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Karnataka J. Agric. Sci., 2 (4) : (332-334) : 1989

Comparing Methods of CEC Estimation for Vertisols

In vertisols, which have higher clay content, estimation of CEC by the method suggested by Bower *et al.* (1952) may not give correct values; because of dispersion colloidal material in organic solvents. Therefore, a CEC estimation method suggested by Gupta *et al.* (1985), which eliminates the use of organic solvents for removing excess salts was compared with the commonly followed method of Bower *et al.* (1952) for CEC estimation of some vertisols of Karnataka.

In the method of Gupta *et al.* (1985), soils were sodium saturated with 0.1 N Na OAC + 0.4 N NaCl solution, adjusted to pH 10.0 and then Na was displaced by 1 N Mg $(NO_3)_2$ solution adjusted to pH 8 6. The leachates were analysed for Na and Cl. Cation exchange capacity was calculated using the following equation.

$$CEC = (Na_{total} - Na_{soluble}) = Na_{total} - Cl_{total} \left(\frac{Na}{Cl}\right)_{\substack{saturating \\ solution}}$$

Whereas, in the method of Bower *et al.* (1952), soils were sodium staturated with 1 N NaOAc solution adjusted to pH 8.2. The soils were washed three times with alcohol to remove the excess salts. Then adsorbed Na was extracted in 1 N NH_4 OAC solution.

Exchangeable Na and K of these soils and chloride in the leachate were determined by the methods described by Richard (1968).

The data on cation exchange capacity (CEC), exchangeable sodium percentage

(ESP), exchangeable potash percentage (EPP), time required for CEC estimation and cost of chemicals used for CEC estimation, by two methods compared, are given in Table 1.

The CEC values obtained by Bower *et al.* (1952) method were higher by 19-48 per cent over those by Gupta *et al.* (1985) method. The high CEC values obtained by Bower *et al.* (1952) method are apparently due to the use of alcohol for washing excess salts. Higher Na values noticed, which in turn gave higher CEC values may be due to extraction of retained soluble sodium salts if washing was incomplete (Gupta *et al.*, 1985). The ESP and EPP values calculated with CEC values by Bower *et al.* (1952) method were lower by 16-32 per cent compared to those calculated with CEC values by Gupta *et al.* (1985) method. This was due to the higher CEC values obtained in the former method. This means Bower *et al.* (1952) method under estimates the ESP and EPP values, which is not desirable.

The time required for CEC estimation of six soil samples by Bower *et al.* (1952) method was more by about 75 minutes compared to that by Gupta *et al.* (1985) method. The cost of chemicals required for CEC estimation of 10 soil samples by Bower *et al.* (1952) method was about six times of that for CEC estimation by Gupta *et al.* (1985) method (Table 1).

Looking to the advantages in time factor and cost of chemicals involved and

Table 1. CEC, ESP, EPP values, time required and cost of chemicals as affected by methods of CEC estimation in some vertisols

Soil series	CEC by Bower *et al.* (1952) method			CEC by Gupta *et al.* (1985) method		
	CEC (m.e./100 g)	ESP %	EPP %	CEC (m.e./100 g)	ESP %	EPP %
Hanchinal	81.53	1.34	1.37	57.07	1.91	1.96
Kiresur	81.52	1.94	1.41	55.20	2.86	2.08
Mangoli	76.08	0.81	1.30	63.91	0.97	1.55
Durdundi	64.13	0.69	1.85	49.67	0.89	2.38
Mean	75.82	1.20	1.48	56.46	1.66	1.99
Time required for CEC estimation of 6 soil samples (minutes)	375			300		
Cost of chemicals used for CEC estimation of 10 soil samples (Rupees)	63.91			10.49		

the fact that Gupta *et al.* (1985) method eliminates the use of alcohol and thus the sources that produce errors in the method of Bower *et al.* (1952), the adoption of former method seems to be appropriate for CEC estimation of vertisols.

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Nutrient Composition of Different Animal Organic Manures

Different animal organic manures have been used in agriculture from time immemorial for maintaining and improving the fertility and productivity of soils. Nutrient content of these manures varies depending upon the types of feed used, age of the animal, and source of feed etc. Therefore, the study was taken to know the nutrient composition of some manures which are commonly used in preparing farm yard manure (FYM) by farmers.

Excreta of different animals, cattle dung slurry which is used for biogas production in UAS Campus, Dharwad and the digested slurry which comes out after the production of methane gas from the Gas Chamber are collected and dried under shade at room temperature. Dried samples were powdered in agate pestle and morter and passed through 1 mm sieve. Sieved material was digested in tri-acid digestion mixture ($HNO_3 : H_2SO_4 : HClO_4$ 10 : 1 : 4 ratio) and analysed for the macro, secondary and micronutrient contents by adopting standard procedures as outlined by Jackson (1967) and Piper (1950). The results are presented in Table 1.