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SEMI - DETAILED SOIL SURVEY OF THE GREAT VALLEY/KENILWORTH AREA, HANOVER

Rural Physical Planning Unit
Ministry of Agriculture
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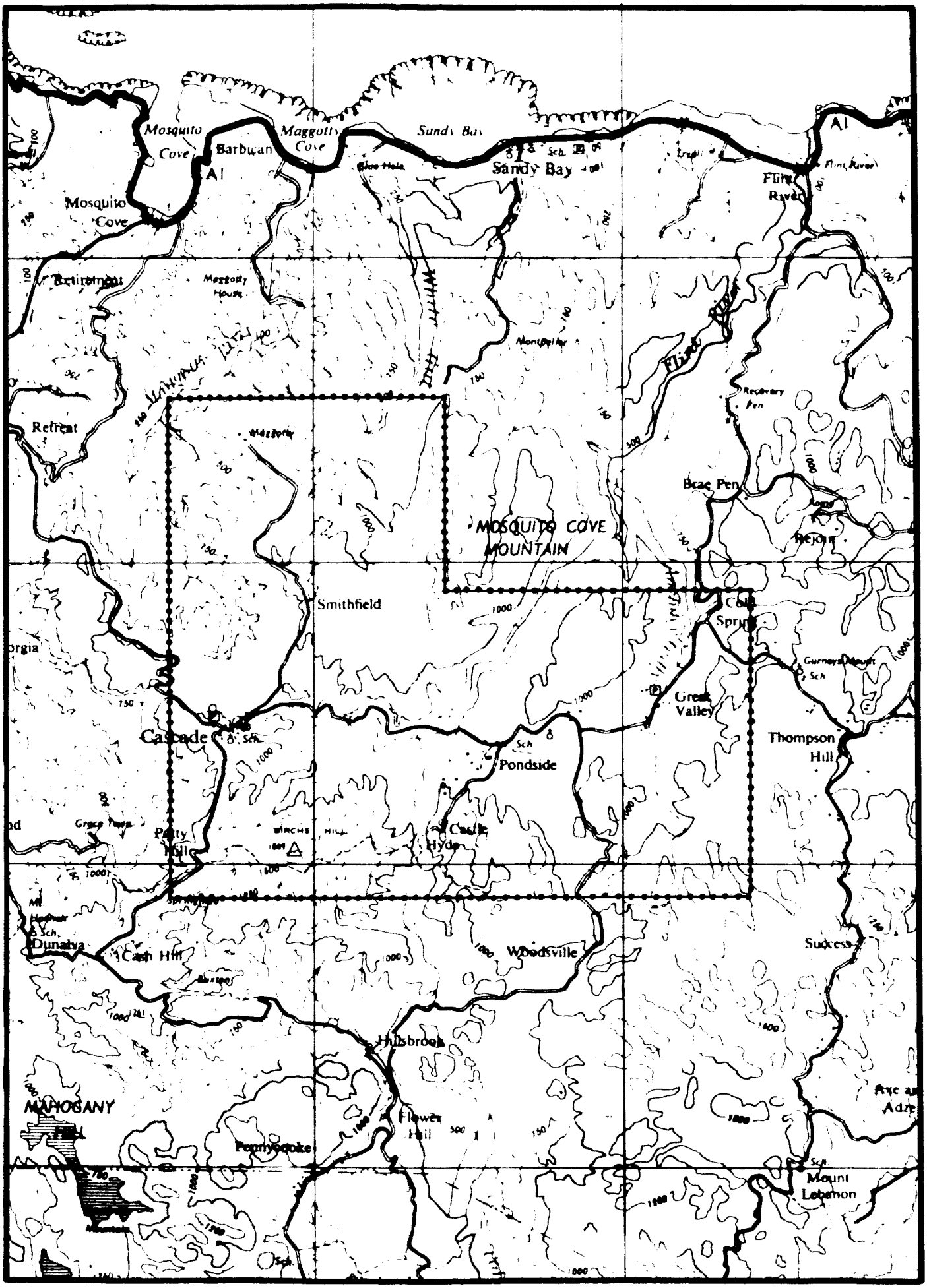

FIG 1 LOCATION OF THE STUDY AREA
Scale 1:50,000

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I. INTRODUCTION

In December 1980, the Rural Physical Planning Unit of the Western Region, Ministry of Agriculture was requested by the Regional Director of the Ministry of Agriculture to carry out soil characterization studies in the pilot demonstration plots that were selected for implementation under the Doubling Farm Production Project, in the Great Valley/Kenilworth area in the parish of Hanover.

The Doubling Farm Production Project is a joint project of the Government of Jamaica, Ministry of Agriculture, and the Food and Agriculture Organization of the United Nations. Under the project demonstrations would be implemented in effective crop production on selected farmers fields throughout the country, with the objective of providing examples of simple agricultural production technology to farmers and extension officers, aiming at increased farm production.

In the Western Region the extension areas of Great Valley and Kenilworth in the parish of Hanover were chosen for the implementation of 10 pilot demonstration sites. In each of the 10 pilot demonstration sites the Planning Unit made detailed descriptions of soil pits, and took samples of genetic horizons of the soil profile for further chemical and physical characterization in the laboratory. Additional soil/physiographic information was gathered by means of 42 soil auger observations and through the interpretation of air photos of the area, at scale 1:25,000. The field work for the survey was carried out from January through May 1981.

This report comprises the results of the soil investigations, including a semi-detailed soil map of the study area at scale 1:12,500 (in back pocket). The report comprises sections on climatology, soil classification, descriptions of soil map units and soil management considerations. Annex 1, in the back of the report includes descriptions and analytical data of soil profiles and augerholes.

The soil map and the report should provide a basis for the extension officers in the area to transfer production data obtained from the pilot demonstration sites under the Doubling Farm Production Project, to other sites within the study area.

The Great Valley/Kenilworth study area comprises a total of 5794 acres of land. It is located in the north-central part of the parish of Hanover, at approximately 20 miles (30 km) from Montego Bay, and 10 miles (15 km) from Lucea (refer to Figure 1).

2. CLIMATOLOGY

Rainfall and evaporation data for the Great Valley-Kenilworth area are taken from the Smithfield climatological station, which, as it is centrally located, is representative for the study area (refer to Table 1).

Table 1

MEAN MONTHLY AND ANNUAL RAINFALL, EVAPORATION AND EVAPOTRANSPIRATION (INCHES) FOR SMITHFIELD, HANOVER (1970-78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Rainfall	5.0	6.1	4.1	6.4	11.3	13.2	9.8	10.9	12.5	15.6	6.7	3.6	105.2
Evaporation	3.5	3.7	4.5	5.4	5.1	5.2	5.5	5.0	4.7	3.9	3.6	3.7	53.6
Evapotranspiration	2.7	2.8	3.4	4.0	3.8	3.9	4.1	3.7	3.5	2.9	2.7	2.7	40.2

From the figures in Table 1 it appears that from April through November rainfall clearly exceeds evaporation, thus giving good opportunities for cultivation of rainfed annual crops. Land preparation could start in the second half of April, so as to allow sufficient rainfall for the crops to be grown. In this period possibly two crops could be grown subsequently, provided they have short growing periods (60 - 90 days). Although rainfall during the December - March period also exceeds evapotranspiration, cultivation of rainfed crops in this period will be risky due to the low reliability of rainfall. Pastures and fruit trees however could be grown, provided they are established in the rainy season,

Mean daily maximum and minimum temperature ranges from 68 - 82°F (Smithfield 1970 - 78).

3. SOILS

3.1 General

The soils of the Great Valley-Kenilworth area were investigated both in the field and in the laboratory. In the field, 10 profile pits were dug and described in detail. In total 51 samples were taken from genetic horizons of these profiles, for further chemical and physical characterization in the laboratory. Also, a total of 42 soil augerings were made and described.

On the basis of airphoto-interpretation, field observations and laboratory analysis seven map units were distinguished. These map units represent soil families*, complexes of soil families** or associations of soil families*** according to the definitions of the USDA Soil Taxonomy.

Three different kinds of parent material occur in the study area: mixed alluvium originating from limestone and shale and sandstone; limestone from the White Limestone Formation; and sandstone and shale. Map unit 1 occupies a valley bottom in the alluvial landscape, near the centre of the area, map units 2,3,4,5 and 6 are developed on limestone or limestone derived materials, mainly in the eastern part of the area, and map unit 7 is found in the sandstone and shale hills that mainly occur in the western part of the area.

In terms of the USDA Soil Taxonomy the soils of the Great Valley - Kenilworth area belong to 3 Soil Orders: Inceptisols, Ultisols and Alfisols. Their classification is explained below (Chapter 3.2). In Chapter 3.3 (Soil Map Units) a description is given of the significant characteristics of the various soil map units occurring in the area. The geographic distribution of the map units is shown on Map No. 1 Descriptions of soil pits and augerholes, as well as laboratory analysis results are compiled in Annex I of this report.

3.2 Soil Classification

Inceptisols

The Inceptisols in the area are alluvial clays found in a slightly undulating valley bottom. These soils have been recently formed in materials brought down by a river from adjoining sand stone and shale hills and limestone hills. These soils show little profile development in terms of the development of structure, clay illuviation and mottling (Cambic horizon). The Inceptisols in the area are classified in the Sub-order of the Tropepts because soil temperature does not vary by more than 5°C between the hot and the cool season. These soils belong to the Great Group of the Eutropept because of their relatively high base saturation (more than 50 percent) and, as their further characteristics are within the ranges as set-out for the central concept of the Eutropepts they are classified: Typic Eutropepts.

* *A soil family is a grouping of soil individuals having similar physical and chemical properties that affect their responses to management and manipulation for use.*

** *A soil complex is a group of defined and named taxonomic units or phases of taxonomic units which occur in a defined pattern that cannot be separated at the scale of survey used, because of its intricate pattern.*

*** *A soil association is a grouping of soils similar to those that make up a complex, but that could be separated out at the scale used, if the need arose.*

Ultisols

The Ultisols are found mainly on the limestone hills of the area, and in some parts of the sand stone and shale hills. These soils show distinct profile development, having argillic horizons that are characterized by well developed clay coatings due to illuviation of clay from overlying horizons. Ultisols have low base saturation (less than 35 percent). Two sub-orders of the Ultisols were recognized: Udults, which have a so-called udic soil moisture regime (i.e. less than 90 cumulative dry days per year); and Humults, which have a relatively high organic matter content (more than 0.9 percent organic carbon in top of argillic horizon).

The Udults in the area have all been classified Plinthudults because they have plinthite in the subsoil, within 125 cm from the surface, formed by the segregation of iron due to a fluctuating water table. Plinthudults are not further differentiated at the sub-group level. The Humults in the study area belong to the Great Group of Tropohumults, because soil temperature does not vary by more than 5°C between the hot and the cool season. All Tropohumults, in the area are Typic Tropohumults.

Alfisols

Alfisols are found equally on both the limestone and the sandstone and shale hills. Alfisols show distinct profile development in terms of the development of an argillic horizon, characterized by the illuviation of clays (clay coatings) from overlying horizons, and they are well structured. Alfisols have high base saturation (more than 35 percent). The Alfisols in the area fall in the Sub-Order of the Udalfs (udic soil moisture regime), and in the Tropudalf Great Group (less than 5°C temperature variation between hot and cool season). The Tropudalfs are further differentiated into four sub-groups based on differences in depth to bedrock (Typic and Lithic sub-group), base saturation (Ultic sub-group) and drainage class (Aquic sub-group).

Family Differentiae

Particle size classes occurring in the area vary from very fine and fine clayey, to fine loamy and clayey skeletal. Mineralogy of all soils though not analytically determined, is assumed to be a mixed origin. Soil temperature regime is isohyperthermic (mean annual soil temperature of more than 22°C, and less than 5°C difference between hot and cool season.

3.3 Description of Soil Map Units

Map Unit 1: Typic Eutropept, very fine, mixed, isohyperthermic; undulating phase (24 acres)

The soils of this map unit are formed in a local valley bottom near the centre of the study area, in mixed materials brought down by the river from the adjoining hilly limestone and sand stone and shale areas. This map unit has an undulating topography with slopes ranging from 0 - 7°. The valley bottom occurs at an elevation of about 650 ft amsl.

This map unit comprises of deep to moderately deep, well drained, heavy clay soils. They have yellowish brown top soils, overlying brownish yellow sub-soils that have a weak structure and very little clay illuviation (Cambic horizon). Common (approximately 10 percent) gravels consisting of weathering limestone, shale and sand stone fragments occur throughout the profile. The pH is neutral throughout (pH 7.0).

Auger observation No. 8 provides a good example of the soils in this map unit. The area is presently cultivated in root crops (yam, dasheen), fruit trees (breadfruit, mango) and some cane.

Map Unit 2: Association of Typic Tropohumult, clayey, mixed, isohyperthermic, and Typic, Tropudalf, very fine, mixed, isohyperthermic; undulating phase (208 acres).

This map unit is an association of two soil families: Typic Tropohumults, clayey, mixed, isohyperthermic, and Typic Tropudalfs, very fine, mixed, isohyperthermic. This map unit encompasses the soils in a large polje (a closed, relatively flat-bottomed hollow in a karst area), in the eastern part of the limestone landscape. The polje has an undulating topography with slopes ranging from 0 - 7 degrees. The elevation ranges from 700 to 800 ft. amsl. The soils in this map unit are derived from weathering limestone as well as from alluvial deposits from the adjoining limestone hills.

The soils of the family of Typic Tropohumults are mainly deep and locally moderately deep, well drained, heavy clay soils. Topsoil colours are (dark) brown and dark yellowish brown. Sub-soils have colours of yellowish brown, brownish yellow, strong brown and yellow These soils have a strong to moderate blocky structure and well developed clay cutans (Argillic horizon). They have low base saturation (less than 35 percent). They are characterized by a relatively high content of organic carbon (more than 0.9 percent) in the upper part of the argillic horizon. There are common (10 percent) manganese nodules throughout these soils, and few (2 percent) gravel-sized weathering limestone fragments. The pH (7.0 in the top soil) drops gradually with depth to 4.5 at about 130 cm.

The Typic Tropudalfs are deep, well drained, heavy clay soils, that have colour, structure and argillic horizon similar to the Typic Tropohumults, but they differ from the latter soil family in that they have high base saturation (more than 35 percent). Also, they have common (10 percent) gravel-sized weathering limestone fragments, and a pH of 8.0 throughout the profile.

Profile number 1 and observations No.3 and 4 are good examples of the Typic Tropohumults. Observations No. 1 and 2 are good examples of the Typic Tropudalfs. The soils of this map unit are presently used for sugar-cane cultivation, for pastures and, locally, for vegetables and root crops.

Map Unit3 : Typic Tropudalf, very fine, mixed, isohyperthermic; undulating phase (136 acres).

This map unit comprises soils of the family of the Typic Tropudalfs, very fine, mixed, isohyperthermic, that occur in the polje near the central part of the limestone area. This polje has an undulating topography (slopes 0 - 7 degrees) and has an elevation of 650 - 750 ft amsl. The soils in this map unit are derived from the weathering materials of underlying limestone, as well as from alluvial deposits from the adjoining limestone hills.

Soils of this map unit are deep, well drained, heavy clays, with yellowish brown and brownish yellow top-soils over brownish yellow sub-soils. These soils have a well developed blocky structure and well developed clay cutans (Argillic horizon). They have favourable base status (base saturation more than 35 percent). There are common (10 percent) weathering limestone fragments throughout the profile. The soil reaction is neutral to slightly acid (pH 6.0 - 7.0).

Observations No. 5,6 and 7 give good examples of the soils in this map unit. The land is presently being used for pastures mainly.

Map Unit 4: Ultic Tropudalf, very fine, mixed, isohyperthermic, rolling to hilly phase (475 acres)

This map unit consists of soils of the family Ultic Tropudalf, very fine, mixed, isohyperthermic. It is found in the rolling to hilly limestone hills in the north eastern part of the study area. Slopes range from 7 - 30 degrees. The elevation is 600 - 1080 ft amsl. These soils are formed in weathering limestone rock.

The soils of this map unit are deep, well drained, heavy clays, consisting of very dark grayish brown and yellowish brown topsoils, with subsoils that have strong brown and yellowish red colours. Brownish yellow, dark red, white and yellow mottles occur in the deeper sub-soil. These soils have a moderately well developed blocky structure, and well developed clay cutans (Argillic horizon). The subsoils have a relatively low base saturation (35 - 60%). Common (10 percent) gravel and stone-sized weathering limestone fragments occur throughout the profile. The reaction of the top soil is slightly alkaline (pH 8.0) in the subsoil. reaction is more acid (pH 5.0).

Profile No. 3 gives a good example of the soils of this map unit. The area of the map unit is presently left in rough pastures and some fruit trees (cocoa, breadfruit, coconut, ackee, banana). Small patches of land are cultivated with yam, dasheen etc.

Map Unit 5: Complex of Typic Tropudalf, very fine,mixed, isohyperthermic; Lithic Tropudalf, very fine, mixed, isohyperthermic; and Lithic Tropudalf,clayey-skeletal, mixed, isohyperthermic; hilly phase (1520 acres).

This map unit is a complex of three soil families: Typic Tropudalf, very fine; Lithic Tropudalf, very fine and Lithic Tropudalf, clayey-skeletal. This map unit occurs in the steeper limestone hills , mainly in the eastern part of the study area, having a hilly topography with slopes ranging from 15 - 30 degrees. The elevation of these hills is 1000 to 1250 ft. amsl. There are common to many limestone outcrops (10 - 50 percent). The soils are formed in the weathering material of the underlying limestone rock. The occurrence of strong soil erosion is evident throughout the map unit.

The Typic Tropudalfs, very fine, mixed, isohyperthermic are truncated, moderately deep, well drained, heavy clay soils, from which most, or all of the Ap horizon has been eroded. Topsoils, where present, have a dark brown colour, sub-soil colours are dark brown, brown, dark grayish brown and yellowish brown. The soils have a moderately well developed subangular blocky structure and well developed clay cutans (Argillic horizon). They have favourable base status. These soils have common (10 percent) gravel-sized weathering limestone fragments. Soil reaction in the topsoils, where present, is neutral (pH 7.0) while in the subsoils it is slightly alkaline (pH 8.0). Depth to bedrock varies between 50 - 70 cm.

The Lithic Tropudalfs, very fine, mixed, isohyperthermic are similar to the Typic Tropudalfs, very fine, except for the depth to bedrock which in the Lithic sub-group is less than 50 cm.

The Lithic Tropudalfs, clayey-skeletal differ from Lithic Tropudalf, very fine, in that they contain more than 35 percent gravel and stone-sized limestone fragments, by volume.

Profile No. 5 provides a good example of the Typic Tropudalf, very fine, mixed, isohyperthermic. Profile No. 4 is a good example of the Lithic Tropudalf, very fine, Profile No. 2 is a good example of the Lithic Tropudalf, clayey-skeletal. The soils of this map unit are used for rough pastures; some parts are left under natural (forest) vegetation and locally plots are cultivated with fruit crops.

Map Unit 6 - Complex of Lithic Tropudalf, very fine, mixed, isohyperthermic, and Lithic Tropudalf, clayey-skeletal, mixed, isohyperthermic; steep hilly phase (466 acres).

This map unit is a complex of two soil families: Lithic Tropudalfs, very fine and Lithic Tropudalfs, clayey-skeletal. This map unit is situated on the very steep slopes of the limestone hills in the south eastern part of the study area. It has a steep hilly topography with slopes mainly over 30 degrees. The elevation of the map unit is 850 - 1350 ft. amsl.

This map unit is characterized by numerous (more than 50 percent) limestone outcrops that mainly occur on the slopes. The soils although shallow, mainly occur in local valley bottoms and depressions.

The Lithic Tropudalfs very fine, mixed, isohyperthermic are shallow, well drained, heavy clay soils, with colours of dark brown, brown and dark grayish brown. These soils have well developed structure and clay cutans (Argillic horizon), and a favourable base status. There are common (10 percent) weathering limestone fragments. The soil reaction is slightly alkaline throughout (pH 8.0).

The Lithic Tropudalfs, clayey-skeletal, mixed, isohyperthermic, differ from the Lithic Tropudalfs, very fine in that gravel and stone-sized weathering limestone fragments make up more than 35 percent of the profile, by volume.

This map unit is not cultivated but is left in natural forest.

Map Unit 7 - Complex of Typic Tropudalf, very fine, mixed, isohyperthermic; Ultic Tropudalf, very fine, mixed, isohyperthermic; Ultic Tropudalf, fine loamy, mixed, isohyperthermic; Aquic Tropudalf, very fine, mixed isohyperthermic; Lithic Tropudalf, very fine, mixed, isohyperthermic; and Plinthudult, clayey, mixed, isohyperthermic; hilly phase (2964 acres)

This map unit is a complex of six soil families, situated over sandstone interbedded with shales in the western part of the area. The area has a hilly topography with slopes of 15 to 30 degrees. The area is characterized by steep slopes separated by well defined ridges and valleys. Strongly varying conditions in terms of elevation, slopes, drainage and parent material have given rise to an intricate pattern of distribution of the various soil families distinguished in this complex soil map unit. The occurrence of erosion in these soils has caused the truncation of parts of, or locally the whole of the Ap horizon.

The Typic Tropudalf, very fine, mixed, isohyperthermic are deep, well drained, heavy clay soils. Topsoil colours are dark brown, brown, and yellowish brown, overlying brown, brownish yellow and yellowish red subsoils with mottles of brown, red, grayish brown and brownish yellow. These soils have moderate blocky structure, well developed clay cutans (Argillic horizon) and favourable base status. The soil reaction is slightly acid (pH 6.0 - 6.5).

The Ultic Tropodulfs, very fine, mixed, isohyperthermic, are deep, locally moderately deep, well drained, heavy clay soils. Topsoils, if present, have colours of (dark) yellowish brown. Subsoils have colours of yellowish brown, strong brown, brownish yellow, very pale brown, reddish yellow and mottled colours reddish brown, red and very pale brown. These soils have moderate structure and well developed clay cutans in the subsoil (Argillic horizon). The subsoils have a relatively low base saturation (35 - 60 percent). The soil reaction is acid (pH 4.5 - 5.5) throughout.

The Ultic Tropudalfs, fine loamy, mixed, isohyperthermic are similar to the Ultic Tropudalfs, very fine, except that they have a fine loamy texture.

The Aquic Tropudalfs very fine are found locally on the lower slopes of the valleys, and have profile development (structure, Argillic horizon) similar to the Typic Tropudalfs, very fine, but they differ in their drainage characteristics. Due to laterally flowing groundwater, that accumulates on the lower parts of the slopes, the Aquic Tropudalfs have a somewhat poor drainage. As a result, they have gley colours (brownish gray, light gray, and light greenish gray) in the subsoils above a depth of 75 cm from the surface.

The Lithic Tropudalfs, very fine are similar to the Typic Tropudalfs very fine, except for the depth to bedrock (less than 50 cm).

The Plinthudults, clayey, mixed, isohyperthermic are deep, well drained, heavy clay soils that are characterized by the occurrence of plinthite (segregated iron components that occur under conditions of fluctuating groundwater) in the subsoils. Topsoil colours are dark yellowish brown, light yellowish brown, brown and pale brown, while subsoil colours include mottles of red reddish yellow, yellow, pale brown , white, pale yellow etc. (plinthite). The soils have strong blocky structure in the subsoil which gets weaker with depth, and well developed clay cutans (Argillic horizon). Soil reaction is acid throughout (pH 4.5)

Profile 9 is an example of Typic Tropudalf, very fine, mixed, isohyperthermic. Profile 6 is an example of Ultic Tropudalf, very fine. Profile 7 is an example of Ultic Tropudalf fine loamy. Profile 10 is an example of Aquic Tropudalf, very fine. Observation number 41 is an example of Lithic Tropudalf, very fine. Profile 8 gives a good example of Plinthudulf, clayey, mixed iso-hyperthermic.

This map unit is terraced for a significant part of the area and is rather intensively cultivated with food crops and vegetable such as yam, dasheen, peanuts, banana, red peas and tomatoes. There are scattered fruit trees of mango, coconut, breadfruit. A small area is used for cattle grazing.

3.4. SOIL MANAGEMENT CONSIDERATIONS

The soils of map unit 1 (Typic Eutropepts, very fine) have generally favourable characteristics for cultivation, in that they are moderately deep to deep, have high base status, contain relatively little gravel, have no drainage limitation and occur on gentle slopes.

The characteristics of the two soil families distinguished within map unit 2 (Typic Tropohumults, clayey, and Typic Tropudalfs, very fine) are also favourable for cultivation. Both families comprise deep, well drained clay soils with relatively little gravel that occur on gentle slopes. Base saturation however in the Tropohumults is low (less than 35 percent) and these soils therefore will require higher fertilizer inputs in order to produce yields comparable to those on the Tropudalfs.

Map unit 3 comprises soils of the family Typic Tropudalfs, very fine, which favourable characteristics for cultivation have been discussed above. Slopes in this map unit are gentle.

The soils of map unit 4 (Ultic Tropudalfs, very fine) have as their main limitation the steeper slopes (7 - 30 degrees) on which they occur, as well as a relatively low base saturation in their subsoil (35 - 60 percent). Soil conservation measures (bench terraces, stone barries, water ways etc) are required to check erosion if the soils of this map unit would be used for the cultivation of annual crops. Preferably, areas with slopes over 25 percent should be kept under permanent vegetation (grass, tree crops).

Map unit 5 comprises soils of the families of Typic Tropudalfs, very fine, that have generally favourable characteristics for cultivation (refer to description of map unit 2), and Lithic Tropudalfs, very fine and clayey-skeletal, that have shallow soil depth. In addition, high gravel and stone contents(over35 percent by volume) occur in the clayey-skeletal Lithic Tropudalfs. Slopes in this map unit are steep, ranging from 15 to 30 degrees rendering it unfavourable for cultivation of crops. Certainly the steepest slopes should be kept under a permanent (forest) vegetation to check erosion.

Map unit 6 comprises shallow soils with a clayey texture and many rock fragments (up to 50 percent by volume; Lithic Tropudalfs very fine and clayey-skeletal). The slopes in this map unit are steep (over 30 degrees) and in addition, rock outcrops occupy more than 50 percent of the area. Therefore, this map unit is unsuitable for cultivation.

The main limitation to cultivation of the soils in map unit 7 is the predominant steep slope (15 - 30 degrees). Soil conservation measures are required if annual crops will be grown, and slopes over 25 degrees should be kept under permanent vegetation. The characteristics of the Typic and Ultic Tropudalfs, very fine, fine loamy, are generally favourable, as has been discussed before. Lithic Tropudalfs, very fine, have a severe depth limitation as they are less than 50 cm deep, whereas soils of the family of Aquic Tropudalfs, very fine,have somewhat restricted drainage. The Plinthudulfs are deep clay soils that have a low base saturation, requiring comparatively high fertilizer inputs if cultivated.

ANNEX I

SOIL DESCRIPTIONS
AND
SOIL ANALYTICAL DATA

GENERAL

In this Annex, ten detailed descriptions from soil profile pits are compiled, as well as 42 descriptions from soil augerholes. The description are prepared following the FAO "Guidelines for Soil Descriptions" and the USDA "Soil Survey Manual". Colours are described using the descriptive terms and notations of Munsell Soil Colour Charts. Colours are for moist soil conditions unless stated otherwise. The pH figures given in the descriptions were determined by means of the Truog Soil Reaction Field Testing Kit. The classification of the soils is at the family level of the USDA Soil Taxonomy.

The ten profile pit descriptions are followed by analytical results for specific chemical and physical properties which are presented by genetic horizon. The analyses were carried out by the laboratory of the Agricultural Chemistry Division, Ministry of Agriculture - Kingston. The following analytical methods were used:

Soil Reaction (pH)	—	**pH-meter with glass/KCL-reference electrode in 1:1 soil/water; 1:2 soil/0.01N KCl suspension; and 1:2 soil/ 0.01N $CaCl_2$ suspension.**
Organic Matter	—	**Walkley & Black Method**
Organic Carbon	—	**By calculation from Organic Matter:** $OC = \frac{\text{Organic Matter}}{1.72}$
Available P	—	**Truog Method: extraction with sulphuric acid; clorimeter.**
Available K	—	**Extraction with acetic acid; flamephotometer**
Exchangeable Bases (Ca, Mg, Na, K)	—	**Extraction with ammonium acetate at pH 7.0; Ca and Mg by atomic absorption; Na and K by flamephotometer**
Cation Exchange Capacity (CEC)	—	**Treatment with ammonium acetate at pH 7.0; ammonium displaced by 10% KCL at pH 2.5.**
Base Saturation	—	**By calculation: Base Saturation = (Sum of Exchangeable Bases ÷ CEC) x 100%**
Particle Size	—	**Pipette Method**

It should be noted that in some cases, analysis results were unreliable. In such cases, interpretations from field observations were made for classification purposes.
The soil pits are numbered P1 through P10, the augerholes have been numbered 1 through 42. Their position is indicated on Map 1. Soils of the Great Valley/Kenilworth area.

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Great Valley

Observation No. Pit No. 1

Topographic Map Sheet No. (Scale 1:12,500): 22B

Co-ordinates: $^{1}7932$ $^{5}4533$

Date: January 20, 1981

Taxonomic classification: Typic Tropohumult, clayey, mixed, isohyperthermic

Land use: Pasture with few coconut and breadfruit trees

Physiography: slightly undulating polje, surrounded by steep limestone hills

Slope at observation site: 3 - 4 precent

Elevation: 775 ft. amsl

Internal drainage: moderately well to well drained

Moisture condition of the soil: moist throughout

Depth of water table: not encountered

Surface stones/rock outcrops: 3 percent

Evidence of erosion: none

Number of samples: 6

Remarks: The pit is situated next to the "Doubling Farm Production" demonstration plot, which is planted to African red peas. Owner of plot Mr. James Coke.

Pit No. 1

Horizon	Depth	Description
A_{11}	0 - 21	dark yellowish brown (10YR 4/4) clay with few (2%) medium and coarse brownish yellow (10YR 6/8) inclusions; strong fine granular and fine sub-angular blocky structure; sticky, plastic, firm; common fine and few medium hard rounded black Mn nodules; many fine and medium roots; few fine worm casts; common fine and few medium tubular pores; few (2%) weathered gravelsized limestone fragments; no reaction to acid, clear and smooth boundary; pH 7.0
A_{12}	21 - 33/37	dark yellowish brown (10YR 4/4) clay, with few (8%) medium and coarse inclusions of brownish yellow (10YR 6/8) from lower horizon; strong medium and fine sunangular blocky structure; sticky, plastic, firm common fine and medium rounded hard Mn nodules; many fine and few medium roots; few worm casts; few fine and medium tubular pores and few fine vesicular pores; few (5%) weathering gravelsized limestone fragments; no reaction to acid; clear and slightly wavy boundary; pH 7.0

B_{11t}	33/37 - 58	yellowish brown (10YR 5/8) clay, with common fine and medium distinct brown (7.5YR 5/4) mottles, moderate medium parting to fine subangular blocky structure; sticky plastic, slightly firm; broken moderately thick clay cutans on ped faces and broken thin clay cutans along pores, few fine and medium tubular pores; few large pores filled with material from overlying horizon due to worm actions; few fine roots; common fine and few medium soft and hard rounded Mn nodules; few (2%) weathering gravel sized limestone fragments (no reaction to acid), few stonesized weathering limestone fragments; reaction to acid: gradual and smooth boundary; pH 7.0
B_{12t}	58 - 72	yellowish brown (10YR 5/8) clay with common fine and medium distinct strong brown (7.5YR 5/8) mottles, strong medium subangular blocky structure; sticky, plastic, slightly firm; broken thick clay cutans on ped faces and along pores; common fine and few medium tubular pores; common fine vesicular pores; common fine and few medium soft and hard rounded black Mn nodules; common coarse blackish Mn stains; few fine roots; few (2%) gravel and stonesized weathering limestone fragfragments (no reaction to acid); few fine roots; gradual and smooth boundary; pH 7.0
B_{21t}	72 - 106	brownish yellow (10YR 6/8) clay; moderate medium and fine subangular blocky structure; slightly sticky, slightly plastic, friable; continuous thick shiny clay cutans on ped faces and along pores; common medium and coarse blackish Mn stains; few fine and medium soft and hard round Mn nodules; few fine roots; few (2%) gravelsized limestone fragments (no reaction to acid); gradual and smooth boundary; pH 4.5
B_{22t}	106 - 140+	yellow (10YR 7/8) heavy clay; moderate medium and fine subangular blocky structure; slightly sticky, plastic and friable; continuous thick shiny clay cutans faces and common coarse shiny oblique grooved stress faces on ped few fine tubular pores and few medium and coarse blackish Mn stains few fine soft and hard rounded Mn nodules; no roots; few (2%) gravelsized weathering limestone fragments (no reaction to acid) pH 4.5

PROFILE NO. P1 - GREAT VALLEY

Soil No.	Horizon	Depth (cm)	pH wet KCl 1:2	pH air H_2O 1:1	pH dry $CaCl_2$ 1:1	Organic Matter (%)	Organic Carbon (%)	Available P_2O_5 (ppm)	Available K_2O (ppm)
Pit 1	A_{11}	0 - 21		6.3	6.0	3.1	1.8	33	59
	A_{12}	21 - 33/37		6.3	6.0	5.8	3.4	26	50
	B_{11t}	33/37 - 58		6.5	5.9	2.9	1.2	29	90
	B_{12t}	58 - 72		5.3	4.2	1.1	0.7	46	104
	B_{21t}	72 - 106		4.9	4.2	0.9	0.5	63	95
	B_{22t}	106 - 140		4.7	4.1	0.9	0.5	73	93

Soil No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil) Ca	Mg	Na	K	CEC (meq/ 100 grs.)	Base Saturation (%)
Pit 1	A_{11}	0 - 21	29.5	1.3	0.1	0.4	42.8	71
	A_{12}	21 - 33/37	34.8	1.4	0.1	0.4	42.4	87
	B_{11t}	33/37 - 58	32.8	0.5	0.1	0.7	46.4	73
	B_{12t}	58 - 72	26.0	0.4	0.1	0.7	43.6	63
	B_{21t}	72 - 106	9.9	0.4	0.1	0.6	42.4	26
	B_{22t}	100 - 140	6.4	0.5	0.1	0.6	44.4	17

Soil No.	Horizon	Depth (cm)	Particle Size Distribution (%) Sand	Silt	Clay	Textural Class (USDA)
Pit 1	A_{11}	0 - 21	12	32	56	C
	A_{12}	21 - 33/37	11	25	64	C
	A_{11t}	33/37 - 58	3	20	77	C
	B_{12t}	58 - 72	5	13	82	C
	B_{21t}	72 - 106	2	15	83	C
	B_{22t}	106 - 140+	2	16	82	C

SOIL PROFILE DESCRIPTION

Parish: Hanover
Area: Castle Hyde
Observation No.: Pit No. 2
Topographic Map Sheet No. (Scale 1:12,500): 22B
Co-ordinates: $^{1}7414$, $^{5}4166$
Date: January 20, 1981
Taxonomic classification: Lithic Tropudalf, clayey-skeletal, mixed, isohyperthermic
Land use: Bush land (ferns, weeds and grasses) with few fruit trees (breadfruit, coconut, mango, ackee)
Physiography: Steep limestone hill
Slope at observation site: 65 percent (33 degrees)
Elevation: 1175 ft amsl
Internal drainage: well drained
Moisture condition of the soil: topsoil dry, subsoil moist
Depth of water table: not encountered
Surface stones/Rock outcrops: 50 percent
Evidence of erosion: Rock outcrops, shallow soil
Number of samples: 3
Remarks: Owner of plot Mrs. Catalina Crooks. Plot to be planted with

Pit No. 2

Horizon	Depth(cm)	Description
A_1	0 - 7	Dark brown (10YR 3/3); moist; brown to dark brown (10YR 4/3) dry; clay; strong coarse, parting to medium subangular blocky structure; sticky and plastic, firm; patchy thin clay coatings on ped faces; few large tubular pores; common fine vesicular pores; many fine and medium roots; many fine worm casts; common (20%) gravel sized limestone fragments that react with HCl, soil matrix does not react with acid; clear and smooth boundary; pH 7.0

B_{1t}	7 - 24	Mixed: dark brown to brown (10YR 4/3) and dark yellowish brown (10YR 4/4) clay; common inclusions of dark brown (10YR 3/3) material from overlying horizon due to biological mixing; strong coarse parting to medium subangular blocky structure, sticky and plastic, firm; broken thin clay coatings on ped faces; few large tubular pores, many fine vesicular pores; common fine and few medium roots; few large and common fine and medium worm casts; common (30%) gravel and stone-sized weathering limestone fragments that react with HCl; peds around limestone fragments covered with powdery calcium carbonate very slight reaction to acid (audible only); gradual and slightly wavy boundary; pH 8.0
B_{2t}	24 - 30/47	Yellowish brown (10YR 5/4) gravelly clay; with common inclusions of dark brown to brown (10YR 4/3) material due to biological mixing with overlying horizon; moderate medium parting to fine subangular blocky structure; sticky and plastic, slightly firm broken moderately thick clay coatings on ped faces, continuous moderately thick clay coatings along tubular pores; few large and medium tubular pores; few medium vesicular pores; many fine roots; common fine and medium worm casts; many (50%) gravel and stonesized weathering limestone fragments that react strongly with acid; peds around limestone fragments covered with powdery calcium carbonate; slight reaction with acid; audible only) pH 8.0 abrupt irregular contact with
R	30/47+	Hard white limestone rock

Sample No.	Horizon	Depth (cm)	pH			Organic Matter (%)	Organic Carbon (%)	Available	
			wet	air	dry				
			KCl 1:1	H_2O 1:1	$CaCl_2$ 1:1			P_2O_5 (ppm)	K_2O (ppm)
Pit 2	A_1	0 - 7		7.1	6.8	16.0	9.3	43	76
	B_{1t}	7 - 24		7.3	7.1	9.3	5.4	26	68
	B_{2t}	24 - 30/47		7.6	7.2	6.4	3.7	26	63

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil)				CEC (meq/100 grs.)	Base Saturation (%)
			Ca	Mg	Na	K		
Pit 2	A_1	0 - 7	71.3	2.7	0.3	1.5	66.4	100
	B_{1t}	7 - 24	71.9	0.9	0.3	0.4	39.6	100
	B_{2t}	24/30/47	88.3	0.8	0.4	0.4	46.4	100

Sample No.	Horizon	Depth (cm)	Particle Size Distribution(%)			Textural Class (USDA)
			Sand	Silt	Clay	
Pit 2	A_1	0 - 7	7	33	60	C
	B_{1t}	7 - 24	2	21	77	C
	B_{2t}	24 - 30/47	1	27	72	grC

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Pondside

Observation No.: Pit No.3

Topographic Map Sheet No. (Scale 1:12,500): 22B

Co-ordinates: $^{1}7534$, $^{5}4166$

Date: January 27, 1981

Taxonomic classification: Ultic Tropudalf, very fine, mixed, isohyperthermic

Land use: Rough pasture with many ferns and some fruit trees (cocoa, breadfruit, coconut, ackee, banana) and small patches with yam and dasheen

Physiography: Rolling footslopes of steep limestone hills

Slope at observation site: 12 - 14 percent (7 - 8 degrees)

Elevation: 760 ft. amsl

Internal drainage: well drained

Moisture condition of the soil: moist throughout

Depth of water table: not encountered

Surface stones/rock outcrops:

Evidence of erosion: none

Number of samples: 7

Remarks: Owner of plot Mr. Louis CRooks. Plot to be planted with pakchoi

Pit No. 3

Horizon	Depth (cm)	Description
A_1	0 - 14/17	Very dark grayish brown (10YR 3/2) with inclusions of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) material due to biological action clay; moderate medium and fine subangular blocky structure, sticky, plastic, slightly firm; common fine tubular pores; medium and fine vesicular pores; , many medium and fine roots; common (10%) gravelsized, and few stone-sized weathering limestone fragments; very few small snail shells; strong reaction with HCl, clear and slightly wavy boundary; pH 8.0

A_3	14/17-23/25	Yellowish brown (10YR 5/6) with inclusions of dark grayish brown (7.5YR 5/8) due to biological action clay; moderate medium and fine subangular blocky parting to moderate fine and medium granular structure; sticky, plastic, firm; patchy thin clay cutans on ped faces and in tubular pores; common medium and fine tubular and vesicular pores; common medium and fine roots; common medium and fine worm casts; common (10%) gravel and stone-sized weathering limestone (no reaction to acid) and flint fragments, very few small snail shells; soil matrix gives reaction strong with HCl; few fine rounded hard Mn nodules, clear and smooth boundary; pH 7.0
B_{1t}	23/25-30/48	Strong brown (7.5YR 5/8) heavy clay; moderate medium and fine subangular blocky structure; sticky, plastic, slightly firm; broken thin clay cutans on ped faces, continuous thick clay cutans in tubular pores; common fine and few medium tubular and vesicular pores; few fine plant roots; few fine worm casts; common fine rounded hard black Mn nodules, few soft fine irregular yellowish red (5YR 4/6) Fe nodules; few fine roots; common (15%) gravel and stone-sized weathering limestone and flint fragments (showing no reaction to acid); soil matrix gives slight reaction to HCl (audible only); gradual and wavy boundary; pH 7.0
B_{21t}	30/48-55/65	Yellowish red (5YR 5/8) heavy clay; strong medium and fine subangular blocky structure, sticky and plastic, firm; continuous thick clay cutans on ped faces and broken thick clay cutans on stone and gravel faces; common fine and few medium tubular pores; few fine vesicular pores; few medium and fine roots; few fine rounded soft and hard Mn nodules; few (5%) gravel and stone-sized weathering limestone and flint fragments (showing no reaction to HCl); soil matrix gives no reaction to HCl; gradual and wavy boundary; pH 6.5.

B_{22t}	55/65-90/96	Mottled: strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) heavy clay; strong medium and fine subangular blocky structure; sticky and plastic; firm; continuous thick clay cutans on ped faces and along pores; broken thick clay cutans on stone faces; common fine and medium tubular and vesicular pores; very few medium and fine roots; common fine and medium hard rounded Mn nodules; common (10%) gravel-sized and few (5%) stone-sized highly weathered limestone and flint fragments (showing no reaction to HCl); gradual and wavy boundary; pH 5.5
B_{31t}	90/96-115/123	Mottled: yellow (10YR 7/8) yellowish red (5YR 5/8) heavy clay with few fine distinct dark red (2.5YR 3/6) mottles; sticky and plastic; slightly firm; moderate medium and fine subangular blocky structure; continuous thick clay cutans on ped faces and along tubular and vesicular pores; few fine roots; few fine rounded hard Mn nodules; common (20%) gravel and stone-sized weathering limestone and flint fragments (showing no reaction to acid); soil matrix gives no reaction to HCl; gradual and wavy boundary; pH 5.0
B_{32t}	115/123-160+	Mottled: brownish yellow (10YR 6/8) dark red (2.5YR 3/6), hwhite (10YR 8/2), yellow (10YR 8/6) heavy clay strong medium and coarse angular and subangular blocky structure; sticky, plastic; firm broken thick clay coatings on ped faces and stone faces; few fine and medium tubular pores;few fine roots; common (10%) gravel and few (5%) stone-sized weathering limestone and flint fragments (showing no reaction to HCl; soil matrix gives no reaction to HCl; pH 5.0

Sample No.	Horizon	Depth (cm)	pH wet KCl 1:1	pH air H_2O 1:1	pH dry $CaCl_2$ 1:2	Organic Matter (%)	Organic Carbon (%)	Available P_2O_5 (ppm)	Available K_2O (ppm)
Pit 3	A_1	0 - 14/17		7.8	7.5	5.6	3.3	36	59
	A_3	14/17 - 23/25		7.5	7.1	2.4	1.4	26	22
	B_{1t}	23/25 - 30/48		7.7	7.2	0.5	0.3	26	11
	B_{21t}	30/48 - 55/65		5.7	4.1	0.9	0.5	26	99
	B_{22t}	55/65 - 90/96		5.2	4.3	0.8	0.4	23	113
	B_{31t}	90/96 - 115/123		4.8	4.5	0.6	0.3	23	50
	B_{32t}	115/123-160+		4.9	4.5	0.5	0.3	26	164

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil) Ca	Mg	Na	K	CEC (meq/100 grs.)	Base Saturation (%)
Pit 3	A_1	0 - 14/17	83.8	.8	.4	.2	18.4	100
	A_3	14/17 - 23/25	18.9	. 2	.1	.2	7.6	100
	B_{1t}	23/25 - 30/48	9.3	. 1	.1	.1	26.8	36
	B_{21t}	30/48 - 55/65	12.0	. 6	.2	0	22.4	57
	B_{22t}	55/65 - 90/96	7.5	. 6	.2	.5	22.8	39
	B_{31t}	90/96 - 115/123	7.8	. 4	.1	.3	19.6	44
	B_{32t}	115/123-160	Results not reliable					

Sample No.	Horizon	Depth (cm)	Particle Size Distribution (%) Sand	Silt	Clay	Textural Class (USDA)
Pit 3	A_1	0 - 14/17	Results Unreliable			
	A_3	14/17 - 23/25		"	"	
	B_{1t}	23/25 - 30/48		"	"	
	B_{21t}	30/48 - 55/65	10.0	12 "	78	C
	B_{22t}	55/65 - 90/96	20.	22	56	C
	B_{31t}	90/96 - 115/123	25	22	53	C
	B_{32t}	115/123 - 160+	4	29	67	C

SOIL PROFILE DESCRIPTION

Parish: Hanover
Area: Woodsville
Observation No. Pit No. 4
Topographic Map Sheet No. (Scale 1:12,500): 22B
Co-ordinates: $^{1}7987$, $^{5}4021$
Date: January 27, 1981
Taxonomic classification: Lithic Tropudalf, very fine, mixed, isohyperthermic
Land use: Pasture, with few scattered trees.
Physiography: steep limestone hills
Slope at observation site: 58 percent (30 degrees)
Elevation: 1075 ft. amsl
Internal drainage: well drained
Moisture condition of the soil: moist throughout
Depth of water table: not encountered
Surface stones/rock outcrops: 10 percent
Evidence of erosion: Truncated, shallow profile, rock outcrops
Number of samples: 3
Remarks: Owner of plot Mr. James Anderson. Plot to be planted with yam, peast, etc.
Part of plot treated with stone barriers

Profile No. 4

Horizon	Depth(cm)	Description
B_{1t}	0 - 20	Mixed: dark grayish brown (10YR 4/2) and dark brown (10YR 3/3) heavy clay; moderate medium parting to fine subangular blocky structure, sticky, plastic, firm; broken thin and patchy moderately thick clay cutans on ped faces, stone faces and along pores; common fine, few large tubular pores; few worm casts; many fine, few medium, very few large roots; few (8%) gravel sized weathering limestone fragments, most of which give a reaction to HCl; powdery secondary calcium carbonate along stone faces; soil matrix does not react with HCl; gradual and smooth boundary; pH 8.0

B_{12t}	20 - 30/33	mixed: dark graysih brown (10YR 4/2) and dark brown (10Y 3/3) clay (preceptible increase in clay content); miderate medium parting to fine subangular blocky structure, sticky, plastic; firm; broken thin and patchy moderately thick clay coatings on ped faces, stone faces and along pores; common fine and few large tubular pores; few fine vesicular pores; common fine and medium worm casts; few fine roots; common (10%) gravelsized and few (5%) stonesized weathering limestone fragments (most of which react with HCL); powdery secondary calcium carbonate along stone faces; slight reaction of soil matrix to HCL; clear and wavy boundary; pH 8.0
B_{2t}	30/33 - 30/55	mixed: yellowish brown (10YR 5/6 and brown to dark brown (10YR 4/3) heavy clay (preceptible increase in clay content); moderate coarse parting to medium angular and subangular blocky structure; sticky; plastic, firm; broken thick clay cutans on ped faces, continuous thick on stone faces and in pores; common fine tubular and vesicular pores; common fine and medium worm casts; few fine roots; common (10%) gravel and stonesized weathering limestone fragments which react to HCL; distinct reaction of soil material to HCL; powdery secondary carbonate along stone faces; abrupt broken boundary;
R	30/55+	Hard white limestone

Sample No.	Horizon	Depth (cm)	pH			Organic Matter (%)	Organic Matter (%)	Available	
			wet	air	dry				
			KCl 1:1	H_2O 1:1	$CaCl_2$ 1:2			P_2O_5 (ppm)	K_2O (ppm)
Pit 4	B_{1t}	0 - 20		6.9	7.5	9.9	5.8	26	81
	B_{2t}	20 -30/33		7.1	7.1	8.6	5.0	50	54
	B_{2t}	30/33 - 55		7.1	7.1	4.8	2.8	36	59

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100 gr soil)				CEC (meq/100 grs.)	Base Saturation (%)
			Ca	Mg	Na	K		
Pit 4	B_{11t}	0 - 20	76.3	2.3	.3	.5	74.0	100
	B_{12t}	20 -30/33	n.d.	n.d.	n.d.	n.d.	n.d	n.d.
	B_{2t}	30/33 - 55	79.1	1.0	.2	.4	77.2	100

Sample No.		Depth (cm)	Particle Size Distribution (%)			Textural Class (USDA)
			Sand	Silt	Clay	
Pit 4	B_{11t}	0 - 20	Results unreliable			
	B_{12t}	20 -30/33		" "		
	B_{2t}	30/33 - 55		" "		

n.d. - not determined

SOIL PROFILE DESCRIPTION

Parish : Hanover

Area: Ponside

Observation No. Pit No. 5

Topographic Map Sheet No. (Scale 1:12,500) :22P

Co-ordinates: $^{1}7416$ $^{5}4366$

Date: February 3, 1981

Taxonomic Classification: Typic Tropudalf, very fine, mixed, isohyperthermic

Land Use: bushland, with many ferns, few fruit trees

Physiography: steep limestone hill

Slope at observation site: 40 - 45 percent (22 - 25 degrees), aspect east

Elevation: 900 ft amsl

Internal drainage: well drained

Moisture condition of the soil: topsoil dry, subsoil moist.

Depth of water table: not encountered

Surface stones/rock outcrops: 20 percent

Evidence of erosion: shallow soil, rock outcrops

Nunber of samples: 5

Remarks: plot owned by Mr. V. Grant. Plot to be planted with carrot and tomato. Plot treated with stone barriers.

Horizon	Depth (cm)	Description
A_p	0 - 3	dark brown (10YR 3/3) moist, heavy clay; very strong medium and fine subangular blocky structure, heavy clay hard when dry, firm when moist, sticky, plastic, patchy thin clay coatings on ped faces; many fine interstitial pores; common medium and fine roots; common fine and medium wormcasts ; few (5%) gravel-sized weathering limestone and flint fragments, (some limestone fragments react with HCL); soil matrix does not react with HCL; clear and smooth boundary; pH 7.0

Horizon	Depth	Description
B_{1t}	3 - 18/24	brown to dark brown (10YR 4/3) heavy clay; moderate medium and fine subangular blocky structure, sticky, plastic, firm; patchy thin clay coatings on ped faces, broken thin clay coatings in tubular pores; common fine and medium, few large tubular pores; common fine and medium vesicular pores;common medium and fine roots; common fine and medium worm casts; few (3%) gravelsized limestone and flint fragments; powdery secondary calcium carbonate coatings along limestone fragments; soil matrix does not react with HCl; clear and smooth boundary; pH 7.5
B_{21t}	18/24 - 22/29	mixed: dark brown (10YR 3/3) and yellowish brown (10YR 5/4) heavy clay, strong medium and fine subangular blocky structure, sticky, plastic, firm, broken thick clay coatings on ped faces and in tubular pores; common large and medium tubular pores, few fine vesicular pores; mixed colour due to biological mixing; many fine and medium, common large worm casts; few fine and medium roots; few (5%) gravelsized limestone and flint fragments; powdery secondary calcium carbonate coatings along limestone fragments; soil matrix does not react with HCl; clear and slightly wavy boundary; pH 8.0
B_{22t}	22/29 - 32/49	yellowish brown (10YR 5/8) gravelly heavy clay (perceptible increase in clay content) with many coarse and medium distinct brown (10YR 5/3) inclusions, strong medium and fine angular and subangular blocky structure; sticky, plastic, firm; broken thick clay coatings on ped faces and along tubular pores; many fine and common medium and large tubular pores; few fine vesicular pores; few fine roots; common medium, fine and large wormcasts; many (50%) gravelsized weathering limestone, marl and flint fragments; soil matrix reacts distinctly with HCl; abrupt and broken boundary; pH 8.0
C	32/49 - 65	weathering limestone and marl, with cracks filled with material as in overlying horizon.
R	65+	hard limestone

Sample No.	Horizon	Depth(cm)	pH			Organic Matter (%)	Organic Carbon (%)	Available	
			wet	air	dry				
			KCl 1:1	H_2O 1:1	$CaCl_2$ 1:2			P_2O_5 (ppm)	K_2O (ppm)
Pit 5	Ap	0 - 3		6.9	6.5	9.6	5.6	43	90
	B_{1t}	3 - 18/24		7.0	6.8	6.2	3.6	36	59
	B_{21t}	18/24 - 22/29		7.3	7.2	6.2	3.6	33	50
	B_{22t}	22/29 - 32/49		7.6	7.4	3.0	1.8	29	59

Sample No.	Horizon	Depth(cm)	Exchangeable Bases (meq/100gr soil)				CEC (meq)	Base Saturation (%)
			Ca	Mg	Na	K		
Pit 5	A_p	0 - 3	68.8	4.0	0.4	0.6	71.2	100
	B_{1t}	3 - 18/24	69.1	2.3	0.4	0.6	64.4	100
	B_{21t}	18/24 - 22/29	58.8	2.5	0.2	0.2	38.8	100
	B_{22t}	22/29 - 32/49	85.0	1.1	0.3	0.3	39.2	100

Sample No.	Horizon	Depth(cm)	Particle Size Distribution (%)			Textural Class (USDA)
			Sand	Silt	Clay	
Pit 5	A_p	0 - 3	Results	Unreliable		
	B_{1t}	3 - 18/24	"	"		
	B_{21t}	18/24 - 22/29	"	"		
	B_{22t}	22/29 - 32/49	"	"		

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Kenilworth (FRDP)

Observation No.: Pit No. 6

Topographic Map Sheet No. (Scale 1:12,500): 22B

Co-ordinates: $^{1}72021$, $^{5}4749$

Date: February 3, 1981

Taxonomic classification: Ultic Tropudalf, fine, mixed, isohyperthermic

Land use: rough pasture

Physiography: steep hills in sandstone and shale formations

Slope at observation site: 40 percent (20 degrees)

Elevation: 1050 ft. amsl

Internal drainage: well drained

Moisture condition of the soil: moist throughout

Depth of water table: not encountered

Surface stones/Rock outcrops: 2 - 3 percent weathering sandstones

Evidence of erosion: shallow profile

Number of samples: 4

Remarks: Plot owned by Mr. C. Wood Plot to be planted to peanut

Horizon	Depth(cm)	Description
A_p	0 - 11	brownish yellow (10YR 6/6) moist, yellow (10YR 8/6) dry; clay; moderate medium and fine subangular blocky structure, sticky, plastic, very firm, patchy thin clay coatings on ped faces, broken thin in pores; many medium and fine, few large tubular pores; many fine vesicular pores; many medium and fine wormcasts; many fine roots; few medium soft rounded black Mn nodules with reddish Fe coatings; few (less than 1%) gravelsized weathering sand stone fragments; clear and smooth boundary; pH 5.5

B_{21t}	11 - 24/27	yellowish brown (10YR 5/6) heavy clay with few medium faint brownish yellow (10YR 6/8) inclusions; moderate coarse, parting to medium and fine subangular blocky structure; sticky, plastic, firm; broken moderately thick clay coatings on ped faces, continuous moderately thick in pores; many medium and fine, common large tubular pores, many medium and fine vesicular pores; many fine and medium, common large worm casts; common fine roots; few medium soft rounded black Mn nodules; few (5%) gravelsized, strongly weathered sandstone and shale fragments; clear and smooth boundary; pH 5.5
B_{22t}	24/27 - 35/41	mottled: yellowish brown (10YR 5/8), strong brown (7.5YR 5/6) clay with common medium prominent red ((2.5YR 4/8), common medium faint brownish yellow (10YR 6/8) and few medium distinct very pale brown (10YR 8/4) mottles; moderate coarse parting to medium subangular blocky structure; sticky, plastic, slightly firm; broken moderately thick clay coatings on ped faces, continuous moderately thick on pores; common fine, and medium, few medium wormcasts; few fine roots; common (10%) strongly weathered gravelsized sandstone and shale fragment gradual and smooth boundary pH 5.0
$B_{3t}+C_1$	35/41 - 95/100	mottled: reddish brown (5YR 5/4) red (2.5YR 4/6), very pale brown (10YR 8/4) clay with many (40%) inclusions of weathering sand stone and shale, strong brown (7.5YR 5/8) and reddish yellow (7.5YR 7/6) in colour; weak coarse, parting to medium and fine subangular blocky structure; plastic, sticky, friable, patchy moderately thick clay coatings on ped faces and rock faces; no worm casts, very few fine roots; few Mn coatings on some rock faces; gradual and slightly wavy boundary; pH 5.0
C_2	95/100 - 135+	multi-coloured, including brown, red, black and gray, weathering sandstone and shale including common (10%) pockets of white (N8/) residual clay.

Sample No.	Horizon	Depth (cm)	pH wet KCl 1:1	pH air H_2O 1:1	pH dry $CaCl_2$ 1:2	Organic Matter (%)	Organic Carbon (%)	Available P_2O_5 (ppm)	Available K_2O (ppm)
Pit 6	A_p	0 - 11		5.1	4.7	1.9	1.1	26	141
	B_{21t}	11 - 24/27		5.0	4.6	1.6	0.9	29	99
	B_{22t}	24/27 - 33/41		4.9	4.5	0.6	0.4	26	109
	B_{3t}+C	33/41 - 95/100		4.8	4.4	0.3	0.2	26	113
	C_2	95/100-135+		4.9	4.3	0.2	0.1	29	160

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil) Ca	Mg	Na	K	CEC meq/100 gra)	Base Saturation (%)
Pit 6	A_p	0 - 11	10.5	10.5	.2	.4	36.0	60
	B_{21t}	11 - 24/27	11.8	13.6	.3	.3	36.0	69
	B_{22t}	24/27 - 35/41	9.9	11.8	.4	.3	38.8	57
	B_3 +C	35/41 - 95/100	8.1	11.2	.4	.3	41.6	48
	C_2t	95/100-135+	7.5	12.6	.8	.4	40.4	53

Sample No.	Horizon	Depth (cm)	Particle Size Distribution (%) sand	silt	clay	Textural Class (USDA)
Pit 6	A_p	0 - 11				
	B_{21t}	11 - 24/27				
	B_{22t}	24/27 - 35/41				
	B_{3t}+C	35/41 - 95/100		RESULTS NOT RELIABLE		
	C_2	95/100 - 135+				

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Kenilworth

Observation No.: Pit No. 7

Topographic Map Sheet No. (Scale 1:12,500): 22 B

Co-ordinates: $^{1}7060$, $^{5}4705$

Date: February, 10, 1981

Taxonomic classification: Ultic Tropudalf, fine loamy, mixed, isohyperthermic

Land use: cropland, presently being cleared and ploughed. Grass, bush, bamboo and a few scattered mango trees grow in vicinity.

Physiography:

Slope at observation site: 45 percent (25 degrees), aspect West 290°.

Elevation: steeply dissected hills in sandstone and shale

Internal drainage: well drained

Moisture condition of the soil: profile moist except for upper 2 - 3cm

Depth of water table: non encountered

Surface stones/Rock outcrops: less than 1 percent

Evidence of erosion: topsoil (Aphorizon) eroded, shallow profile

Number of samples: 5

Remarks: Farmer Adolphus Birch. Plot to be planted with pineapple, yam, pigeon pea, red pea, banana. Plot will be bench terraced

Horizon	Depth(cm)	Description
B_{1t}	0 - 13/16	yellowish brown (10YR 5/8) moist and yellow (10YR 8/6) dry clay; moderate coarse parting to medium and fine sub-angular blocky structure and moderate medium and fine granular structure; sticky, plastic, firm, patchy thin brownish yellow (10YR 6/6) clay cutans on ped faces and broken moderately thick clay cutans in tubular pores; few large and common medium and many fine roots; few fine charcoal fragments; common large, medium and fine worm casts; very few (less than 1%) gravelsized flint and quarts fragments; clear and wavy boundary; pH 4.5

B_{2t}	13/16 - 27	brownish yellow (10YR 6/6) clay with common medium faint strong brown (7.5YR 5/8) and few fine distinct yellowish red (5YR 5/6) mottles (perceptible increase in clay content) medium and fine granular structure; sticky, plastic, firm; broken thick clay cutans on ped faces and continuous thick clay cutans in tubular pores; common large and many medium and fine vesicular pores ; very few (1%) gravelsized weathering flint sandstone and shale fragments; many large, medium and fine worm casts; few fine charcoal fragments; common fine roots; clear and wavy boundary; pH 4.5
B_{31t}	27/37 - 27/46	brownish yellow (10YR 6/5) clay with many medium distinct reddish yellow (7.5YR 6/8) mottles; moderate coarse parting to medium subangular blocky structure; sticky, plastic, slightly firm; patchy thin clay cutans on ped faces and broken thin clay cutans in pores; few large and common medium and fine tubular pores; common medium and fine vesicular pores; few (5%) strongly weathered gravelsized red (2.5YR 5/8), grayish brown (10YR 5/2) sandstone and shale fragments; few medium and fine wormcasts; few fine white fungi mycelia; few fine roots; clear and broken boundary; pH 4.5
$B_{32}+C_1$	27/46 - 75/84	strong brown (7.5YR 5/8) clay loam with common medium distinct light yellowish brown (10YR 6/4) and faint reddish yellow (7.5YR 6/8) mottles; weak very coarse and coarse subangular blocky structure; slightly sticky, slightly plastic, friable patchy moderately thick clay cutans on some faces and broken moderately thick clay cutans in tubular pores; few large and medium, and many fine tubular pores; few medium and fine vesicular pores; common (20%) weathered stonesized soft shale and sandstone fragments; very few large worm casts; very few fine roots; gradual and smooth boundary; pH 4.5
C_2	78/84 - 160	multi-coloured (brown, gray, strong brown, red) weathering soft sandstone and shale fragments including few (2%) pockets of weathering grayish residual clay surrounded by yellowish red sands; pH 4.5

Sample No.	Horizon	Depth (cm)	pH wet KCl 1:2	pH wet H_2O 1:1	pH dry $CaCl_2$ 1:2	Organic Matter (%)	Organic Carbon (%)	Available P_2O_5 (ppm)	Available K_2O (ppm)
Pit 7	B_{1t}	0 - 13/16		4.7	4.2	21.3	12.4		364
	B_{2t}	13/16 - 22/37		4.9	4.2	1.2	0.7	15	141
	B_{31t}	22/37 - 27/46		5.0	4.2	0.6	0.3	15	146
	$B_{32t}+C_1$	27/46 - 75/84		5.2	4.3	0.4	0.2	15	132
	C_2	75/84 - 160+		5.2	4.3	0.3	0.2	17	146

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil) Ca	Mg	Na	K	CEC (meq)	Base Saturation (%)
Pit 7	B_{1t}	0 - 13/16	6.0	9.3	0.4	0.8	32.0	52
	B_{2t}	13/16 - 27/37	5.7	9.8	0.2	0.4	34.2	47
	B_{31t}	27/37 - 37/46	4.2	10.1	0.1	0.4	37.2	40
	$B_{32t}+C_1$	37/46 - 75/84	11.0	11.5	0.2	0.3	34.4	67
	C_2	75/84 - 160+	0.70	16.1	0.5	0.4	31.2	56

Sample No.	Horizon	Depth (cm)	Particle Size Distribution (%) Sand	Silt	Clay	Textural Class (USDA)
Pit 7	B_{1t}	0 - 13/16	29.5	29.1	41.4	C
	B_{2t}	13/16 - 27/37		Results	not reliable	
	B_{31t}	27/37 - 27/46	15.6	32.3	52.2	C
	$B_{32t}+C_1$	27/46 - 75/84	32.7	43.1	24.2	L
	C_2	75/84 - 160+	36.9	39.2	23.8	L

n.d. not determined

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Kenilworth

Observation No Pit No. 8

Topographic Map Sheet No. (Scale 1:12,500) : 22B

Co-ordinates: $^{1}7037$, $^{5}4088$

Date: February 10, 1981

Taxonomic Classification: Plinthudult, clayey, mixed, isohyperthermic

Land Use: Cropland, fallow at present

Physiography: Steeply dissected hills in sandstone and shale

Slope ot observation site: 36 percent (20 degrees), aspect East (100°)

Elevation:

Internal drainage: well drained

Moisture condition of the soil: Profile moist, except for upper 3 cm

Depth of water table: not encountered

Surface stones/Rock outcrops: less than 1 percent

Evidence of erosion:

Number of samples:

Remarks:

Horizon	Depth (cm)	Description
A_{p1}	0 - 5/9	dark yellowish brown (10YR 4/4) moist; light yellowish brown (10YR 6/4) dry; clay; with few and medium prominent red (2.4YR 4/6) inclusions of material from underlying horizons; moderate coarse and medium parting to fine sub-angular blocky structure; sticky, plastic, firm, very hard when dry; patchy thin clay coating on ped faces, broken thin clay coatings in tubylar vesicular pores; few medium common fine vesicular pores; few (less than 1%) gravelsized flint fragments; common fine worm casts; few fine mycelia; few medium plant roots; pH 4.5.

A_{p2}	5/9 - 26/30	brown to dark brown (7.5YR 4/4) clay (preceptible increase in clay content); common fine and medium prominent yellowish red (5YR 5/8), and red (2.5YR 5/8) inclusions of material from underlying horizons; moderate coarse and medium subangular blocky structure, sticky, plastic, firm; patchy thin clay coatings on ped faces; continuous thin clay coatings in tubular and vesicular pores; common large, many medium and fine tunular pores; many mdeium and fine vesicular pores; few (less than 1%) gravelsized flint fragments; few fine white fungi mycelia; few large many medium and fine wormcasts; few medium, many fine roots, abrupt and slightly wevy boundary; pH 4.5
B_{21t}	26/30 - 48/51	inped: red (2.5YR 4/8) heavy clay with common fine prominent reddish yellow (7.5YR 6/8) mottles; Exped: strong brown (7.5YR 5/6) and brown (7.5YR 5/4); strong coarse subangular blocky structure sticky, very plastic, slightly firm; broken thick clay coatings on ped faces, continuous thick clay coatings in pores many medi um and fine, common large tubular pores; few large vesicular pores; common large and medium casts in upper part of the horizon, few below; few fine white fungi mycelia; few fine medium, many fine roots; clear and smooth boundary; pH 4.5
B_{22t}	48/51 - 77	inped: red (2.5YR 5/8) heavy clay with many fine prominent reddish yellow (7.5YR 6/8) and common fine prominent very pale brown (10YR 8/4) mottles; Exped: strong brown (7.5YR 5/6); moderate coarse bubangular blocky structure; sticky, very plastic, firm; broken moderately thick clay coatings on ped faces; continuous moderately thick in pores; few fine tubular pores; few fine vesicular pores; few fine white fungi mycelia; few fine roots; gradual and smooth boundary; pH 4.5
B_{31}	77 - 114	mottled: red (2.5YR 4/6) strong brown (2.5YR 5/8) and white (5Y 8/2) heavy clay; weak, coarse, subangul ar blocky structure; sticky, plastic, slightly firm continuous moderately thick clay coatings on ped faces, moderately thick in tubular pores; few fine tubular pores; very few (less than 1%) strongly weathered shale and sandstone, fragments; gradual and smooth boundary; pH 4.5
B_{32}	144 - 160+	white (10YR 8/2) heavy clay; common medium prominent red (2.5 YR 5/6) and many medium distinctreddish yellow, (7.5YR 6/8) mottles; weak coarse partly parting to weak coarse subangular blocky structure; sticky, plastic, slightly firm; patchy moderately thick clay coatings on ped faces developed as lamellae, few smooth grooved stress cutans; continuous moderately thick clay coatings in tubular pores; few medium and fine tubular pores; few (2%) strongly weathered shale and sandstone fragments; very few fine roots; pH 4.5

Sample No.	Horizon	Depth (cm)	pH wet KCl 1:2	pH air H_2O 1:1	pH dry $CaCl_2$ 1:2	Organic Matter (%)	Organic Carbon (%)	Available P_2O_5 (ppm)	Available K_2O (ppm)
Pit 8	Ap1	0 - 5/9		4.7	4.2	2.3	1.3	20	247
	A_{p2}	5/9 - 26/30		4.8	4.1	2.2	1.2	17	70
	B_{21t}	26/30 - 48/51		4.8	4.1	1.5	0.8	15	81
	B_{22t}	48/51 - 77		4.4	4.2	1.0	0.6	15	99
	B_{31t}	77 - 144		4.9	4.4	1.0	0.6	17	99
	B_{32}	144 - 60$^+$		4.8	4.4	0.4	0.2	20	155

Sample No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100gr soil) Ca	Mg	Na	K	CEC (meq)	Base Saturation (%)
Pit 8	A_{p1}	0 - 5/9	2.6	3.0	0.1	0.5	16.8	37
	A_{p2}	5/9 - 26/30	3.4	2.8	0.1	0.2	10.0	65
	B_{21t}	26/30 - 48/51	3.6	4.4	0.2	0.3	22.8	37
	B_{22t}	48/51 - 77	2.4	3.1	0.2	0.2	22.0.	27
	B_{31t}	77 - 114	1.4	2.2	0.2	0.2	n.d.	n.d.
	B_{32}	114 - 160$^+$	1.5	2.9	0.3	0.4	23.2	22

Sample No.	Horizon	Depth (cm)	Particle Size Distribution (%) Sand	Silt	Clay	Textural Class (USDA)
Pit 8	A_{p1}	0 - 5/9	Results Unreliable			
	A_{p2}	5/9 - 26/30				
	B_{21t}	26/30 - 48/51				
	B_{22t}	48/51 - 77				
	B_{31t}	77 - 114				
	B_{32}	114 - 160$^+$				

n.d. - not determined

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Smithfield land allocated to Guy Ellis

Observation No. 9

Topographic Map Sheet No. (Scale 1:12,500):

Co-ordinates: $^{1}6816$, $^{5}5381$

Date: 17th February 1981

Taxonomic classification: Typic Tropudalf, fine, mixed, isohyperthermic

Land Use: Land planted in tomato, banana, pigeon pea, red peas, escallion, plantain, cane. Tomato and callaloo to be planted.

Physiography: steeply sloping dissected sandstone and shale hills.

Slope at observation site: 29^{o} (55%)

Elevation: 630 ft.

Internal drainage: well drained

Moisture condition of the soil: profile moist throughout except for top 3 cm

Depth of water table: not encountered

Surface stones/rock outcrops: few (2%) sandstone fragments

Evidence of erosion: some removal of topsoil

Remarks:

Horizon	Depth(cm)	Description
A_{p1}	0 - 10/15	dark brown (10YR 3/3) (moist), brown (10YR 5/3) (dry) clay, with common fine faint brownish yellow; (10YR 6/8) inclusions of strongly weathered sandstone; moderate coarse and medium subangular blocky structure; sticky, plastic, firm; thin very patchy clay cutans on some ped faces; few large, medium and tubular pores, common medium and fine vesicular pores; few gravelsized (less than 5%) sand stone fragments; few large, common medium and fine plant roots; clear and smooth boundary, pH 6.5

B_{1t}	10/15 - 20/24	brown (10YR 5/3) clay; with many brownish yellow (10YR 6/8) inclusions due to weathering sandstone, strong coarse and medium subangular blocky structure, sticky, plastic, firm; continuous thin clay cutans on ped faces; broken moderately thick along pores; few large medium and fine tubular pores; common medium and fine vesicular pores; common (10%) gravelsized weathering sandstone fragments; and few (1%) stonesized sandstone fragments; common large medium and fine wormcasts; common fine, few medium roots; common medium black (10YR 2/1) manganese stains.
B_{2t}	20/24 - 26/53	mottled: brown (10YR 5/3) and red (2.5YR 4/8) heavy clay, with few grayish brown (10YR 5/2) due to weathering shale and many brownish yellow (10YR 6/8) due to weathering sandstone; strong coarse subangular blocky structure; sticky plastic, continuous moderately thick clay cutans on ped faces and in tubular pores; common large medium and fine tubular pores; common medium and fine vesicular pores; few fine roots, clear and wavy boundary; pH 6.5
C	26/53 - 58/65	multi-coloured: gray, reddish brown, black, yellow weathering sandstone and shale, including few (less than 5%) residual clay in pockets; few fine plant roots; gradual and smooth boundary; pH 6.5
R	58/65+	hard sandstone and shale parent material

Soil No.	Horizon	Depth (cm)	pH			Organic Matter (%)	Organic Carbon (%)	Available	
			wet	air	dry			P_2O_5 (ppm)	K_2O (ppm)
			KCl 1:2	H_2O 1:1	$CaCl_2$ 1:1				
Pit 9	A_p	0 - 10/15		5.9	5.6	3.6	2.1	30	169
	B_{1t}	10/15 - 20/24		5.8	5.6	1.8	1.1	15	95
	B_{2t}	20/24 - 26/53		5.9	5.5	1.4	0.8	16	109
	C	26/53 - 58/65		6.0	5.6	0.9	0.5	27	86

Soil No.	Horizon	Depth (cm)	Exchangeable Bases (meq/100 gr soil)				CEC (meq/ 100 grs.	Base Saturation (%)
			Ca	Mg	Na	K		
Pit 9	A_p	0 - 10/15	22.5	8.1	0.3	0.4	30.0	100
	B_{1t}	10/15 - 20/24	20.9	7.5	0.4	0.2	23.0	100
	B_{2t}	20/24 - 26/53	25.3	9.4	0.7	0.3	33.2	100
	C	26/53 - 58/65	24.2	9.4	0.7	0.2	26.0	100

Soil No.	Horizon	Depth (cm)	Particle Size Distribution (%)			Textural Class (USDA)
			Sand	Silt	Clay	
Pit 9	A_p	0 - 10/15	results	unreliable		
	B_{1t}	10/15 - 20/24				
	B_{2t}	20/24 - 26/53				
	C	26/53 - 58/65				

SOIL PROFILE DESCRIPTION

Parish: Hanover

Area: Kenilworth FRDP area, land allocated to Mr. Noel Kerr,

Observation No. : P10

Topographic Map Sheet No. (Scale 1:12,500) 22B

Co-ordinates: $^{1}7231$, $^{5}4942$

Taxonomic Classification: Aquic Tropudalf, very fine, mixed, isohyperthermic

Land Use: land bench terraced, planted in yam, banana, dasheen tomato, a few mango trees.

Physiography: steeply sloping dissected sandstone and shale hills

Slope at observation site: 23° (or 42%)

Elevation: 100 ft.

Internal drainage: moderately well drained

Moisture condition of the soil: moist throughout

Depth of water table: below 120 cm from the surface

Surface stones/rock outcrops : none

Evidence of erosion: some removal of topsoil

Number of samples: 5

Remarks:

A_p	0 - 13/17	brownish yellow (10YR 6/6) clay with common fine distinct light brownish gray (10YR 6/2) few fine distinct red (2.5YR 5/6) and common medium faint yellow (10YR 7/6) mottles; strong coarse parting to medium subangular blocky structure; sticky, plastic, firm; patchy thin clay cutans on some ped faces;broken moderately thick clay cutans in tubular pores; common large, many medium and fine tubular pores; many medium and fine vesicular pores; few (less than 1%) gravelsized weathering sandstone fragments; few fine and medium charcoal fragments; few large common medium and fine wormcasts common fine plant roots; clear and slightly wavy boundary; pH 6.0
B_{1tg}	13/17 - 37	inped: brownish yellow (10YR 6/6) and yellow (10YR 7/6); exped: yellowish brown (10YR 5/4), clay; with common to many fine distinct gray (10YR 5/1) mottles (increase in abundance towards lower part of the horizon), strong coarse parting to medium angular and subangular blocky structure, very plastic, very sticky, firm; patchy thin clay cutans and ped faces; broken moderately thick clay cutans in tubular pores many large, medium and fine tubular pores; few large vesicular pores; few (2%) gravelsized weathering sandstone fragments; common medium and fine worm casts; few charcoal fragments; few fine roots; clear and smooth boundary; pH 6.0.
B_{2t}	37 - 65/67	inped: brownish yellow (10YR 6/8); exped: pale yellow (2.5Y 7/6) heavy clay; strong coarse angular and subangular parting medium angular and subangular blocky structure,very sticky, very plastic; firm, continuous moderately thick clay cutans on ped faces; continuous thick clay cutans in tubular pores; few large, common medium and fine tubular pores; few (2%) gravelsized weathering sandstone fragments with iron and manganese coatings; few medium wormcasts; few charcoal fragments; few fine roots; gradual and smooth boundary; pH 6.0
B_{3tg}	65/67 - 117/120	mottled: pale yellow (2.5Y 7/4) reddish yellow (7.5YR 7/8) heavy clay with few fine distinct light greenish gray (5GY 7/1) mottles along some tubular pores; moderate coarse and medium angular and subangular blocky structure, sticky; plastic; firm, broken moderately thick clay coatings on ped faces; continuous moderately thick clay cutans in tubular pores, continudus very thick along few large vesicular pores; common fine few large vesicular pores; few (3%) gravelsized weathering sandstone fragments with iron and manganese coatings; few medium worm casts in upper part of horizon few fine roots; clear and smooth boundary; pH 6.0.

C	117/120 - 150	multi-coloured: brownish, reddish weathering sandstone with black manganese coatings on cleavage plains; continuous moderately thick pale yellow (2.5Y 7/6) clay coatings along vertical cleavage plains; pH 6.5

Soil No.	Horizon	Depth (cm)	pH			Organic Matter (%)	Organic Carbon (%)	Available	
			wet	air	dry				
			KCl 1:2	H_2O 1:1	CaCl 1:1			P_2O_5 (ppm)	K_2O (ppm)
Pit 10	A_p	0 - 13/17		5.2	4.7	2.7	1.6	17	174
	B_{1tg}	13/17 - 37		5.3	4.8	2.2	1.3	17	109
	B_{2t}	37 - 65/67		5.3	4.8	2.0	1.2	12	41
	B_{3t}	65/67 - 117/120		5.6	4.9	0.6	0.3	15	72
	C	117/120-150+		5.5	4.9	0.4	0.2	12	81

Soil No.	Horizon	Depth (cm)	Exchangeable Bases(meq/100gr soil)				CEC (meq/ 100 grs.	Base Saturation (%)
			Ca	Mg	Na	K		
Pit 10	A_p	0 - 13/17	7.2	6.5	0.3	0.4	13.2	100
	B_{1tg}	13/17 - 37	7.7	6.8	0.3	0.2	16.0	94
	B_{2t}	37 - 65/67	8.6	7.6	0.4	0.1	15.6	100
	B_{3t}	65/67 - 117/120	11.5	12.5	0.4	0.3	23.6	100
	C	117/120-150+	12.2	14.2	0.4	0.2	22.0	100

Soil No.	Horizon	Depth (cm)	Particle Size Distribution (%)			Textural Class (USDA)
			Sand	Silt	Clay	
Pit 10	A_p	0 - 13/17	results	unreliable		
	B_{1tg}	13/17 - 37				
	B_{2t}	37 - 56/67				
	B_{3t}	65/67 - 117/120				
	C	117/120-150+				

22814a

DESCRIPTIVE LEGEND FOR THE SOIL MAP OF THE GREAT VALLEY/KENILWORTH AREA

Map Unit Number	Parent Material	Land Form	Map Unit Name	Slope (degrees)	DESCRIPTION OF CHARACTERISTICS	EXTENT	
						Acres	Percent of Total Area
1	Alluvial Deposits	Valley Bottom	Typic Eutropept, very fine, mixed, isohyperthermic; undulating phase.	0 - 7	Deep to moderately deep, well drained, heavy clay soils with yellowish brown topsoils overlying brownish yellow subsoils, that are weakly developed (Cambic B horizons) and have common (10 percent) limestone and shale gravels. pH is neutral throughout.	24.0	0.4
2	Karst Limestone	Polje	Association of Typic Tropohumult, clayey, and Typic Tropudalf, very fine, mixed isohyperthermic; undulating phase	0 - 7	Association of deep, well drained, heavy clay soils with dark brown to dark yellowish brown topsoils over strong brown and yellowish brown to yellow subsoils with developed structure and clay cutans (Argillic B horizons). Few to common limestone gravels. pH in Tropohumults decreases with depth from 7 in topsoil to 4.5 at 120 cm. pH in Tropudalfs is 8 throughout.	209.0	3.6
3			Typic Tropudalf, very fine, mixed, isohyperthermic; undulating phase.	0 - 7	Deep, well drained, heavy clay soils with yellowish brown and brownish yellow topsoils over brownish subsoils with well developed structure and clay cutans (Argillic B horizons).Common (10 percent) limestone gravels. pH 6 - 7 throughout.	136.0	2.4
4		Limestone Hills	Ultic Tropudalf, very fine, mixed, isohyperthermic; rolling to hilly phase.	7 - 30	Deep, well drained, heavy clay soils with very dark grayish brown and yellowish brown topsoils over strong brown and yellowish red subsoils with mottles at greater depth. Well developed structure and clay cutans (Argillic B horizons). Common (10 percent) limestone gravels. pH decreases from 8 in topsoil to 5 in subsoil.	475.0	8.2
5			Complex of Typic Tropudalf, very fine; Lithic Tropudalf, very fine; and Lithic Tropudalf, clayey-skeletal, mixed; isohyperthermic; hilly phase.	15 - 30	Complex of shallow (Lithic Tropudalfs) and moderately deep (Typic Tropudalfs) well drained soils with heavy clay texture (mainly on the more gently sloping areas) and with clayey-skeletal texture (containing more than 35 percent gravels and stones) on the steeper slopes. Topsoils if not eroded away, have dark brown colour. Subsoil colours are dark brown, dark grayish brown and yellowish brown. Well developed structure and clay cutans (Argillic B horizons). Common to many (10 to 50 percent) limestone gravels and stones. pH 7 - 8 throughout.	1520.0	26.2
6			Complex of Lithic Tropudalf, very fine, and Lithic Tropudalf, clayey-skeletal, mixed isohyperthermic; steep hilly phase	more than 30	Complex of shallow, well drained soils with heavy clay texture (Lithic Tropudalf, very fine) and with clayey-skeletal texture (Lithic Tropudalf, clayey-skeletal; having more than 35 percent gravel and stones). The stony soils occur relatively more on the steeper slopes. Colours are (dark) brown to dark grayish brown. These soils have well developed structure and clay cutans (Argillic B horizons). Common to many limestone gravels and stones; pH 8 throughout.	466.0	8.0
7	Shale and Sandstone	Shale and Sandstone Hills	Complex of Typic Tropudalf very fine; Ultic Tropudalf, very fine; Ultic Tropudalf fine loamy; Aquic Tropudalf, very fine; Lithic Tropudalf, very fine; and Plinthudult, clayey, mixed, isohyperthermic; hilly phase.	15 - 30	Complex of deep and shallow, well drained heavy clay soils with favourable base status and pH (6 - 6.5) (Typic and Lithic Tropudalfs); deep, well drained soils that have relatively low base status and pH (4.5 - 5.5) with heavy clay texture or with fine loamy texture (Ultic Tropudalfs, very fine and fine loamy respectively); deep, somewhat poorly drained, heavy clay soils (Aquic Tropudalfs, mainly occurring on the lower part of the slopes) and deep, well drained, heavy clay soils with plinthite in the subsoil (Plinthudults) that have a relatively low pH (4.5). Main soil colours are brown, brownish yellow, strong brown and yellowish brown. Aquic Tropudalfs have grey colours in the subsoil, reflecting somewhat poor drainage conditions; Plinthudults have red, reddish yellow, pale brown, white etc. mottles in deeper subsoil.	2964.0	51.2
						5793.0	100.0

1 Auger Hole and Observation No.

P1 Soil Pit and Profile No.

MINISTRY OF AGRICULTURE
WESTERN REGION

Rural Physical Planning Unit

Map No. 1
SOILS OF THE GREAT VALLEY/KENILWORTH AREA

Scale 1:12,500
0 100 200 Yards
0 100 200 Metres

Drawn By:	Checked By:	Date Completed:	File Number:
R. F. GARDENER	W. ANDRIESSE	AUGUST 1981	

Approved By:
Date:

Restrictions for use: