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Karnataka J. Agric. Sci., 5 (4) : (398 - 401) 1992

Neutralisation of $BaCl_2$ – TEA Extractable Acidity

In the coastal and heavy rainfall areas of Uttar Kannada district of Karnataka State, the soils are acidic and respond well to liming. The rate at which the added liming material reacts with the soil is not established for these soils. The investigation reported here was undertaken to find out the rate of reaction of lime with acid laterite soils of Ankola and Kumata of Uttara Kannada District.

Soils used for the study were base unsaturated lateritic soils. The physico-chemical properties are determined by standard methods and are presented in Table 1. Lime requirement methods followed were Puri's Exchangeable Calcium Method (Puri, 1964), Improved Woodruff Buffer (IWB) Method (Brown and Cisco, 1984), SMP Single Buffer (SMPSB) Method (Mclean *et al.*, 1977), SMP Double Buffer (SMPDB) Method (Mclean *et al.*, 1978). Lime levels were tried at $^1/_2$, 1, 1.5 and 2 times LR along with control I (no lime + no fertilizer) and control II (no lime + recommended dose of fertilizer for groundnut. Ground lime stone with 65% $CaCO_3$ and 2.4% $MgCO_3$ was used as a liming material. Lime was allowed to react with acid soil (10 kg) in a pot at 60 per cent of maximum water holding capacity for three weeks. Soil samples were drawn every week and estimated for $BaCl_2$ – TEA extractable acidity (Black, 1965). The incubation study in pots were laidout in randamised block design, with factorial experiment.

In the study loam soil of Ankola and sandy clay loams soil of Kumta, consequent to the addition of lime, the extractable acidity decreased significantly by the end of first week. (fig. 1 and 2). Maximum neutralisation of soil acidity was observed. when soil was limed as per Improved Woodruff Buffer Method. The order of neutralisation of extractable acidity by different Lime requirement methods was IWB>SMPSB>Puri>SMPDB. This indicates that the neutralisation of soil acidity was in direct proportion to the addition of lime as per different methods.

Decrease in extractable acidity at the first level of lime addition was maximum and is in the order of 15.25 to 10.22 C mol K^{-1} of the sandy loam soil of Ankola, and 15.33 to 11.25 C mol K^{-1} in Kumta sandy clay loam and thereafter reduction was marginal in both the soils. The differences in values of extractable acidity in these two soils can be attributed to higher buffering capacity of Kumta soil as compared to Ankola soil. From the

Table 1. Physico–chemical properties of soils used for the study.

Property	Ankola	Kumta
Clay (per cent)	18.5	26.2
Textural class	Sandy loam	Sandy clay loam
Max. water holding capacity (%)	40.1	47.5
pH	5.2	5.0
EC(dS/m)	0.2	1.8
Organic matter %	2.9	3.2
$BaCl_2$–TEA extractable acidity C mol K^{-1}	15.3	15.8
Ex. cations (C mol K^{-1})		
Calcium	2.15	4.00
Magnesium	1.50	2.25
Sodium	0.90	0.90
Potassium	0.27	0.47
Cation exchange capacity (C mol K^{-1})	21.40	24.50
Lime requirement t/ha		
Puri's Exchangeable Calcium Method	7.3	8.5
Improved Woodruff Buffer Method	18.0	20.8
SMP Single Buffer Method	9.0	10.5
SMP Double Buffer Method	6.0	5.7

Table 2. Effect of lime levels on soil pH during incubation period (II week).

Treatments	LR Methods			
	PURI	IWB	SMPSB	SMPDB
Ankola Sandy Loam				
Control–I	5.2	5.2	5.2	5.2
Control–II	5.2	5.2	5.2	5.2
$^1/_2$ LR	6.6	6.8	6.6	6.3
1.0 LR	6.8	7.0	6.9	6.6
1.5 LR	6.9	7.2	7.0	6.7
2.0 LR	7.1	7.3	7.1	6.9
Kumta Sandy Clay Loam				
Control–I	5.1	5.1	5.1	5.1
Control–II	5.2	5.2	5.2	5.2
$^1/_2$ LR	6.3	6.9	6.5	6.2
1.0 LR	6.8	7.2	6.7	6.4
1.5 LR	6.9	7.3	6.9	6.6
2.0 LR	7.2	7.4	7.2	6.9

results (Table 2) it is evident that pH increased at the levels of added lime. The rate of pH change due to the addition of lime was maximum at the end of first week. At higher doses of lime application increase in pH gets narrowed down. This is because when Ca^{++} displaced H^+ from the exchange sites, H^+ gets leached out or is neutralised and the equilibrium is established between lime and soil particles, and the change in pH due to application of higher doses of lime will be slow (Colemn and Thomas, 1967; Ananthanarayana and Perur, 1972).

Thus it could be concluded from the study that lime applied to acid soil will come to equilibrium within three weeks and extractable acidity would be reduced considerably.

This note forms a part of the M.Sc. (Agri.) thesis submitted by the first author to the University of Agricultural Sciences, Dharwad.

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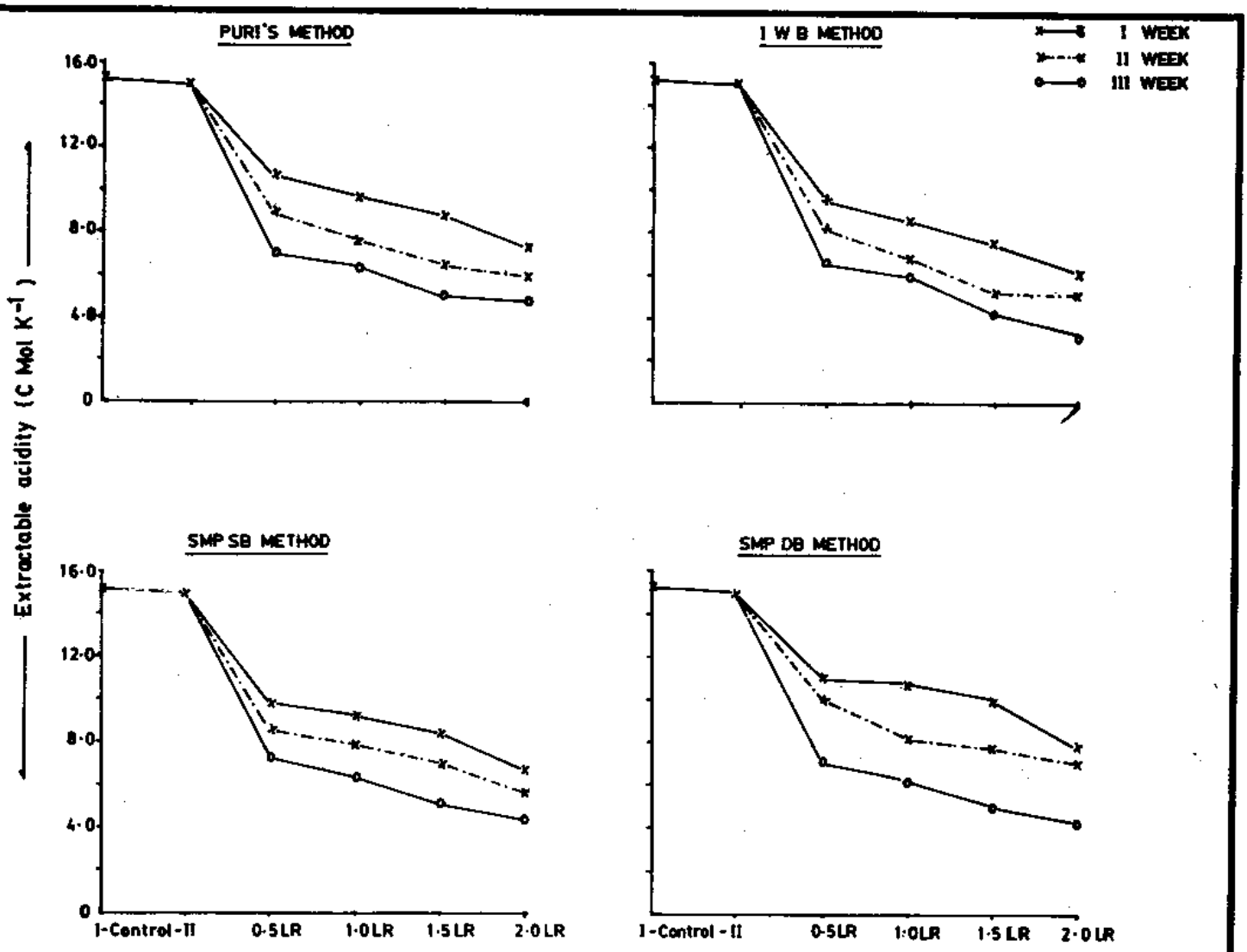

FIG. 1. EFFECT OF LIME LEVELS BY DIFFERENT METHODS ON $BaCl_2$-TEA EXTRACTABLE ACIDITY IN ANKOLA SANDY LOAM SOIL

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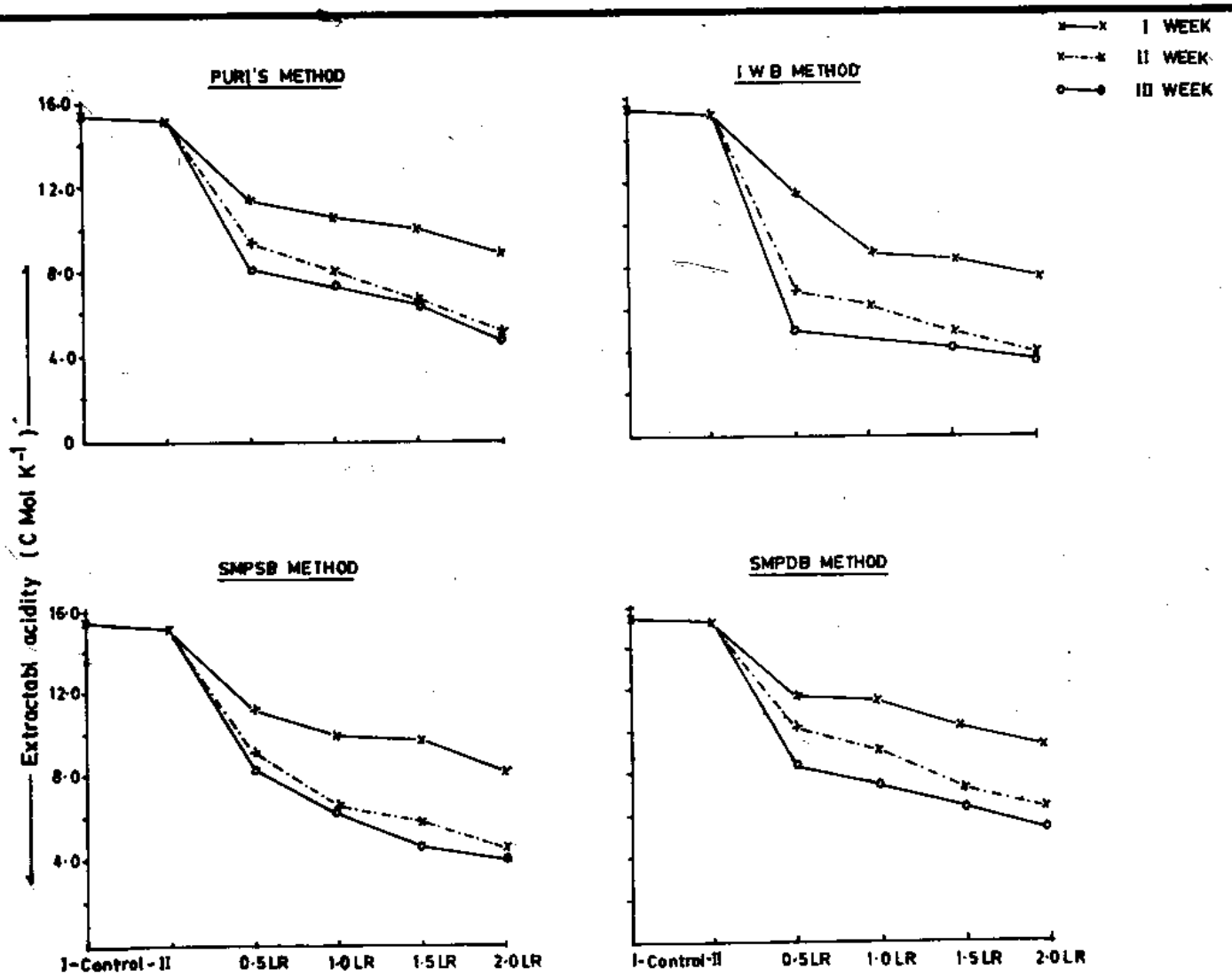

FIG. 2. EFFECT OF LIME LEVELS BY DIFFERENT METHODS ON $BaCl_2$-TEA EXTRACTABLE ACIDITY IN KUMTA SANDY LOAM SOIL

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