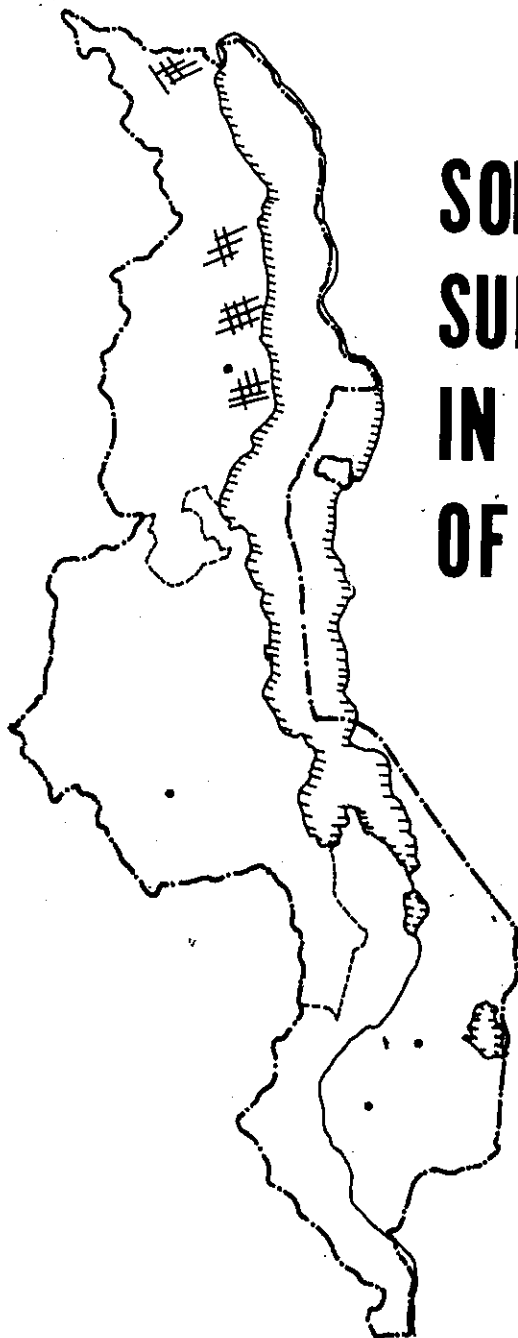


*Senem*



MALAWI GOVERNMENT



# SOIL TYPES AND LAND SUITABILITY FOR COFFEE IN THE NORTHERN REGION OF MALAWI.

REPORT No. 20.

AGRO-ECONOMIC SURVEY

Report no. 20

SOIL TYPES AND LAND SUITABILITY FOR  
COFFEE IN THE NORTHERN REGION OF MALAWI


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Explanation of symbols used in  
profile descriptions

no	sample code
depth	depth in cm
 S	% <u>silt</u> of mineral matter
Cl	% clay of mineral matter
O.M.	% organic matter
N	% nitrogen
C/N	carbon - nitrogen ratio
Na	exchangeable sodium (Me%)
K	id potassium
Mg	id magnesium
Ca	id calcium
cec	cation exchange capacity (me/100g soil)
teb	total exchangeable bases (me%)
b.s.	base saturation
pH	pH(H <sub>2</sub> O)

The percentage organic matter of a few profiles was not established.

FAO (1988): Humic Nitisol

LREP

dystic-ferralic (r)

33

Profile number: P1  
 Soil name: Humic Nitisol, phase clay (Nh1)  
 Date of examination: 12-6-1975  
 Location: Misuku, Agricultural Training Centre, grid point WE 582/315  
 Altitude: 485 ft  
 Land form: top convex slope; hilly country  
 Slope: 4%  
 Land use: fallow  
 Parent material: Basement Complex rocks (Misuku Series)  
 Drainage: well drained  
 Moisture conditions: moist  
 Depth of groundwater table: more than 3m  
 Evidence of erosion: none  
 Human influence: tillage

Profile description:

Ap 0- 27 cm Clay loam; 5YR3/4; common medium distinct mottles, 2,5YR4/6 (parts of underlying horizon); weak fine angular blocky; friable; common very fine and few fine pores; common very fine and fine roots; abrupt smooth boundary; pH 5.4; sample V1101 (5-20 cm).

Bt1 27- 73 cm Clay; 2,5YR4/6; moderate fine angular blocky; friable; moderately thick patchy cutans; common very fine, few fine and medium pores; few fine and very fine roots; diffuse smooth boundary; pH 5.6 (upper) - 5.2 (lower); samples V1102 (30-40 cm) and V1103 (60-70 cm).

Bt2 73-170 cm Clay; 2,5YR4/6; moderate fine - medium angular blocky; firm; moderately thick broken cutans; some unweathered stones (less than 1%); very few fine and very fine roots; pH 5.3; sample V1104 (110-120 cm).

-----  
 -280 cm Clay; 2,5YR4/6; some unweathered stones (less than 20%); pH 5.4; sample V1105 (240-270 cm).

no	depth	Silt	Cl	O.M.	N	C/N	Na
V1101	5- 20	23	39	6.43	.33	11	.45
1102	30- 40	29	47	2.43	.13	9	.06
1103	60- 70	39	57	1.66	.09	11	.18
1104	110-120	27	63	.76	.04	11	.06
1105	240-270	33	47	.34	.02	10	.06

no	K	Mg	Ca	cec	teb	b.s.	CEC (clay)
V1101	.18	.30	.60	4.61	1.53	33%	12
1102	.12	.46	1.45	4.61	2.09	45	10
1103	.12	.35	.60	2.89	1.25	43	5
1104	.06	.26	.60	1.50	1.08	74	2

FAO (1988)

LREP.

Humic Nitisol.

dystic - ferralic (F)

34

Profile number: P2  
 Soil name: Humic Nitisol, phase clay (Nh1.)  
 Date of examination: 21-6-1975  
 Location: Makeye, grid point WE 613/306  
 Altitude: 4700 ft  
 Land form: top convex slope; steeply dissected country  
 Slope: 6%  
 Land use: coffee and bananas  
 Parent material: Basement Complex Rocks (Misuku Series)  
 Drainage: well drained  
 Moisture conditions: dry  
 Depth of groundwater table: more than 2m  
 Evidence of erosion: none  
 Human influence: tillage

Profile description:

- Ap 0- 20 cm Sandy loam; 5YR3/4; structureless (loose); soft; common very fine, few fine and medium pores; common fine and very fine, few medium and very few coarse roots; abrupt smooth boundary; pH 5.4; sample V1371 (0-20 cm).
- EB 20- 60 cm Clay; 5YR4/6; moderate fine - medium subangular blocky; soft; common very fine, few fine and medium pores; common fine and very fine, few medium and very few coarse roots; gradual wavy boundary; pH 5.4; sample V1372 (30-40 cm).
- Bt1 60- 70 cm Clay; 2,5YR3/6; moderate medium angular blocky; slightly hard; thin broken cutans; few very fine and fine, very few medium and coarse roots; clear - gradual wavy boundary; pH 5.0; sample V1373 (60-70 cm).
- Bt2 70-160 cm Clay; 2,5YR/4/6; moderate fine - medium prismatic; (slightly) hard; thick continuous cutans; few very fine, medium and coarse roots; pH 4.6 (upper) - 4.9 (lower); samples V1374 (90-100 cm) and V1375 (150-160 cm).

no	depth	S	Cl	O.M.	N	C/N	Na
V1371	0- 20	21	15	6.78	.41	10	.12
1372	30- 40	19	49	3.00	.19	9	.15
1373	60- 70	21	49	2.28	.14	9	.06
1374	90-100	21	59	1.07	.06	10	.06
1375	150-160	19	63	.45	.04	7	.09

no	K	Mg	Ca	cec	teb	b.s.	EC (clay)
V1371	.29	.43	1.00	8.20	1.84	22%	54
1372	.23	.38	1.20	7.96	1.96	25	16
1373	.18	.49	1.10	7.63	1.83	24	16
1374	.12	.43	2.80	7.85	3.41	43	13

FAO 1988 Eutric Regosol

LREP: eutric - ferralic

35

Profile number: P3  
Soil name: Eutric Fluvisol, phase 1 (well drained) (Je1.)  
Date of examination: 16-4-1975  
Location: coffee garden Mr. Simone Munthali, SSE of  
Khanga, grid point XC 234/821  
Altitude: 4800 ft  
Land form: lower concave slope; hilly country; poorly  
terraced  
Slope: 7%  
Land use: coffee (mature)

Parent material: colluviums of different ages  
Drainage: well drained  
Moisture conditions: moist  
Depth of groundwater table: more than 2.5m  
Evidence of erosion: none  
Human influence: tillage; some terracing

Profile description:

- Ap1 0- 8 cm Sandy clay loam; 7,5YR3/2; weak fine  
crumb; friable; common very fine, few  
medium and fine pores; common fine and  
very fine roots; abrupt smooth bound-  
ary; pH 6.5
- Ap2 8- 20 cm Sandy clay loam; 7,5YR3/2; weak very  
fine crumb; very friable; pores, roots  
id Ap1; abrupt irregular boundary;  
pH 6.5; sample V61 (0-20 cm).
- C 20- 45 cm Sandy clay loam/sandy clay; 5YR3/4; weak  
fine (sub-) angular blocky; friable;  
few fine fine and medium, common very  
fine pores; common (very) fine roots;  
very few unweathered stones; clear  
broken boundary; pH 6.1; sample V62  
(30-40 cm).
- Ab 45- 54 cm Sandy clay; 7,5Yr3/2; weak fine (sub-)  
angular blocky; friable; common very  
fine, few fine and medium roots; clear  
broken boundary; pH 5.9; sample V63  
(45-54 cm).
- Bt,b 54-105 cm Sandy clay; 5YR3/4; weak medium sub-  
angular blocky; friable; thin patchy  
cutans; few fine and medium pores; very  
few unweathered stones; abrupt broken  
boundary; pH 5.8; sample V64 (70-80 cm).
- Eb 105-120 cm Sandy clay loam/sandy clay; 5YR4/4; weak  
fine subangular blocky; thin patchy  
cutans; abrupt broken boundary; pH 6.4;  
sample V65 (105-120 cm).
- Bt:b 120-150 cm Caly; 5YR4/8; weak fine subangular  
blocky; friable; pH 6.2; sample V66  
(140-150 cm).
- 
- 210-250 cm Clay; 7,5YR5/6; pH 6.1; sample V67

Profile number 3 (continued)

no	depth	S	Cl	O.M.	N	C/N	Na
V61	0- 20	12	31	*	.14	*	.12
62	30- 40	12	35		.11		.12
63	45- 55	12	36		.12		.12
64	70- 80	10	45		.09		.12
65	105-120	15	35		.06		.15
66	140-150	15	45		.04		.06
67	230-240	13	49		.03		.06

no	K	Mg	Ca	cec	teb	b.s.	<i>CEC (clay)</i>
V61	.61	.80	6.10	8.07	* 7.63	95%	26
62	.44	.80	2.90	5.78	4.26	74	17
63	.47	1.25	5.70	8.94	7.54	84	25
64	.38	.20	1.50	2.80	2.20	79	6
65	.26	1.10	2.80	4.67	4.31	92	13
66	.15	.70	2.40	3.91	3.31	84	
67	.12	1.50	1.80	3.54	3.48	98	

\*not estimated

FAO (1988) Dystric Regosol

LREP: (gleyic) or dystric-ferralic

37

Profile number P4  
 Soil name: Dystric Fluvisol (imperfectly drained) (Jd2.)  
 Location: two miles E of Usowoya school, grid point XC  
 225/879  
 Altitude: 5100 ft  
 Land form: lower concave slope; hilly country  
 Slope: 7%  
 Land use: grazing; vegetation: open woodland  
 Parent material: colluvium  
 Drainage: imperfectly drained  
 Moisture conditions: moist (0-55 cm); wet (+55 cm)  
 Depth of groundwater table: 0.8m  
 Evidence of erosion: none  
 Human influence: -

Profile description:

- Au1 0-7 cm Sandy clay; 7,5YR3/2; moderate coarse crumb; very friable; common fine and very fine pores; few medium pores; frequent fine and very fine, common medium and coarse roots; abrupt smooth boundary; pH 5.8; sample V281 (0-7 cm).
- Au2 7-20 cm Sandy clay; 5YR3/4; moderate coarse crumb; very friable; common fine and very fine, few medium pores; common very fine, fine, medium and coarse roots; clear smooth boundary; pH 5.5; sample V282 (7-20 cm).
- C 20-55 cm Sandy clay loam; 5YR4/6; weak medium angular blocky; friable; few medium pores; common very fine, fine, medium and coarse roots; clear smooth boundary; pH 5.5; sample V283 (30-40 cm).
- Cg 55-75 cm Sandy clay (loam); 5Y5/2; many fine prominent mottles (5YR4/6); weak medium angular blocky; slightly plastic; few fine and coarse roots; clear smooth boundary.
- Cr 75-80 cm Sandy clay (loam); 5Y5/2; slightly plastic.

no	depth	S	Cl	O.M.	N	C/N	Na
V281	0-7	19	37	6.71	.27	14	.12
282	7-20	17	39	5.72	.20	17	.06
283	20-40	21	25	4.33	.14	18	.06

no	K	Mg	Ca	cec	teb	V	CEC (clay)
V281	.64	3.12	4.00	9.68	7.88	81%	26
282	.29	.79	.40	4.34	1.54	35	11
283	.15	.59	.20	3.56	1.00	28	14



FAO (1988): Haplic Phaeozem.  
 LREP: eutric-ferralic (x)

38

Profile number: P5  
 Soil name: Eutric Fluvisol, phase 1 (well drained) (Je1.)  
 Date of examination: 16-5-1975  
 Location: coffee garden 1.5 mile NE of Uzumara, grid point XC 218/958  
 Altitude: 5000 ft  
 Land form: lower concave slope, hilly country  
 Slope: 10%  
 Land use: coffee (mature)

Parent material: colluvium  
 Drainage: well drained  
 Moisture conditions: moist  
 Depth of groundwater table: more than 3m  
 Evidence of erosion: none  
 Human influence: tillage, mulching

Profile description:

Ap 0- 27 cm Clay; 5YR2/2; strong fine crumb; very friable; many fine and very fine, few medium pores; common fine and very fine, few medium roots; clear wavy boundary; pH 6.4; sample V561 (10-20 cm).

C 27- 60 cm Clay; 5YR3/3; moderate fine - medium subangular blocky; firm; common fine and very fine, few medium pores; some very fine gravel; few fine and very fine, very few medium roots; gradual smooth boundary; pH 6.1; sample V562 (40-50 cm).

2C 60-145 cm Clay; 5YR4/6; weak medium subangular blocky; firm; some very fine gravel; pH 6.2; samples V563 (70-80 cm) and V564 (11-120 cm).

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 200-280 cm Clay; 5YR4/8; some very fine gravel; pH 6.0; sample V565 (220-235 cm).

no	depth	S	Cl	O.m.	N	C/N	Na
V561	10- 20	19	45	6.78	.26	15	.18
562	40- 50	19	49	4.05	.15	16	.09
563	70- 80	21	55	1.66	.09	11	.09
564	110-120	17	65	1.10	.05	13	.06
565	220-235	15	51	.62	.04	9	.06

no	K	Mg	Ca	cec	teb	b.s.
V561	.87	2.82	9.30	14.69	13.17	90%
562	.64	1.22	3.60	7.19	5.65	77
563	.47	1.25	2.40	4.45	4.21	95
564	.23	1.25	2.80	4.70	4.34	92
565	.18	1.48	2.10	1.18	1.10	00

CEC  
 clay  
 (33)  
 15  
 8  
 7  
 10

FAO (1988) : Rhodic Ferralsole

LREP: eutric-ferralic (\*)

39

Profile number: P6  
Soil name: Eutric Nitosol; phase: sandy clay  
Date of examination: 14-4-1975  
Location: Chinyalu, two miles NE of Mphompha, along  
Khanga road XC 203/846  
Altitude: 5150 ft  
Land form: plateau; undulating  
Slope: 3%  
Vegetation: tree/shrub savanna  
Parent material: Basement Complex rocks  
Drainage: well drained  
Moisture conditions: moist  
Depth of groundwater table: more than 2m  
Evidence of erosion: none  
Human influence: grazing

Profile description:

A 0- 30 cm Sandy loam; 2,5YR3/4; moderate coarse  
crumb; friable; few very fine pores; abun-  
dant fine and very fine roots; clear  
smooth boundary; pH 5.4; sample V21 (10-  
20 cm).

AB 30- 40 cm Sandy clay loam; 2,5YR3/6; moderate  
coarse crumb; friable; few very fine  
pores; common fine and very fine roots;  
clear smooth boundary; pH 5.5; sample V22  
(30-40 cm).

Bt 40-120 cm Sandy clay; 2,5YR3/6; structureless, mas-  
sive; friable - firm; few very fine pores;  
few very fine roots; pH 5.9 (upper - 6.8  
(lower); samples V23 (50-60 cm) and V24  
(90-100 cm).

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120-200 cm Sandy clay; 2,5YR3/6; pH 6.0; sample V25  
(180-200 cm).

no.	depth	S	Cl	N	Na
V21	10- 20	8	19	.06	.06
22	30- 40	7	31	.05	.06
23	50- 60	7	41	.03	.06
24	90-100	7	39	.03	.09
25	180-200	5	49	.02	.06

no	K	Mg	Ca	cec	teb	b.s.	CEC (clay)
V21	.12	.30	.80	1.72	1.28	74%	9
22	.12	.20	.20	1.02	.58	57	3
23	.12	.20	.20	1.22	.58	48	3
24	.99	.10	.30	1.48	1.48	100	4
25	.09	.23	.60	1.34	.98	73	3

FAO (1988) / Haplic Ferralsol or Haplic Lixisol

LREP : eutric-ferralic (x)  
40

Profile number: P7

Soil name: Rhodic Luvisol; phase: sandy clay

Date of examination: 15-4-1975

Location: two miles WSW of Mphompha, grid point XC 137/814

Altitude: 4600 ft

Land form: top convex slope, undulating country, ant-hills

Slope: 3%

Vegetation: shrub woodland

Parent material:

Drainage: well drained

Moisture conditions: moist

Depth of groundwater table: more than 2m

Evidence of erosion: none

Human influence: wood cutting

Profile description:

- A 0- 12 cm Sandy clay loam; 7,5YR4/2; weak fine sub-angular blocky; firm; common very fine pores; common very fine, few fine and medium and very few coarse roots; abrupt smooth boundary; pH 6.2; sample V41 (5-10 cm).
- E 12- 23 cm Sandy clay loam; 5YR3/4; weak fine sub-angular blocky; firm; few medium pores; fine gravel (primary minerals); common very fine, few fine and medium and very few coarse roots; clear smooth boundary; pH 6.2; sample V42 (10-20 cm).
- Bt 23-110 cm Sandy clay; 5YR4/8 or 2,5YR3/6; structureless, massive; friable; continuous thin cutans; common very fine pores; fine gravel (primary minerals); few fine and very fine, very few medium and coarse roots; diffuse broken boundary; pH 6.7; sample V43 (50-60 cm).
- BC 110-130 cm Sandy clay loam; 7,5YR4/4; structureless, massive; very friable; fine gravel (primary minerals); few very fine roots; pH 6.4; sample V44 (110-130 cm).
- 
- 180 cm Sandy loam; 7,5YR5/6; pH 6.4; sample V45 (160-180 cm).

no	depth	S	Cl	N	Na
V41	5- 10	9	21	.08	.06
42	10- 20	9	30	.06	.12
43	50- 60	9	39	.04	.06
44	110-130	6	25	.02	.06
45	160-180	11	17	.01	.09

no	K	Mg	Ca	cec	teb	b.s.
V41	.81	.90	2.10	4.11	3.87	94%
42	1.05	.60	1.90	4.02	2.67	01

FAO (1938): Rhodic Ferralsol

LREP: eutric-ferralic (x)

41

Profile number: P8

Soil name: Eutric Nitosol; phase clay, with characteristics of phase sandy clay

Date of examination: 29-4-1975

Location: 100m N of Usowoya school, grid point XC 200/875

Altitude: 5000 ft

Land form: top convex slope, rolling country

Slope: 4%

Land use/vegetation: tree/shrub savanna

Parent material: Basement Complex rocks

Drainage: well drained

Moisture condition: moist

Depth of groundwater table: more than 2,5m

Evidence of erosion: none

Human influence: grazing

Profile description:

- Au1 0- 4 cm Sandy clay loam; 5YR3/4; moderate medium crumb; firm; few fine and medium pores; frequent very fine and very few coarse roots; abrupt smooth boundary; pH 5.5
- Au2 4- 12 cm Sandy clay loam; 2,5YR4/4; moderate medium crumb; friable; few fine and medium pores; frequent very fine and very few coarse roots; clear smooth boundary; pH 5.5; sample V261 (0-12 cm).
- E 12- 26 cm Clay; 2,5YR3/6; moderate medium crumb; friable; few fine and medium pores; frequent very fine and very few coarse roots; clear smooth boundary; pH 5.4; sample V262 (15-25 cm).
- Bt 26-150 cm Clay; 2,5YR3/6 or 10R3/6; weak fine angular blocky; (very) friable; thin patchy cutans; very few fine and medium pores; some small quartz stones at a depth of 90 cm; very few veryfine and coarse roots; pH 5.8; samples V263 (60-70 cm) and V264 (120-130 cm).

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-250 cm Clay; 2,5YR4/6; pH 5.8; sample V265 (210-240 cm).

no	depth	S	Cl	O.M.	N	C/N	Na
V261	0- 12	15	31	3.64	.16	13	.06
262	15- 25	11	49	2.36	.10	14	.06
263	60- 70	9	59	.69	.03	13	.06
264	120-130	11	57	.31	.03	6	.06
265	210-240	11	57	.10	.06	6	.06

no	K	Mg	Ca	cec	teb	b.s.
V261	.38	1.38	1.60	4.82	3.42	71%
262	.18	.36	1.00	2.88	1.60	56
263	.10	.20	.50	1.50	.80	40

FAO (1988): Rhodic Nitisol or. Haplic Nitisol.

LRFP eutric ferralsol (X)  
42

Profile number: P9  
Soil name: Eutric Nitisol; phase: clay  
Date of examination: 14-4-1975  
Location: coffee garden Mr. Nerson Mohango, Sinowa Village, one mile S of Mphompha; XC 170/817  
Altitude: 5200 ft  
Land form: upper convex slope; rolling  
Slope: 7%  
Land-use: coffee (mature)

Parent material: Basement Complex rocks  
Drainage: well drained  
Moisture conditions: moist  
Depth of groundwater table: more than 3m  
Evidence of erosion: none  
Human influence: tillage

Profile Description:

- Ap 0- 15 cm Sandy clay; 5YR3/4; weak fine subangular blocky; friable; common fine and very fine pores; few fine and very fine roots; clear wavy boundary; pH 6.1; sample V11
- A 15- 35 cm Sandy clay; 2,5YR3/6; weak fine subangular blocky; friable; few fine and very fine pores; few fine roots; gradual wavy boundary; pH 6.0; sample V12 (20-25cm).
- Bt 35-150 cm Clay; 2,5YR3/6; moderate medium angular blocky; firm; continuous thin cutans; few very fine pores; few very fine roots; pH 6.7 (upper) - 5.7 (lower); sample V13 (50-60 cm) and V14 (90-110 cm).

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+200 cm Sandy clay - clay loam; 5YR4/8; pH 7.0; sample V15 (220-260 cm).

no	depth	S	Cl	N	Na
V11	10- 15	5	45	.15	.12
12	20- 25	5	44	.13	.09
13	50- 60	14	49	.06	.06
14	90-110	13	53	.04	.09
15	220-260	16	37	.03	.09

no	K	Mg	Ca	cec	teb	b.s.	CEC (clay)
V11	1.05	1.8	5.1	8.51	8.07	95%	19
12	.55	.9	3.0	4.78	4.54	95	11
13	.41	.7	2.6	4.07	3.71	91	8
14	.64	1.4	3.0	5.36	5.12	96	10
15	1.02	.8	2.2	4.11	4.11	100	11

FAO (1988) Rhodic Ferralsol

LREP: eutric-ferralic (x)

43

Profile number: P10

Soil name: Eutric Nitosol; phase: clay/heavy clay

Date of examination: 15-4-1975

Location: along Rumphii road, one mile W of Mphompha; grid point XC 150/826

Altitude: 4950 ft

Land form: plateau, almost flat

Slope: 1%

Vegetation: shrub savanna

Parent material: Basement Complex rocks

Drainage: well drained

Moisture conditions: moist

Depth of groundwater table: more than 3m

Evidence of erosion: none

Human influence: grazing

Profile description:

- A 0- 5 cm Sandy clay; 5YR3/3; moderate medium crumb; friable; common fine pores; abundant fine and very fine roots; abrupt wavy boundary; pH 6.3; sample V31 (0-5 cm).
- E 5- 20 cm Sandy clay loam; 2,5YR3/4; weak fine angular blocky; friable; few fine pores; frequent fine and very fine roots, very few coarse roots; clear irregular boundary; pH 6.4; sample V32 (5-20 cm).
- Bt1 20- 40 cm Clay; 2,5YR3/5; weak fine angular blocky; friable; thin patchy cutans; few fine pores; common very fine and few coarse roots; clear broken boundary; pH 6.4; sample V33 (20-40 cm).
- Bt2 40-150 cm Clay; 2,5YR3/6; weak fine angular blocky; friable; thin patchy cutans; few fine pores; isolated parts of weathered rock in lower horizon; few fine and very fine roots, few coarse roots; pH 6.6; samples V34 (65-75 cm) and V35 (120-130 cm).

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-270 cm Clay; 2,5YR3/6; pH 6.5; sample V36 (240-260 cm).

no	depth	S	Cl	N	Na		
V31	0- 5	12	39	.07	.09		
32	5- 20	11	33	.17	.09		
33	20- 40	11	63	.10	.12		
34	65- 75	13	65	.05	.15		
35	120-130	7	75	.06	.09		
36	240-260	12	67	.06	.06		

no	K	Mg	Ca	cec	teb	b.s.
V31	.76	1.00	6.30	8.79	8.15	93%
32	.52	.70	4.20	6.59	5.51	84
33	.17	.60	2.10	1.10	2.50	22

FAO: *Haplic Lixisol*

LAEP: *eutric-ferralic* (x)

44

Profile number: P11

Soil name: eutric Nitosol; phase: clay

Date of examination: 30-4-1975

Location: coffee garden Mr. Jofrey Nyasulu, Gadi, grid point XC 188/856

Altitude: 5150 ft

Land form: middle convex slope, rolling country

Slope: 7%

Land use: coffee(mature)

Parent material: Basement Complex rocks

Drainage: well drained

Moisture: moist

Depth of groundwater table: more than 3m

Evidence of erosion: none

Human influence: tillage

Profile description:

- Ap 0- 14 cm Clay; 5YR3/4; moderate medium crumb; very friable; common fine and very fine, few medium pores; common very fine, few fine and very few medium roots; abrupt smooth boundary; pH 5.4; sample V271 (0-14 cm).
- E 14- 22 cm Clay; 5YR4/6; weak fine angular blocky; friable; few very fine, fine and medium pores; few very fine and very few fine roots; clear smooth boundary; pH 5.4; sample V272 (15-20 cm).
- BE 22- 45 cm Clay; 5YR4/6; weak fine angular blocky; friable; few very fine, fine and medium pores; very few very fine roots; gradual smooth boundary; pH 5.3; sample V273 (25-40 cm).
- Bt 25-150 cm Clay; 2,5YR4/6; weak medium angular blocky; friable; thin patchy cutans; few medium pores; isolated rounded stone (several dm's); very few fine and very fine roots; pH 5.4-5.5; samples V274 (60-70 cm) and V275 (110-130 cm).

230-270 cm Sandy clay loam; 7,5YR5/6; pH 5.9; sample V276 (240-250 cm).

no	depth	S	Cl	O.M.	N	C/N	Na
V271	0- 14	19	41	4.34	.14	18	.12
272	15- 20	17	55	3.17	.12	15	.09
273	25- 40	17	61	2.09	.08	15	.12
274	60- 70	15	67	1.12	.05	13	.09
275	110-130	15	61	.59	.03	11	.06
276	240-250	21	21	.21	.02	6	.09

no	K	Mg	Ca	cec	teb	b.s.
V271	.96	1.68	3.70	7.98	6.46	81
272	.47	1.28	3.40	6.76	5.24	78
273	.29	.94	1.90	4.45	3.25	73

FAO (1988): Rhodic Nitisol or Haplic Lixisol

LREP: eutric - ferralic  
45

Profile number: P12  
 Soil name: Eutric Nitisol; phase: clay  
 Date of examination: 16-5-1975  
 Location: coffee garden Mr. Hiskiah Mzumara, Uzumara village, grid point XC 208/952  
 Altitude: 5000 ft  
 Land form: top convex slope, rolling country  
 Slope: 6%  
 Land use: coffee (mature)  
 Parent material: Basement Complex rocks  
 Drainage: well drained  
 Moisture conditions: moist  
 Depth of groundwater table: more than 3m  
 Evidence of erosion: none  
 Human influence: tillage, mulching

Profile description:

Ap 0- 15 cm Sandy clay; 5YR3/3; moderate fine sub-angular blocky; friable; common fine and very fine, few medium pores; fine gravel; common fine and very fine, few medium and very few coarse roots; clear wavy boundary; pH 6.1; sample V551 (0-15 cm).

A 15- 27 cm Sandy clay; 5YR4/3; weak fine sub-angular blocky; friable; common fine and very fine, few medium pores; fine gravel; common fine and very fine, few medium and very few coarse roots; abrupt broken boundary; pH 5.8; sample V552 (15-27 cm).

E 27- 38 cm Sandy clay/clay loam; 2,5YR4/4; common coarse distinct mottles, 5YR4/3 (activity of organism); weak fine sub-angular blocky; few very fine, fine and medium pores; fine gravel; very few fine roots; clear wavy boundary; pH 5.6; sample V553 (27-38 cm).

Bt 38-155 cm Clay; 2,5YR4/6 or 10R4/6; common coarse distinct mottles, 5YR4/3 (activity of organisms); moderate fine - medium prismatic; fine gravel; friable; moderately thick broken cutans; few medium pores; weathered stones; pH 5.0; samples V554 (50-60 cm) and V555 (120-130 cm).

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 -290 cm Sandy clay loam; 10R4/8; fine gravel; sample V556 (230-260 cm).

no	depth	S	Cl	O.m.	%N	C/N	Na
V551	0- 15	19	37	5.95	.26	13	.09
552	15- 27	13	39	3.81	.13	17	.06
553	27- 38	17	39	1.66	.07	14	.12
554	50- 60	17	57	.90	.05	10	.06
555	120-130	21	57	.55	.03	11	.09
556	230-260	15	27	.10	.01	6	.06



## Profile number P12 (continued)

no	K	Mg	Ca	cec	teb	b.s.
V551	.44	1.91	5.60	9.12	8.04	88%
552	.12	1.48	2.30	4.88	3.96	81
553	.12	1.13	1.40	3.37	2.77	82
554	.18	.77	.80	2.53	1.81	72
555	.23	.33	.60	1.85	1.25	68
556	.26	.33	.40	1.65	1.05	64

LREP: eutric - ferralic. (x)

FAO (1988) Rhodic Ferralsol.

47

Profile number P13

Soil name: Eutric Nitosol; phase: heavy clay

Date of examination: 15-5-1975

location: Usowoya/Uzumara road, one mile ESE of Sasi,  
grid point XC 185/925

Altitude: 4950 ft

Land form: top convex slope, undulating country, ant-hills

Slope: 2%

Vegetation: shrub woodland

Parent material: Basement Complex rocks

Drainage: well drained

Moisture conditions: moist

Depth of groundwater table: more than 3m

Evidence of erosion: none

Human influence: cutting

Profile description:

Au1 0- 2 cm Sandy clay; 5YR3/4; moderate medium crumb; friable; many fine and very fine, few medium and coarse pores; abundant very fine, frequent fine roots; abrupt smooth boundary; pH 5.9; sample V541 (0-2 cm).

Au2 2- 12 cm Clay; 2,5YR3/6; weak fine angular blocky; firm; common fine and very fine, few medium and coarse pores; frequent fine and very fine, very few medium roots; clear smooth boundary; pH 6.0; sample V542 (2-12 cm).

Bt1 12- 90 cm Clay; 2,5YR4/6; weak fine angular blocky; (very) firm; moderately thick broken cutans; few fine and very fine, very few medium and coarse pores; termite activity (holes with diameter of several dm's); few fine and very fine, very few medium and coarse roots; gradual irregular boundary; pH 6.1; sample V543 (50-60 cm).

Bt2 90-150 cm Clay; 2,5YR4/6; weak fine subangular blocky; very friable (termite activity?); few fine and very fine pores; some quartz stones at 150 cm; pH 6.2; sample V544 (120-130 cm).

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-230 cm Clay; 2,5YR4/6; pH 6.1; sample V545 (200-210 cm).

230-290 cm Clay loam; 5YR5/8; pH 5.9; sample V546 (270-280 cm); some weathered stones (290 cm).

no	depth	Silt	Cl	O.m.	N	C/N	Na
V541	0- 2	15	39	5.55	.18	18	.06
542	2- 12	31	55	1.81	.08	13	.06
543	50- 60	9	71	.69	.03	13	.12
544	120-130	7	71	.14	.02	4	.06
545	200-210	17	57	.14	.01	8	.06
546	270-280	23	39	.07	.01	4	.06

## Profile number P13 (continued)

no	K	Mg	Ca	cec	teb	b.s.
V541	.76	2.33	2.20	6.99	5.35	77
542	.70	1.48	1.00	3.88	3.24	84
543	.76	1.25	.60	2.93	2.73	93
544	.55	.31	1.60	3.38	3.02	89
545	.52	.66	.60	1.90	1.84	97
546	.52	.39	.40	1.73	1.37	79

FAO (1988): Haplic Lixisol

LREP: entic-feralic.

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Profile number: P14  
Soil name: Orthic Ferralsol  
Date of examination: 22-5-1975  
Location: Chipunga, Malaŵi Young Pioneers, grid point  
XC 235/450  
Altitude: 4200 ft  
Land form: upper convex slope, hilly country  
Slope: 7%  
Land use: recent clearing

Parent material: Basement Complex rocks  
Drainage: well drained  
Moisture conditions: moist  
Depth of groundwater table: more than 2m  
Evidence of erosion: thin topsoil  
Human influence: clearing

Profile description:

Au1 0- 2 cm Sandy clay loam; 10YR3/4; moderate medium crumb; very friable; common very fine, few fine and medium pores; frequent very fine, common fine roots; abrupt smooth boundary; pH 6.2

Au2 2- 6 cm Sandy clay loam; 5YR3/4; weak medium crumb; very friable; common very fine and few fine + medium pores; common very fine, few fine, very few coarse roots; clear irregular boundary; pH 6.2; sample V641 (0-6 cm).

B 6-170 cm Sandy clay; 5YR4/6; weak fine prismatic; (very) friable; common very fine and few fine pores; few very fine, very fine, very few fine, medium and coarse roots; pH 5.9; samples V642 (20-40 cm), V643 (80-90 cm) and V644 (150-160 cm).

no	depth	S	Cl	O.m.	N	C/N	Na
V641	0- 6	13	23	2.71	.11	14	.06
642	20- 40	13	37	.86	.05	10	.03
643	80- 90	13	39	.38	.03	7	.06
644	150-160	15	37	.28	.02	8	.06

no	K	Mg	Ca	cec	teb	b.s.
V641	.70	1.55	1.00	3.91	3.31	85%
642	.29	.85	7.60	9.13	8.77	96
643	.23	.69	.60	1.64	1.58	96
644	.29	.90	.30	1.91	1.55	81