

APPENDIX I - Soil Analytical Methods.

All results have been expressed in terms of the oven-dry soil passing a 2 mm. sieve, except that of gravel, which is shown as a percentage of the air-dry field sample.

Electrical conductivity (E.C. 20°C.). A 1:5 soil-water suspension was shaken for 1 hour at 20°C., and the conductivity determined with a "Philips" conductivity bridge and dip cell.

Soil reaction (pH). This was determined on the above suspension, with a "Jones" glass electrode pH meter.

Chloride ion (Cl). The electrometric silver nitrate titration method of R. J. Best was used, as described by Piper (1942).

Particle size analysis. Where necessary samples were pre-treated to remove carbonates and organic matter by the methods described by Piper (1942). A hydrometer was used to determine silt and clay percentages, and hand decantation and sieving for the separation of coarse and fine sands.

Calcium carbonate (CaCO₃) This was calculated from the carbonate content, as determined by the rapid titration method described by Piper (1942).

Organic carbon (Org C). The wet combustion method of Walkley and Black, as described by Piper (1942) was used. No "recovery factor" has been applied to these results.

Total nitrogen (N). A semi-micro Kjeldahl technique described by Metson (1956) was used. In this method 0.2-0.5 g. of finely ground soil is digested with sulphuric acid, and the ammonia is titrated with standard acid after recovery by distillation in a Markham still.

Hydrochloric acid extract The extract was prepared by boiling 4 g. soil with 20 ml. concentrated hydrochloric acid with refluxing for 4 hours, with subsequent filtration and dilution to 200 ml. Phosphorus was determined in an aliquot of this extract using a modification of the Berenblum. and Chain colorimetric procedure (Hutton, unpublished data), and potassium was determined in another portion of extract by means of a "Lange" flame photometer.

Exchangeable cations Exchangeable cations and exchange capacity (pH = 7) were determined by the centrifuge method described by the United States Department of Agriculture (1954), with normal ammonium chloride (pH = 7.0) as leaching solution for the exchangeable cations in the non-calcareous samples, and alcoholic ammonium chloride (pH = 8.5) for the calcareous samples (Tucker 1954). Exchange capacity at pH 7 was determined by leaching in turn with normal sodium chloride (pH = 7.0), 60 per cent ethanol, and normal ammonium chloride (pH = 7.0), taking the concentration of sodium in the last leachate as a measure of the exchange capacity.

Where necessary, the leachates were evaporated to dryness to remove alcohol and excess ammonia, and re-dissolved in distilled water before estimation of potassium and sodium by flame photometry. Calcium and magnesium were determined by titration with E.D.T.A. (diamino-ethane-tetra-acetic acid, disodium salt) the indicator for calcium + magnesium being Eriochrome Black T, and that for calcium, Murexide.

APPENDIX II - Land-Use Classes.

Forms of land use required to bring land to, or maintain it in its most productive state. (Classification is according to the known potential of the land under average management.)

Class.

1. Land suitable for cropping without the need for erosion control measures.
2. Land suitable for cropping but in need of erosion control measures-
 - (a) no mechanical works are needed, but broad rotations (e.g., pasture for at least 3 years out of 5) and/or special cultivation practices (e.g., stubble mulch) are required;
 - (b) in need of the use of the contour principle, namely, contour cultivation alone or together with closed banks or graded banks and waterways.
3. Land suitable for grazing without the need for erosion control measures.
4. Land suitable for grazing but in need of erosion control measures-
 - (a) can be ploughed for pasture improvement and can be contour banked, furrowed or ripped; cannot be ploughed but can be surfaced worked for pasture improvement and can be contour furrowed or ripped.
5. Land suitable for strictly controlled grazing where no mechanical erosion control measures can be undertaken and a vegetative cover must be carefully maintained.
6. Land not suitable for agricultural production because of roughness, stoniness, wetness, dryness, infertility or extreme erosion hazard.

Morphological Group	Lab Sample No.	Depth in	Field Texture	pH	Elec Cond µmho/cm	Cl %	Mechanical Analysis						Total Org C %	Total N %	Total P %	Total K %	Exchangeable Cations m.e. %						Percentage Total Metal Ions					
							Gravel p.c. of field sample %	Coarse Sand %	Fine Sand %	Silt %	Clay %	Fine Earth CaCO ₃ %					Ca	Mg	K	Na	Total metal cats.	Total exch. Cap.	Ca	Mg	K	Na		
Group B Sandy	56/100	0-1.5	SL	7.8	91	-	-	40	37	6	17	-	0.60				9.7	2.2	0.8	0.1	12.8	14.8	76	17	6	1		
	101	1.5-3	SL	7.9	32	0.001	-	46	38	2	11	2	0.55	0.046	0.007	0.26	7.6	1.0	0.4	0.2	9.2	11.2	83	11	4	2		
	102	3-5	SL	8.2	34	-	-	45	40	0.7	11	2	0.50	0.041	0.006	0.24												
	103	5-6	S	8.4	58	0.001																						
	104	6-12	SC	9.4	310	0.023	-	38	29	2	29	3	0.24				7.9	6.9	1.3	2.6	18.7	18.1	42	37	7	14		
	105	12-18	SC	9.2		0.082																						
	106	18-24	SC	9.6	770	0.090																						
	107	24-36	SC	9.6		0.081							0.07	0.013	0.005	0.49												
	108	36-48	SC	9.7	820	0.075																						
	109	48-60	SC	9.8	900	0.084	5	25	15	0.7	25	36	0.06															
Group C Sandy	56/181	0-1.5	SCL	8.2	150	0.009							1.33	0.178	0.018	0.86												
	182	1.5-4	SCL	8.4	110	0.007	-	29	34	12	20	2	0.55				9.3	2.6	1.6	0.1	13.6	15.8	68	19	12	1		
	183	4-6	C	8.6	84	0.010	-	19	27	11	37	2																
	184	6-12	C	8.8	150	0.009							0.23															
	185	12-18	C	9.4	240																							
	186	18-24	C	9.5	340	0.010	25	13	14	5	47	16					7.9	9.3	1.9	5.7	24.8	25.4	32	38	8	23		
	187	24-40	C	9.8	430	0.021							0.06	0.019	0.009	0.80												
	188	40-48	C	10.1	570	0.024																						
	189	48-60	C	10.0	590	0.036	2	16	21	6	33	20	0.12	0.015	0.007	0.67	1.8	5.9	0.9	9.6	18.2	20.2	10	32	5	53		
Shallow sany	56/396	0-3	SL	8.4	100	2.000	13	60	9	17	-	0.7	0.097				12.0	5.8	1.1	0.2	19.1	22.4	63	30	6	1		

