Annals of Arid Zone 25 (3) 237-238 1986

PREDICTION OF SALINITY IN THE SOILS OF CENTRAL IRAQ FROM ELECTRICAL CONDUCTIVITY AT DIFFERENT SOIL WATER RATIOS

K.V. PALIWAL[1] AND M.M. KHODIER[2]

Water Technology Centre, I.A.R.I., New Delhi-110012

Electrical conductivity at saturation is a satisfactory measure of soil salinity but its estimation is time consuming in case of fine textured soils. Estimation of EC at different soil water ratios has been proposed to predict ECe with different conversion factors (Richards, 1954; Sonneveld and Ende, 1971; Paliwal *et al.*, 1978 and Aggarwal *et al.*, 1983). The accuracy of estimated ECe is influenced by the type of salinity, soil texure, saturation percentage and the dilution factor(df). Data obtained on these relationships are discussed in this paper.

Sixty five representative saline soils were collected from different locations of Al-Waheda Farm, situated in the central Iraq. Chemical properties varied widely (ECe 3.2 - 74.0 d sm^{-1}; pH 7.2 - 7.9; SAR 8-25; lime 21-35%; gypsum traces-1.55%, HCO^{-}_3 traces-2.0 me/1). The soils were Na-Mg-Ca; Cl-SO_4-HCO_3 type, calcarious, silt loam (15-25% clay, 50-60% silt, 40-55 saturation percentage) to silt clay loam (28-35% clay, 53-60 silt, 50-75 saturation percentage) with heavy incrustations of salts on the surface. Saturation percentage (SP) was estimated according to Richards(1954). EC at satura- and at 1:2, 1:5 and 1:10 soil-water ratios was estimated by EC-bridge after shaking the soil-water suspensions mechanically for 10 minutes. ECe was also calculated by multiplying the EC_2 value with the df 200/SP and expressed at EC_2-df.

ECe significantly correlated with EC at different soil water ratios with an accuracy >94% (Table 1) and thus EC_2 method is the most satisfactory for prediction purposes. High silt and clay content and rather similar mineralogical and chemical composition appear to be responsible for much less variation even at EC_5 in the predicted ECe value as was obtained for fine textured clay loam soils upto EC_{16}, and coarse soils showed more variations (Paliwal *et al.*, 1978). Aggarwal *et al.* (1983) also obtained similar highly significant coefficient of correlation for soil water ratios of 1:2 to 1:4 for the salt affected soils of Wasit region of southern Iraq. However, they recommended 1:3 soil water ratio for the clay loam soils though variation in R^2 for different soil water ratios was very little (99. 2-99. 4).

Further, ECe correlated significantly ($r = 0.96$) with ECe obtained by EC_2-df method with accuracy of 95% which also correlated significantly ($r = 0.95$) with the

1. Professor 2. Research Asstt., State Organisation for Land Reclamation, Baghdad, Iraq.

value predicted by EC_2 method. Conclusively, ECe of the fine textured soils can be satisfactorily obtained both by EC_2 and EC_2-df method, and the latter is equally satisfactory without developing the ECe-EC_2 relationship on large number of soil samples; mean SP and EC_2 values are sufficient to predict ECe of the fine textured soils.

ECe of the salt affected soils of central Iraq significantly correlated with EC at all ratios and be most satisfactorily predicted by the regression equation developed (Table 1).

Table 1. Relationships between EC at saturation and different soil water ratios for silt loam and silty clay loam soils of central Iraq

Factors	r	R^2	Regression equation
ECe x EC_2	0.989	97.9	$ECe = 2.90\ EC_2 - 0.213$
ECe x EC_5	0.977	95.4	$ECe = 6.338\ EC_5 + 0.652$
ECe x EC_{10}	0.970	9[illegible].1	$ECe = 11.727\ EC_{10} + 1.93$

REFERENCES

Aggarwal, R.K., Hussain, T. and El-Dosoky, H. 1983. Prediction equations for salinity appraisal in clay loam soils of southern Iraq. *Ann. Arid Zone* 22: 295-299.

Paliwal, K.V., Maliwal, G.L. and Yadav, B.R. 1978. Prediction of soil salinity at saturation by different soil-water ratios. *Curr. Agr.* 2: 43-47.

Richards, L.A. 1954. *Diagnosis and improvement of saline-alkali soils.* USDA Hand Book No. 60.

Sonneveld, C. and Ende, J.V. 1971. Soil analysis by means of a 1:2 volume extract. *Plant & Soil* 35: 505-516.