

ENCLOSURE SYSTEM AT ROUGH CASTLE

MATE

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Munsell colour and sample preparation

G12-14

Excavations of an enclosure system at Rough Castle, Falkirk District, Central Region - I Mate

Munsell Colour and Sample Preparation

A record of the Munsell colour of each sample was made. They were then air-dried and sieved through a 2 mm mesh. Stones and roots were removed. The determinations detailed below were all carried out on air-dried 2 mm soil. Where necessary, allowance was made for moisture content which was determined as the difference in weight of a subsample after oven drying at 100° C for 4 hours.

Hand Texturing

The dried soils were hand textured using Fitzpatrick's method (1977, 21-26).

Charcoal and Ash

The samples' ash and charcoal content were estimated using a x10 microscope. A scale of 1-5 was used, where '1' indicated no charcoal or ash, '5' indicated abundant, rather than 100% charcoal or ash.

pH in Water and CaCl

15g of air-dried soil was placed in a beaker with 45 ml of distilled water, stirred and allowed to stand for 30 mins. The pH was then recorded with a glass electrode. 5 cm³ of 0.1 M CaCl₂ was then added. The mixture was again shaken and allowed to stand for 30 minutes. The pH was then re-recorded as above.

Loss-on-ignition

The soils were ignited for one hour at 850°C in a preheated furnace.

Total Phosphate

Total soil phosphate was determined after the method of Shackley (1975, 69). The samples were ground to a fine powder. The time allowed for initial digestion with sulphuric acid in a water bath was increased to 45 minutes. After cooling, the samples were made up to 100 ml and a 5ml aliquot taken. The aliquot and 20 ml Lorsch's developer were returned to the water bath for 25 minutes. Immediately upon removal the strength of colour was read at 890nm wavelength on an EEL colorimeter. Every sample was spiked with 200 microgramme P because in most samples the content was extremely low and the addition brought the P levels up to the optimum range of sensitivity of the colour meter.

Exchangeable Hydrogen, Aluminium and Total Exchange Acidity

10 g of soil was placed in a funnel fitted with No 2 filter paper, standing in a 100 ml volumetric flask. The soil was leached with 10 ml of 1 M KCl every 14 minutes, until the soil had been leached with 100ml. the solutions were made up to 100 ml with fresh KCl and mixed. 75ml was then piped into a conical flask and a few drops of phenolphthalein were added. 0.1 M NaOH was then titrated into the solution until a permanent pink colour developed. A few drops of 0.05 M HCl were added to make the solution colourless again and then 10 ml of 4% NaF. 0.05 M HCl were then titrated into the solution, which was now bright pink, until a colourless solution was attained which lasted for at least two minutes. The total exchange acidity was calculated from the NaOH titration, the exchangeable aluminium from the HCl titration, and exchangeable hydrogen as the difference between those two results. (Yuan 1959).

Exchangeable Cations (Ca, K, Mg, Na).

5 g of soil was placed in a beaker with 25 ml of 1 M ammonium acetate buffered to pH.7 stirred and left to stand overnight. The mixture was filtered through a No 2 filter paper and the filtrate collected in a 250 ml volumetric

flask. The residue in the beaker was rinsed with 25 ml aliquots of ammonium acetate, and poured through the soil in the funnel, until the sample had been leached with a total of 250 ml. The solutions were then made up to 250 ml with fresh ammonium acetate. The Ca and Mg Content was determined using atomic absorption spectrometry and the Na and K by flame emission spectrometry (MAFF 1981).

Cation Exchange Capacity (CEC)

This was calculated by the addition of the values for exchangeable hydrogen, aluminium, potassium, sodium calcium and magnesium.

Base Saturation (BS%)

Base saturation was calculated as the percent of CEC filled by the basic cations (Ca, Mg, K, Na).

TABLE I

Summary Statistics of the Soil Data

	pH	LOI	P	Exc h	Exc h	Exc h	Exc h	Exc h	Exc h	Exc h	Total	CEC	BS	
	water	CaCl2	w	pp m	H	Al	Acid	Ca	Mg	K	Na	Cations	%	
	miliequivalents per 100 grammes of soil													
N	107	107	106	-10 5	104	104	104	103	103	103	103	103	102	102
Av	4.7	4.0	9	57	9	32	41	33	0.9	0.7	1.8	7	47	15
Std	0.5	0.4	2	80	7	13	18	2.4	1.3	1.1	0.9	5	20	8
Min	3.4	2.8	0.7	1	-1.5	7	7	1	0.1	0.1	0.9	3	10	7
Max	5.7	4.9	74	67 0	33	73	105	23	12	9	7	51	119	52