

Characterization and classifications of cultivated soils of Porbandar district of Gujarat

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ABSTRACT

Seventy three surface (0-15 cm) soil samples from the three talukas viz., kutiyana, Ranavav and Porbandar of Porbandar district were collected from the cultivated fields and were analyzed for different chemical properties. The results revealed that Na⁺ and Cl⁻ were dominant among the water soluble ions, whereas, Ca⁺⁺ and Mg⁺⁺ were dominant among the exchangeable cations. Nearly half (48.0%) of the cultivated coastal soils of Porbandar district were found normal in nature, followed by sodic (20.5%), saline (16.4%) and saline-sodic (15.1%).

Key words : Characterization of soils, Water soluble ions, Exchangeable ions, Saline, Sodic, Saline-sodic.

It is estimated that about 8.087 million hectares of land in India are affected by the problem of salinity and sodicity (Yadav *et al.*, 1983). In Gujarat, about 1.649 million hectares of land is lost to agriculture because of salinity and sodicity and are extensively distributed both on the coastal and inland areas. The characterization of these soils has not been done earlier and hence, the present investigation was undertaken for characterization and classification of cultivated coastal soils of Porbandar district of Gujarat.

MATERIALS AND METHODS

Seventy three surface (0-15 cm) soil samples from the three talukas viz., Kutiyana, Ranavav and Porbandar of Porbandar district were collected from the cultivated field and were prepared for chemical analysis. The soil pHs and ECe were determined from the saturation extract of soils, whereas water soluble ions were estimated from

1:2.5 soil water extract and the exchangeable cations (Ca⁺⁺, Mg⁺⁺, Na⁺ and K⁺) by neutral normal ammonium acetate as per the standard methods outlined by Richards (1954). The analyzed soil samples were then categorized into salinity/sodicity classes as per the criteria suggested by Richards (1954).

RESULTS AND DISCUSSION

The range and mean values (Table 1) of water soluble cations showed higher proportion of Na⁺, which was followed by Ca⁺⁺, Mg⁺⁺ and K⁺. In case of anions, the highest overall mean value of 8.86 meL⁻¹ was noted for Cl⁻ and it was followed by HCO₃⁻ and SO₄⁻ and the least was CO₃⁻. These results are in conformity with the earlier report of Polara *et al.* (2004) for the soils of Kachchh region and Kabaria and Polara (2006) for the coastal soils of Amreli district of Gujarat. The overall exchangeable Ca⁺⁺, Mg⁺⁺, Na⁺ and K⁺ ranged from 14.90 to 40.40, 0.75

Table 1 : Talukawise range and mean values of water soluble and exchangeable ions in soils of Porbandar district

Name of taluka	Water soluble ions (meL ⁻¹)						Exchangeable cations (cmol(P ⁺)kg ⁻¹)					
	Ca ⁺⁺	Mg ⁺⁺	Na ⁺	K ⁺	CO ₃ ⁻	HCO ₃ ⁻	Cl ⁻	SO ₄ ⁻	Ca ⁺⁺	Mg ⁺⁺	Na ⁺	K ⁺
Kutiyana	0.6-3.2 (1.85)*	04.-4.4 (1.53)	1.25-11.60 (5.23)	0.02-0.28 (0.13)	0.0-1.6 (0.94)	0.8-2.8 (1.8)	1.6-13.0 (5.20)	0.16-3.33 (1.07)	20.95-36.40 (27.34)	3.45-27.70 (16.80)	3.04-19.35 (7.46)	0.29-1.44 (0.72)
Ranavav	1.4-2.4 (1.76)	0.4-2.4 (1.47)	2.86-8.75 (4.96)	0.04-0.18 (0.11)	0.8-1.6 (1.13)	1.6-2.4 (1.89)	3.4-5.4 (4.45)	0.16-4.68 (1.06)	23.55-31.35 (26.52)	4.10-25.05 (13.09)	4.73-10.31 (6.84)	0.39-1.81 (0.79)
Porbandar	0.8-16.0 (3.27)	0.4-29.0 (2.45)	1.50-54.00 (10.02)	0.02-2.42 (0.18)	0.4-2.8 (1.07)	0.8-3.0 (1.74)	2.2-82.8 (11.75)	0.08-15.09 (1.68)	14.90-40.40 (25.89)	0.75-47.55 (16.57)	3.70-13.42 (7.54)	0.25-4.78 (0.86)
Overall	0.6-16.0 (2.65)	04.-29.0 (2.05)	1.25-54.00 (7.95)	0.02-2.42 (0.15)	0.0-2.8 (1.08)	0.8-3.0 (1.78)	1.6-82.8 (8.86)	0.08-15.09 (1.42)	14.90-40.40 (26.38)	0.75-47.55 (16.10)	3.04-19.35 (7.41)	0.25-4.78 (0.81)

* Figure in the parenthesis indicates the mean values