure passing to moderately well developed fine angular blocky structure; slightly plastic, non-sticky, friable consistence; a few manganese nodules; strong reaction to H_2O_2 (MnO_2 present).
II	A/(B)	7-16 "	Dark brown (7.5 YR 4/3); clay; moderately well developed medium angular blocky structure; plastic, sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present).
III	$(B)_I$	16-28 "	Dark brown (7.5 YR 4/4), with darker manganese stains and lighter patches of reddish-yellow (7.5 YR 6/6); clay loam to clay; moderately well developed fine angular blocky structure; moderately plastic, sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present).
IV	$(B)_{II}$	28-45 "	Reddish-yellow (7.5 YR 6/6), with darker and lighter areas and much manganese staining; gritty sandy clay; weakly developed fine angular blocky structure; plastic, sticky, friable, slightly smeary consistence; strong reaction to H_2O_2 (MnO_2 present).
V	$(B)_{III}$	45-57 "	Dark brown (7.5 YR 4/4); gritty, sandy clay loam; weakly developed fine angular blocky structure; moderately plastic, slightly sticky, friable, slightly smeary consistence; strong reaction to H_2O_2 (MnO_2 present).
VI	(B)/C	57 " plus	Yellowish brown (10 YR 5/4); loamy sand; weakly developed fine angular blocky structure; moderately plastic, slightly sticky, friable, slightly smeary consistence; strong reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	16.8	13.5	10.1	3.9	0.25	1.6	3.3	80	2.8	0.26	10.7	2
II	6.3	13.1	10.0	6.8	3.1	0.10	1.7	3.1	76	1.1	0.11	9.9	2
III	6.6	16.0	13.7	8.7	4.5	0.10	2.7	2.3	86				0
IV	6.7	19.0	16.8	11.0	4.8	0.15	2.1	2.2	88				1
V	7.5	14.6	14.7	9.6	5.0	0.10	1.9	0.0	100				4

NOTES

PROFILE No. 29 SOIL UNIT : 11 Windy Hill Series CLASSIFIED AS: Kandoid Latosolic

LOCATION At 1,300 ft elevation near the highest point of the bulldozed public road

CLIMATE Sub-humid (B) with an annual rainfall of approximately 70 ins

VEGETATION Coarse grass with short guava scrub

The soil is developed from andesitic agglomerate with a thin overlay of more recent ash (polysoil effect) on a stable slope (3°-4°E) of a remnant hill of the Centre Hills volcanic mass in an area of smooth, convex slopes. The permeability of the soil is moderate and the drainage is rapid and free. There are few surface stones. Roots are confined mainly to the surface 6 ins.

PROFILE DESCRIPTION

I_{yz}	A	0-7 ins	Dark brown (10 YR 3/3, dry), brown (10 YR 4/3); clay loam; granular structure in the top inch, above well developed medium sub-angular blocky structure; non-sticky, very slightly plastic consistence, hard when dry, friable when moist; weak reaction to H_2O_2; undulating, sharp boundary to :
II_z	(B)	7-24 "	Red (2.5 YR 4/6 to 2.5 YR 5/8) with dark manganese and organic matter stains; silty clay; well developed fine to medium angular blocky structure; plastic, very slightly sticky, friable consistence; moderate to weak reaction to H_2O_2; merging, flat boundary to :
III_z	(B)/C	24-35 "	Colours similar to previous horizon, but more browns and yellows from little weathered rock fragments; silty clay to silty clay loam; moderately well developed fine to medium angular blocky passing downwards to a nearly massive structure; moderately plastic, slightly sticky, friable consistence; weak reaction to H_2O_2; merging, undulating boundary to :
IV_z	C	35-60 " plus	Mass of little weathered stones, concentrically exfoliated hard, yellow and 'mealy' reddish weathering material.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.8	20.0	10.7	8.0	3.4	0.55	0.7	9.3	54	1.6	0.18	9.0	8
II	5.6	19.7	17.5	9.1	8.0	0.45	1.2	2.2	89	1.3	0.08	16.8	3
II	5.4	20.5	17.0	9.0	8.1	0.25	1.5	3.5	83				5
III	5.5	21.3	18.4	9.6	8.0	0.25	1.8	2.9	86				2
IV	5.4	24.1	20.2	10.8	9.5	0.15	2.2	3.9	84				2

NOTES

The values for exchangeable Mg are rather higher than usual

PROFILE No. 30 SOIL UNIT : 11 Windy Hill Series (atypical) CLASSIFIED AS : Kandoid Latosolic

LOCATION At 1,300 ft elevation, below the water tank on Windy Hill

CLIMATE Sub-humid (B) with an average annual rainfall of about 65 ins

VEGETATION Coarse grass and shrubs

The soil is developed from a deep colluvium of slightly weathered recent ash above an older red soil (kandoid latosolic) developed from agglomerate. The profile is located just below the Windy Hill plateau level, on an unstable slope (30°NE) in an area of smooth, steep, convex slopes. The permeability of the soil is moderately low and the drainage is moderately slow.

PROFILE DESCRIPTION

I	0-3 ins	Dark yellowish brown (10 YR 3/4); clay loam, weakly developed large granular and sub-angular blocky structure; slightly plastic, slightly sticky, hard, (friable when moist) consistence.
II	3-18 "	Dark yellowish brown (10 YR 4/4), with a few yellowish areas and rusty veins; silty clay loam; moderately well developed medium angular blocky structure; moderately plastic, virtually non-sticky somewhat friable consistence; strong reaction to H_2O_2 (MnO_2 present).
III	18-29 "	Dark yellowish brown (10 YR 4/4), with a few yellow areas and rusty veins; fine sandy clay loam; weakly developed medium angular blocky structure; moderately plastic, somewhat friable but sticky consistence; moderate reaction to H_2O_2 (MnO_2 present).
IV	29-45 "	Dark yellowish brown (10 YR 4/4), but much darker than above; fine sandy clay loam; weakly developed medium angular blocky structure; very slightly plastic, slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present).
V	45-54 "	Dark brown (7.5 YR 4/3), with many dark stains; clay; moderately well developed medium angular blocky structure; sticky, plastic consistence; abundant MnO_2 nodules; strong reaction to H_2O_2 (MnO_2 present).
VI	54" plus	Reddish brown (5 YR 4/4); clay; well developed fine angular blocky structure; sticky, plastic consistence; abundant MnO_2 nodules; moderate reaction to H_2O_2 (MnO_2 present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
II	6.0	15.7	10.1	5.3	2.8	0.40	2.9	5.6	64	0.4	0.07	5.4	2
III	6.4	14.6	12.1	6.9	2.5	0.60	3.6	2.5	83				2
IV	6.4	13.8	12.7	7.2	4.6	0.40	2.2	1.1	92				0
V	6.3	18.0	17.2	9.2	5.8	0.50	3.4	0.8	96				2
VI	6.2	20.0	16.8	8.4	5.7	0.80	4.0	3.2	84				0

NOTES

Horizon designations were not included in the profile description

PROFILE No. 31 SOIL UNIT : 11 Windy Hill Series CLASSIFIED AS : Kandoid Latosolic

LOCATION At 1,300 ft above sea level, 20 yds east from the bulldozed road at Windy Hill.

CLIMATE Sub-humid (B) with an average annual rainfall of approximately 70 ins

VEGETATION Coarse grass

The soil is developed from andesitic agglomerate (and possibly a thin ash shower above the agglomerate) on a gully side at the edge of the dissected plateau formed by part of the maturely reduced Centre Hills volcano. The profile is on an unstable, smooth, convex slope (19°E) The permeability of the soil is moderate and the drainage is moderately rapid and free. This profile is very slightly eroded, (erosion stage 1, A horizon less than 50 per cent gone), but locally where the topsoil has gone the B horizon is deeply gullied - being obviously much less resistant to erosion than the A horizon. This is a distinctly less red and freely drained soil than that about 10 yds upslope in the stable phase. There are few roots below 12 ins.

PROFILE DESCRIPTION

I A 0-12 ins Dark brown (7.5 YR 4/4); clay loam; large granules in top 2 ins above moderately well developed fine sub-angular blocky structure; slightly sticky, moderately plastic, friable consistence; strong reaction to H_2O_2 (MnO_2 present); undulating, sharp boundary to :

II (B) 12-50 " Yellowish red (5 YR 5/6) areally 2 per cent one inch broad white streaks, a few rusty streaks, and areas of MnO_2 stains; fine sandy clay to fine sandy clay loam; moderately well to well developed medium angular blocky structure; sticky, plastic, very friable consistence; weak to moderate reaction to H_2O_2 (MnO_2 present). Virtually no change observed to 50 ins. Unweathered parent material is apparently at about 4 ft below this level.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.4	19.3	12.6	4.7	6.0	1.70	2.2	6.7	65	1.2	0.14	8.7	2
II	5.0	16.7	9.2	3.2	5.4	0.15	3.1	7.5	55	0.3	0.03	10.6	2
II	5.2	15.9	8.2	2.6	5.9	0.15	2.8	7.7	52				1

NOTES

PROFILE No. 3 SOIL UNIT : 18 **Paradise Series** CLASSIFIED AS : **Allophanoid Latosolic**

LOCATION At 1,560 ft elevation at the narrowest point of the ridge above Amersham Estate

CLIMATE Humid with an average annual rainfall of over 80 ins

VEGETATION Secondary bush, mainly ferns, clusia and mahogany

The soil is developed from two ash layers in a stable position at the middle of a ridge (slope about 10° West) in an area of smooth convex slopes. The permeability of the soil is high and the drainage is free and rapid. This could, possibly, be a disturbed profile near an old coal pit, but no evidence of mixing of soil was found and pieces of charcoal near the bottom of the pit probably indicate combustion of existing plant life at the time of deposition of the second ash shower. Root development is mainly confined to the upper 7 ins of the profile.

PROFILE DESCRIPTION

I			Dense surface network of roots mingling with the litter layer of twigs and leaves.
II_y	A	0-7 ins	Dark grey brown (10 YR 3/2); fine sandy loam; moderately well developed fine granular structure; very friable to loose, non-plastic, non-sticky consistence; moderate reaction to H_2O_2; flat boundary, merging over 3" to :
III_y	(B)	7-18 "	Dark yellowish brown (10 YR 4/6); fine sandy loam; composite peds: very fine angular blocky in larger angular blocky developing to granular structure; very friable, non-plastic, non-sticky consistence; weak reaction to H_2O_2; fairly sharp, flat boundary to :
IV_z	A	18-26 "	Dark brown (10 YR 3/3); very fine sandy loam; composite peds: very fine angular blocky in large angular blocky structure; very friable; non-plastic, non-sticky consistence; weak reaction to H_2O_2; flat boundary merging over 3" to :
V_z	(B)	26-54 " plus	Brownish yellow (10 YR 5/8); very fine sandy loam; rudimentary very fine angular blocky structure; extremely friable to loose, non-plastic, non-sticky consistence; moderate to no reaction to H_2O_2 at various depths.
			Below 40" becomes more yellowish (less weathered) and there are more completely unweathered stones in the soil.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent		C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
II	5.6	27.9	7.6	6.9	1.8	0.15	0.5	20.3	27	6.7	0.61	11.0	3
III	5.7	25.9	5.1	2.7	1.4	0.15	0.6	20.8	20	3.3	0.46	7.2	0
IV	5.4	28.7	2.9	1.5	0.8	0.10	0.4	25.8	10	-	-	-	0
V	5.3	24.9	1.1	0.7	0.4	0.10	0.6	23.8	4	-	-	-	0
V	5.1	19.8	1.6	0.5	0.4	0.05	0.7	18.2	8	-	-	-	0

NOTES

The organic matter remains high throughout the profile

PROFILE No.19 SOIL UNIT : 18 Paradise Series CLASSIFIED AS: Allophanoid Latosolic

LOCATION At 1,850 ft. elevation at the top end of the ridge above Paradise Estate House

CLIMATE Humid with an average annual rainfall of about 100 ins

VEGETATION Mainly palm and caklain (an elfin woodland formation), low and wind-swept

The soil is developed from andesitic ash above moderately tough agglomerate on a stable slope (8°E) at the edge of a ridge of a dissected glacis in an area of fairly smooth slopes. The permeability of the soil is high and the drainage is free. The lower part of horizon IV can be considered as a separate horizon by reason of the much larger proportion of unweathered rock. There is organic matter accumulation, a grey to bleached layer and a rudimentary iron-pan.

PROFILE DESCRIPTION

I	L	1-0 ins	Dense surface mat of leaves and roots
II	A_1	0-5 "	Dark brown (7.5 YR 3/2); humic silt; moderately well developed medium angular blocky structure; non-plastic, non-sticky, slicking (smeary) consistence; moderate reaction to H_2O_2; on :
III	A_2	5-12 "	Dark yellowish brown (10 YR 4/4); humic silt; weakly developed fine angular blocky structure; non-plastic, non-sticky, slicking (smeary) consistence; weak reaction to H_2O_2; flat boundary transitional over 5 ins to :
IV	$(B)_I$	12-35 "	Yellowish brown (10 YR 5/8); silt; moderately well developed medium angular blocky structure; slicking, very slightly plastic, very slightly sticky consistence, the effect becoming more enhanced towards the base of the horizon; sharp, undulating boundary to :
V	Bg	At 35 "	Reddish yellow (7.5 YR 6/8); silt; massive to platey structure; non-plastic, non-sticky, slightly slicking consistence. (A very thin 1/8th inch layer - a rudimentary pan horizon).
VI	D	35 " plus	Slightly consolidated agglomerate with dacitic stones.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
II	5.0	25.3	4.1	3.1	1.5	0.85	1.0	21.2	16	11.8	0.75	15.8	1
III	5.0	13.3	2.8	1.1	1.6	0.20	0.4	10.5	21	4.1	0.35	11.6	0
IV	4.7	16.9	1.1	0.1	1.0	0.20	0.5	15.8	7				0
IV	4.9	18.9	2.7	0.4	1.0	0.20	0.6	16.2	14				2
IV& V	5.2	10.1	2.3	0.3	0.3	0.15	0.4	7.8	23				0

NOTES

The sample from horizons IV & V was taken at the bo tton of IV

PROFILE No. 20 SOIL UNIT : 18 Paradise Series CLASSIFIED AS: Allophanoid Latosolic

LOCATION At 1,400 ft elevation on the ridge above Paradise Estate

CLIMATE Humid with an annual rainfall of approximately 80 ins

VEGETATION Secondary growth, including rhubarb, sweetwood and fishwood

The soil is developed from andesitic ash at the edge of a broad ridge, part of the dissected Soufriere glacis, in an area of smooth slopes (8^{o}E). The permeability of the soil is high and the drainage is very rapid, being excessive. The profile was situated close to a ghaut edge so that there may have been erosion in earlier (cultivated) periods, though this is not now obvious.

PROFILE DESCRIPTION

I	A	0-3 ins	Dark yellowish brown (10 YR 3/4); silt loam; well developed medium granular structure; slightly hard, loose, non-plastic, non-sticky consistence; possibly a few minor iron concretions; moderate reaction to H_2O_2; merging flat boundary to :
II	A/(B)	3-9 "	Dark brown (7.5 YR 4/3); silt loam; well developed medium angular blocky structure; very friable, non-plastic, non-sticky consistence; weak reaction to H_2O_2; merging flat boundary to :
III	(B)	9-20 "	Strong brown (7.5 YR 4/6); silt loam; composite peds: moderately well developed very fine crumbs in weakly developed fine angular blocky structure; feathery, non-plastic, non-sticky consistence; strong reaction to H_2O_2 (MnO_2 present); undulating, sharp boundary to :
IV	C	20 " plus	Virtually unweathered andesitic tuff (no quartz found, though some may be present).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.2	40.8	35.5	22.5	10.9	1.40	2.2	5.3	87	12.7	1.09	11.6	0
II	6.0	31.4	18.1	11.5	6.7	0.40	1.7	13.3	58	4.7	0.71	6.6	0
III	6.0	22.4	8.5	4.0	4.9	0.20	1.1	13.9	38				0

NOTES

The base saturation of the topsoil is unusually high

PROFILE No. 23 **SOIL UNIT : 18** **Paradise Series** **CLASSIFIED AS : Allophanoid Latosolic**

LOCATION At 2,980 ft elevation on the upper slopes of the Chance's Peak of Soufriere

CLIMATE Per-humid with an annual rainfall of about 120 ins

VEGETATION Palms with a fairly dense undergrowth

The soil is developed from two layers of tuff (polysoil effect) on a stable gentle slope (5°E) of the final ridge of the Soufriere Volcanic Pile in an area of smooth, well covered slopes. The permeability of the soil is moderately high and the drainage is moderately rapid and slightly imperfect. There is a dense layer of roots in the top 6 ins.

PROFILE DESCRIPTION

I_x	A	0-7 ins	Dark brown (7.5 YR 3/2); humic silt; moderately well developed medium and large granules passing to sub-angular blocky structure; smeary, slicking, non-plastic, non-sticky consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II_x	(B)	7-11 "	Light olive brown (2.5 Y 5/4); silt; very weakly developed fine sub-angular blocky structure; smeary, non-plastic, slightly sticky consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III_x	(B)/C	11-18 "	Light yellowish brown (10 YR 6/4) weathered rock and grey unweathered rock with yellowish red (5 YR 4/8) rust stains; stony, fine sand; mainly original rock structure; weak reaction to H_2O_2; merging, flat boundary to :
IV_y	(B)	18-26 "	Light olive brown (2.5 Y 5/4); fine sandy loam, weakly developed fine angular blocky structure; non-plastic, non-sticky, very smeary consistence; weak reaction to H_2O_2; sharp, flat boundary to :
V_y	(B)-C	26-40 "	Yellowish brown (10 YR 5/8) with yellowish red (5 YR 4/8) stains; fine sandy loam; non-sticky, non-plastic, very smeary consistence; weak reaction to H_2O_2; boundary merging to :
VI_z	(B)	40-54 " plus	Olive yellow (2.5 YR 6/6); silt; weakly developed fine angular blocky to unaltered rock structure; non-plastic, non-sticky, very smeary consistence; weak reaction to H_2O_2.

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	P_2O_5 p. p. m.
		C. E. C.	T. E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.6	17.8	11.0	5.5	4.3	0.10	3.2	6.8	62	11.7	0.37	32.1	10
II	6.0	18.2	19.4	10.8	8.9	0.10	1.8	0.0	100	2.0	0.19	10.6	2
III	6.2	19.6	7.5	5.8	2.2	0.15	1.4	12.1	38	0.5	0.05	9.2	1
IV	6.0	6.4	0.8	0.6	0.3	0.20	0.6	5.6	13				6
V	5.8	5.0	1.0	0.6	0.2	0.25	0.7	4.0	20				0
VI	5.8	7.2	1.3	1.4	0.5	0.20	0.9	5.9	18				0

NOTES

There is an increase in organic matter in horizon V but there is no corresponding increase in C. E. C.

PROFILE No. 7 SOIL UNIT : 10 St. John's Series CLASSIFIED AS : "Mixed" latosolic

LOCATION At 1,000 ft elevation about $\frac{1}{4}$ mile from the end of the road south from Cudjoe Village

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 65 ins

VEGETATION Very poor, coarse grass fallow

The soil is developed from fairly solid dacitic agglomerate at the centre of a gently convex ridge (slope 0^{o}-2^{o}, position of minimal natural movement) of the dissected glacis of Centre Hills Volcano. The permeability of the soil is moderate and the drainage is moderately rapid but impeded by unweathered rock near the surface, so that rapid surface flow occurs. The area is very stony, being very seriously eroded (down to the parent material, stage 5, locally). The profile is in fact only that of a minor remnant of the soil. Ten feet downhill away from the profile 'ginger' brown clay is still evident between stones of the decayed agglomerate, and lower still a more or less uneroded soil can be observed - as in profile 8.

PROFILE DESCRIPTION

I C_1 0-3 ins / 9 " Dark grey brown (10 YR 4/2), becoming a little less dark with increasing depth; sandy clay loam; moderately well developed medium sub-angular blocky structure; moderately plastic, nearly non-sticky, somewhat friable consistence; no reaction to H_2O_2;

II C_{11} 3" - 5 / 9" - 15 " Weak red (2.5 YR), streaked with dark grey (10 YR 4/1); sandy clay; poorly developed sub-angular blocky structure; plastic, sticky consistence; no reaction to H_2O_2.

III 5 / 15 " Weathering and unweathered rock.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.7	14.0	10.5	5.5	4.7	0.35	0.9	3.5	71	0.6	0.06	9.9	4

NOTES

PROFILE No. 8 SOIL UNIT : 10 St. John's Series CLASSIFIED AS : 'Mixed' latosolic

LOCATION At 750 ft elevation about 250 yds from the end of the road south of Cudjoe Head Police Station

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 60 ins

VEGETATION Tall, coarse grass and some shrubs (long fallow)

The soil is developed from dacitic agglomerate in a gully on the slightly unstable side slope (24°ENE, position of slight net accumulation) of a ridge of Centre Hills in an area of smooth slopes. The permeability of the soil is moderate and the drainage is moderately slow, with some impedance, causing occasional surface flow.

PROFILE DESCRIPTION

I	A	0-4 ins	Dark brown (10 YR 4/3); loam; moderately well developed medium and fine crumb structure; non-plastic, sticky, very friable consistence (but bakes out on drying).
II	A/(B)	4-10 "	Dark brown (7.5 YR 4/2); clay loam; weakly to moderately well developed fine crumb structure; moderately plastic, slightly sticky, friable consistence;
III	$(B)_I$	10-23 "	Dark brown (10 YR 3/3), with black stains of old roots; light clay; moderately well developed large and medium prismatic structure; plastic, sticky, friable consistence :
IV	$(B)_{II}$	23-35 "	Dark brown (7.5 YR 4/4); with grey ped faces, and darker blotches; gritty light clay; moderately well developed medium prismatic to large angular blocky structure; plastic, sticky, friable consistence :
V	(B)/C	35-50 "	Yellowish brown (10 YR 5/8), blotched with light grey (2.5 Y 7/2), in an areal proportion of about 3:1 ; very fine sandy clay; moderately well developed large angular blocky structure; moderately plastic, slightly sticky, friable consistence.
VI	C_I	50" plus	Similar to horizon V, but with lighter texture, grading to less weathered agglomerate.

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	P_2O_5
		C. E. C.	T. E. B.	Ca	Mg	K	Na	H	Base Saturation	C	N		p. p. m.
I	6.1	14.9	12.1	7.7	5.3	0.10	0.6	2.8	81	0.6	0.06	9.4	9
II	6.0	14.9	11.6	6.3	4.6	0.20	1.8	3.3	78	0.6	0.07	8.8	7
III	5.9	19.0	14.4	5.6	8.4	0.15	1.8	4.6	76				11
IV	5.3	22.1	16.6	5.6	9.8	0.20	1.9	5.5	75				8
V	5.9	13.9	10.5	6.2	7.5	0.15	0.5	3.4	76				7

NOTES

PROFILE No. 45 SOIL UNIT : 7 Bugsby Series CLASSIFIED AS : Smectoid Clay

LOCATION At 870 ft elevation on the north side of Bugsby Hole

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 60 ins

VEGETATION Coarse grass for grazing (a long fallow after cotton)

The soil is developed from weathered, well consolidated agglomerate or slightly autobrecciated lava on a flat (3°ESE slope), apparently a remnant of the dissected old plantation surface of the rejuvenated valley, in an area of gently convex slopes, which become abruptly sharp and straight at the ghaut side. The permeability of the soil is very low and the drainage is slow and impeded. The whole profile was very difficult to dig, being compact and tenacious - possibly this is correlated with the type of basic parent material. Grass roots are confined mainly to the A horizon.

PROFILE DESCRIPTION

I	A	0-9 ins	Reddish brown (5 YR 4/3); silty clay; a few surface granules above moderately well developed medium sub-angular blocky structure; moderately friable, plastic, slightly sticky consistence; moderate reaction to H_2O_2, numerous MnO_2 nodules present; sharp, flat boundary to :
II	$(B)_I$	9-21 "	Light yellowish brown (10 YR 6/4), with areas of reddish yellow (7.5 YR 6/8); brown (7.5 YR 5/2); coating ped separations and worm tracks, clay; composite peds: weakly developed medium angular blocky structure within large clods; compact, plastic, sticky, hard consistence (but still slightly friable); weak reaction to H_2O_2; merging, flat boundary to :
III	$(B)_{II}$	21-35 "	Yellowish brown (10 YR 5/4) and brown (7.5 YR 5/4); clay; composite peds: weakly developed medium angular blocky structure within large clods; hard, compact, plastic, sticky consistence (still slightly friable); no reaction to H_2O_2, flat boundary, merging over 4 ins to:
IV	(B)/C	35-44 " plus	Colour variegated as in horizon II; fine sandy clay loam; moderately developed large platey structure merging to rotten rock; friable to compact in place, slightly plastic, slightly sticky consistence; weak reaction to H_2O_2.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	19.3	20.4	10.9	8.1	0.15	1.5	0.0	100	1.9	0.16	11.9	7
II	5.0	25.6	23.1	10.6	11.0	0.15	3.1	2.5	90	0.7	0.05	13.1	1
III	4.8	27.2	19.0	8.3	8.9	0.20	3.8	8.2	70				3
IV	4.6	25.2	18.5	7.4	9.6	0.20	4.4	6.7	73				2

NOTES

PROFILE No. 9 SOIL UNIT : 26 Cork Hill Series CLASSIFIED AS : Smectoid Clay

LOCATION By the side of the main road beyond the bend out of Cork Hill towards Salem

CLIMATE Sub-humid (A) with an average annual rainfall of about 55 ins

VEGETATION Grass and cossie bush

The soil is developed from a cemented agglomerate on an unstable slope (25°E), in an area of straight or slightly convex slopes. The permeability of the soil is low and the drainage is slow with much surface flow. The whole area is obviously eroded, and at the point at which the profile was taken the original topsoil has virtually disappeared (erosion stage 2 or more). Roots are distributed throughout the profile.

PROFILE DESCRIPTION

I	(A) and (B)-C_I	0-9 ins	Dark yellowish brown (10 YR 4/4); gritty loam; weak fine crumb structure in the surface 2 ins above moderately well developed medium sub-angular blocky structure; slightly plastic, slightly sticky, friable to loose consistence; sharp, flat boundary to :
II	(B)-C_{II}	9-19 "	Dark yellowish brown (10 YR 4/4); gritty clay; weakly developed large angular blocky structure; plastic, sticky, hard consistence; sharp, flat boundary to :
III	Csi	19" plus	Quite well cemented agglomerate. The upper surface is coated with a 3 mm thick iron deposit, but there is no particular crust apart from this and odd patches of the same material lower down the profile. Some veins of the horizon II clay are found between the cemented portions of this horizon.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	9.3	8.4	5.0	3.5	0.25	0.5	0.9	90	1.2	0.12	10.6	13
II	5.7	16.3	14.4	6.2	6.9	0.10	0.3	1.9	88	0.4	0.7	5.8	8

NOTES

The C.E.C. value is low for a smectoid clay but this is due to the low proportion of clay in the soil

PROFILE No. 39 SOIL UNIT : 8 Molyneux Series CLASSIFIED AS : Smectoid Clay

LOCATION On the side slope of Bugsby Hole, by the path to Lucas Valley

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 60 ins

VEGETATION Guava and coarse grass

The soil is developed from rotting agglomerate in a slightly unstable position (of no net accumulation) at the head of a 20°(W) slope in an area of smooth concave slopes. The permeability of the soil is low and the drainage, being slightly impeded, is moderately slow.

PROFILE DESCRIPTION

I	A	0-4 ins	Dark grey brown (10 YR 4/2); clay loam; moderately well developed fine to medium granular structure; moderately plastic, slightly sticky, friable consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II	(B)-C_I	4-16 "	Dark grey brown (10 YR 4/2); clay; moderately well developed large angular blocky structure; very plastic, sticky, hard consistence; weak reaction to H_2O_2; merging, flat boundary to :
III	(B)-C_{II}	16-27 "	Light brown grey (10 YR 6/2) clay, with fragments of rotting rock, reddish yellow (7.5 YR 6/6) not always intimately mixed; effective texture sandy clay; moderately well developed medium angular blocky structure; very plastic, sticky, hard consistence; weak reaction to H_2O_2; merging, flat boundary to :
IV	C_I	27-36 "	Colour similar to horizon III; loam, original rock structure visible; friable, slightly plastic consistence; weak reaction to H_2O_2; sharp, flat boundary to :
V	C_2	36" plus	Slightly weathered rock (agglomerate).

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.4	28.6	28.6	18.6	9.8	0.35	2.1	0.0	100	2.0	0.19	10.8	3
II	5.7	43.6	39.4	22.4	16.5	0.10	4.4	4.2	90	0.4	0.07	5.5	2
III	5.3	50.0	45.6	24.4	18.9	0.20	5.8	4.4	91				3
IV	4.9	56.1	50.2	27.7	20.9	0.15	6.0	5.9	90				12

NOTES

The low pH in a soil of such high base saturation is an interesting, though unexplained, phenomenon

PROFILE No. 18 **SOIL UNIT : 6** **Northface Series** **CLASSIFIED AS: Smectoid Clay**

LOCATION At 700 ft elevation on the ridge above St. Peter's

CLIMATE Sub-humid (A) with an average annual rainfall of about 65 ins

VEGETATION Grass (semi-permanent fallow) following a now abandoned cotton cultivation

The soil is developed from dacitic agglomerate on a steep, straight unstable side slope (29°NNW, position of no net accumulation) of a small valley cut in the old maturely reduced volcanic pile of Centre Hills. The area is badly eroded in places (small gulleys), but at this point the erosion stage was approximately 1, that is, only a part of the topsoil had been lost. The permeability of the soil is very low, and the drainage is impeded and very slow with much surface flow. Roots are confined largely to the surface horizon.

PROFILE DESCRIPTION

I	A	0-5 ins	Dark brown (7.5 YR 4/2); clay loam; moderately well developed fine crumb structure; moderately plastic, slightly sticky consistence; moderate reaction to H_2O_2; merging, flat boundary to :
II	(B)-C_I	5-12 "	Dark brown (7.5 YR 4/2), but slightly greyer than above and with a few rusty mottles; gritty clay loam; moderately well developed fine sub-angular blocky structure; plastic, slightly sticky consistence; moderate reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
III	(B)-C_{II}	12-26 "	Brown (10 YR 5/3), with a few rusty patches attributable to half rotten minerals; clay; nearly massive structure with prismatic tendencies; plastic, very sticky consistence; trace of MnO_2 present; merging, flat boundary to :
IV	(B)-C_{III}	26-42 "	Grey brown (10 YR 5/2); clay; weakly developed fine angular blocky structure grading into rotting rock structures towards the base of the horizon; moderately plastic to plastic, sticky consistence; trace of MnO_2 present; flat boundary, merging over 1 inch to :
V	C	42 "	Light brown grey (10 YR 6/2); sparse gritty clay loam among many pieces of rotting agglomerate, with numerous rusty outer coatings to individual rock cores.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	12.9	10.9	5.6	6.4	0.15	0.5	2.0	84	2.1	0.16	13.1	3
II	6.0	12.5	9.2	6.4	4.0	0.10	0.7	3.3	74	1.3	0.10	12.4	5
III	5.4	22.4	18.9	9.0	11.4	0.15	1.9	3.5	84				0
IV	5.5	22.0	18.0	7.6	9.8	0.10	2.8	4.0	82				2

NOTES

PROFILE No. 4 **SOIL UNIT : 2** **Pinnacle Rock Series** **CLASSIFIED AS : Smectoid Clay**

LOCATION At 350 ft elevation to the left of the path from Sweeny's

CLIMATE Sub-humid (A) with an average annual rainfall of approximately 45 ins

VEGETATION Devil's Bit (on fallowed land) and cossie bushes.

The soil is developed from weathered agglomerate on a remnant flat, part of an old, now dissected surface on Silver Hill volcanic centre. The permeability of the soil is low and the drainage is slow and impeded. This particular profile was slightly eroded, having lost a little topsoil, but the whole surrounding area has suffered considerable sheetwash and loss of A horizon material. A nearby exposure shows shoal cemented pavement overlying the parent material of this soil ; this has obviously been covered and re-exhumed at some stage. Roots are found to the base of the profile.

PROFILE DESCRIPTION

I	A	0-3 ins	Dark brown (7.5 YR 3/2); clay; moderately well developed fine crumb structure; plastic, sticky consistence; no reaction to H_2O_2 at top of horizon, moderate reaction towards base; flat boundary merging over 1" to :
II	A/(B)	3-16 "	Dark grey brown (10 YR 4/2); clay; weakly developed large prismatic structure; very plastic, sticky consistence; undulating boundary merging to :
III	(B)-C_I	16-23 "	Brown (7.5 YR 5/3); clay loam to clay; moderately well developed medium to large angular blocky structure; friable, plastic, slightly sticky consistence; merging, flat boundary to :
IV	(B)-C_{II}	23-30 "	Brown (7.5 YR 5/4); clay loam; moderately well developed medium to large angular blocky structure; friable, slightly cemented, plastic, slightly sticky consistence.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.0	31.4	27.9	15.2	13.7	1.65	1.84	3.5	89	1.4	0.18	8.0	26
II	5.9	39.7	30.8	14.4	15.6	1.55	6.0	0.0	78	0.8	0.14	5.6	14
III	5.2	35.0	30.3	10.5	13.6	1.70	10.5	0.0	87				8
IV	5.7	24.7	20.6	7.9	7.5	1.15	8.0	0.0	83				3

NOTES

The lower horizons contain considerable quantities of soluble salts, but these are evidently not in sufficient quantity to affect root penetration

PROFILE No. 40 SOIL UNIT : 32 Roache's Series CLASSIFIED AS : Smectoid Clay

LOCATION At 1,150 ft elevation near the mill at Roache's

CLIMATE Semi-arid with an annual rainfall of about 40 ins

VEGETATION Coarse grass and guava scrub

The soil is developed from tuff, probably dacitic, at the top of the remnant hill of Roache's (15°NNE slope) in an area of smooth, conved slopes. The permeability of the soil is low and the drainage is slow and impeded. There are numerous stones and a few boulders on the surface of this soil. A hoe-erosion 'step' is visible at a contour bund of elephant grass and the whole area has lost a considerable amount of topsoil (erosion stage 1 to 2). A true "shoal" pavement cementation horizon can be observed on other parts of this hill. Root distribution is mainly superficial.

PROFILE DESCRIPTION

I	A	0-8 ins	Dark brown (7.5 YR 3/2); clay loam; moderately well developed medium crumb passing to fine sub-angular blocky structure; plastic, sticky, somewhat friable consistence; strong reaction to H_2O_2 (MnO_2 present); sharp, flat boundary to :
II	(B)-C_I	8-16 "	Dark brown (7.5 YR 3/2); with some darker and lighter streaks; stony clay; well developed medium and large angular blocky structure; very plastic, sticky, hard consistence; strong reaction to H_2O_2 (MnO_2 present); merging, flat boundary to :
III	(B)-C_{II}	16-26 "	Brown (7.5 YR 4/4), with some darker lines (MnO_2) and some orange areas, clay; well developed medium and large angular blocky structure; very plastic, sticky, hard consistence; weak reaction to H_2O_2; merging, flat boundary to :
IV	C_1	26-30 "	Weathering rock with about 30 per cent stripes or planes of clay between unweathered materials; strong reaction to H_2O_2 (MnO_2 present).
V	C_2	30-44 " plus	Weathering, light coloured dacitic tuff.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.3	16.2	15.4	10.6	4.1	0.70	2.8	0.8	95	1.8	0.16	11.2	1
II	6.5	17.1	17.1	11.3	4.5	0.20	3.9	0.0	100	0.4	0.05	7.1	7
III	6.5	23.3	22.0	15.6	6.7	0.20	4.3	1.3	94				1
IV	6.6	17.1	16.6	11.3	4.3	0.15	3.1	0.5	97				0

NOTES

PROFILE No.12 SOIL UNIT : 5 Waterworks Series CLASSIFIED AS : Smectoid Clay

LOCATION At 300 ft elevation between the school and a cricket field at Cork Hill

CLIMATE Sub-humid (A) with an average annual rainfall of about 60 ins

VEGETATION Fallow

The soil is developed from weathering tuff on a small flat (sloping 2°W) in an area of gently undulating slopes, part of the well dissected glacis of Centre Hills volcanic complex. The whole area is obviously well eroded, having lost much or all of the original topsoil (erosion stages 1 to 2), and the present horizon is fairly obviously only a well worked upper part of the (B)-C horizon. Roots are confined to horizon I.

PROFILE DESCRIPTION

I	S	0-6 ins	Very dark grey brown (10 YR 3/2); clay; moderately well developed fine to medium crumb structure; plastic, sticky consistence; weak or no reaction to H_2O_2.
II	(B)-C	6-19 "	Dark brown (10 YR 4/3), occasional structure faces coated with very dark grey brown (10 YR 3/2); clay; more or less massive, poorly developed large prismatic structure; very plastic, sticky consistence; no reaction to H_2O_2.
III	C		Weathering cemented gritty tuff, with much iron-staining.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	21.6	20.2	12.9	7.2	0.15	0.9	1.4	94	1.1	0.12	8.7	14
II	5.8	35.6	34.6	17.8	15.3	0.15	3.1	1.0	97	0.4	0.07	5.6	17

NOTES

The high exchangeable magnesium is typical of these soils

PROFILE No. 13 SOIL UNIT : 5 Waterworks Series CLASSIFIED AS: Smectoid Clay

LOCATION At 250 ft elevation off the road to Waterworks Estate

CLIMATE Sub-humid (B) with an average annual rainfall of about 65 ins

VEGETATION Coarse grass and cossie bush, formerly sugar cane land

The soil is developed from dacitic tuff near the edge of a large dissected glacis flat on smooth, slightly convex gentle slopes (5°SW). The permeability of the soil is very low and the drainage is very slow, being impeded. Erosion stages 0 and 1 are obvious in the immediate vicinity of the profile pit, where erosion and deposition due to sheet wash are both apparent.

PROFILE DESCRIPTION

I	A/(B)	0-9 ins	Dark brown (10 YR 3/3); loam; moderately well developed medium granular structure; very friable, slightly plastic, non-sticky, almost slicking consistence; mainly a washed-out topsoil; a trace of or no reaction to H_2O_2.
II	(B)-C	9-18 "	Dark grey brown (10 YR 4/2); clay; moderately well developed large prismatic to massive structure; very plastic, sticky consistence.
III	(B)-C	18-26 "	Dark grey brown (10 YR 4/2), with areas of very dark grey (10 YR 3/1); stony clay; a transitional horizon with very little clay development. The darker coloured clay appears to be stained with organic matter and is concentrated mainly at the base of the horizon which undulates gently and sharply overlies:
IV	C	26" plus	Cemented tuff with several thin layers of silica cementation apparent.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.1	9.9	9.0	5.7	4.4	0.10	0.3	0.9	91	1.4	0.14	10.3	16
II	5.7	23.3	20.5	10.9	8.9	0.10	1.8	2.8	88	0.3	0.07	5.1	8
III	5.7	32.3	31.0	14.5	12.4	0.20	6.6	1.3	96				10

NOTES

PROFILE No. 35 SOIL UNIT : 14 Woodlands Series CLASSIFIED AS: Smectoid Clay

LOCATION North of the Olveston Estate road entrance and 25 yds seaward of the main road

CLIMATE Sub-humid (A) with an average annual rainfall of 65 ins

VEGETATION Coarse grass and weeds (ridged, former cotton land)

The soil is developed from dacitic pyroclastics of the Centre Hills volcano at the head of a glacis slope (5°W) just below remnant knolls of the dissected central pile in an area of gently undulating smooth slopes. The permeability of the soil is very low and the drainage is moderately slow, being slightly impeded. Roots are almost entirely confined to the top 6 ins.

PROFILE DESCRIPTION

I_y	A	0-4 ins	Dark brown (7.5 YR 4/2); gritty loam; moderately well developed fine crumb structure; slightly plastic, very slightly sticky, non-slicking consistence; strong reaction to H_2O_2 present); fairly sharp, flat boundary to :
II_y	(B)-C	4-16 "	Reddish grey (5 YR 5/2); clay; moderately well developed medium prismatic structure; very plastic, very sticky, extremely hard consistence; weak reaction to H_2O_2.
III_y	Bh	At 16 " ($\frac{1}{2}$" layer)	Dark reddish brown (5 YR 2/2); humic silty clay; moderate reaction to H_2O_2 (MnO_2 present): sharp, flat boundary to :
IV_y	C	16-24 "	Rusty brown little weathered rock.
V_z	(B)-C	24-30 " plus	Brown (7.5 YR 5/4), with darker and lighter stains and a $\frac{1}{2}$ inch humus layer at the base of the horizon similar to horizon III; clay; moderately well developed fine prismatic structure; very plastic, very sticky consistence.

ANALYSES

Horizon	pH	m. e. /100 g on oven dry soil							Per cent			C/N	p. p. m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	5.7	9.9	7.0	4.7	2.3	0.10	0.5	2.9	71	1.4	0.18	7.5	1
II	5.3	23.9	19.0	11.3	7.6	0.10	1.8	4.9	79	0.6	0.15	4.1	5
III	4.9	25.8	19.7	9.4	8.6	0.15	3.1	6.1	76	1.2	0.14	8.4	13
V	4.9	27.8	20.2	9.3	8.6	0.10	4.6	7.6	73				8

NOTES

There is an increase in organic matter in horizon III

PROFILE No. 6 SOIL UNIT : 3 Carrs Bay Series CLASSIFIED AS : Hydrogenic

LOCATION At 10 ft elevation at the east end of a coconut plantation, near the road at Carrs Bay

CLIMATE Semi-arid to sub-humid (A) with an annual average rainfall of 40 ins

VEGETATION Grass between coconut trees

The soil is developed from alluvium, probably partly marine, in a stable position on a valley infill flat (0° slope) below Silver Hill in an area of concave, somewhat irregular slopes which have obviously been much worked in fairly recent times. The permeability of the soil is moderately high and the drainage is moderately free to 15 ins, but increasingly impeded below this level. It seems likely that there is considerable local variation in the drainage. There are few roots below 24 ins.

PROFILE DESCRIPTION

I	A	0-12 ins	Dark grey brown (10 YR 4/2); loamy sand; weakly developed medium sub-angular blocky structure; friable, sticky consistence; no reaction to H_2O_2.
II	A/G	12-16 "	"Pepper and salt" colours, on average grey (10 YR 5/1) with MnO_2 stains; sand; almost single grain structure with some tendency to sub-angular blocky structure; very friable, slightly sticky consistence; no reaction to H_2O_2.
III	G_1	16-24 "	"Pepper and salt" colours, on average grey (10 YR 5/1), with rusty and fine MnO_2 stains; sand and loamy fine sand; weakly developed medium angular blocky structure; very friable, slightly sticky consistence; no reaction to H_2O_2.
IV	G_2	24-51 "	Similar colours to those of horizon III; fine sandy loam; weakly developed medium angular blocky structure; very friable (but slightly compact), moderately sticky consistence; no reaction to H_2O_2.
V	G_3	51-60 " plus	Dark grey (10 YR 4/1); loam; moderately well developed medium angular blocky structure; friable, non-plastic, moderately sticky consistence; no reaction to H_2O_2.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.7	13.7	13.9	9.1	4.0	0.10	0.6	0.0	100	0.7	0.06	10.9	96
II	7.1	12.5	13.0	8.1	4.5	0.10	0.6	0.0	100	0.4	0.03	13.3	90
III	7.5	13.1	14.0	8.8	5.3	0.10	1.4	0.0	100				96
IV	7.4	16.3	16.9	10.0	5.9	0.10	1.8	0.0	100				95
V	7.4	18.9	19.7	11.0	8.0	0.10	2.4	0.0	100				94

NOTES

PROFILE No. 5 SOIL UNIT : 1 Silver Hill Series CLASSIFIED AS : Skeletal Soil (accumulating phase)

LOCATION At 330 ft elevation on the hillside north of profile 4 (Silver Hill)

CLIMATE Sub-humid (A) to semi arid with an average annual rainfall of about 45 ins

VEGETATION Cossie bush and grass with some old sweet potato vines (fallow)

The soil is developed from weathering dacitic agglomerate on the unstable straight sideslope (25°S), of a valley with sharp, steep lower slopes, characteristic of rejuvenation. The area is extremely stony and bouldery. The permeability of the soil is low and the drainage is moderately slow (faster than profile 4). Roots are concentrated mainly in the surface horizon but some extend to the weathering rock.

PROFILE DESCRIPTION

I	A	0-4 ins	Dark brown (7.5 YR 4/2); clay loam; moderately well developed fine crumb structure; sticky, plastic consistence; merging, flat boundary to :
II	(B)-C_1	4-17 "	Dark brown (7.5 YR 4/2), with a purplish tinge; sandy clay; well developed fine angular blocky structure; plastic to very plastic, sticky consistence; merging, flat boundary to :
III	(B)-C_{11}	17-25 "	The overall colour effect is dark yellowish brown (10 YR 4/4), but there are many blues, greys, purples, etc. in this horizon; sandy clay to sandy clay loam; moderately well developed fine angular blocky structure; weakly plastic to plastic, sticky consistence; merging, flat boundary to :
IV	(B)-C_{111}	25-36 "	Colour as horizon III, but also ochreous mottles; sandy clay loam; moderately well developed fine angular blocky structure; moderately plastic, slightly sticky consistence; merging, flat boundary to :
V	C_2	36 " plus	Sandy weathering agglomerate.

ANALYSES

Horizon	pH	m.e./100 g on oven dry soil							Per cent			C/N	P_2O_5 p.p.m.
		C.E.C.	T.E.B.	Ca	Mg	K	Na	H	Base Saturation	C	N		
I	6.4	20.2	17.5	10.3	9.1	1.00	1.1	2.7	87	1.6	0.18	8.7	17
II	6.3	25.3	22.7	12.0	10.2	0.60	1.9	2.6	90	0.8	0.12	6.8	11
III	6.5	35.8	34.9	13.4	18.2	0.30	4.2	0.9	97				9
IV	6.2	31.6	30.7	11.2	15.0	0.25	7.6	0.9	97				8
V	6.1	38.2	40.5	14.5	19.9	0.40	5.0	0.0	100				10

NOTES

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