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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 poperties. 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 Porbadnar 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 HCO_3^- and SO_4^{--} and the least was CO_3^{--}. 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	04.-4.4	1.25-11.60	0.02-0.28	0.0-1.6	0.8-2.8	1.6-13.0	0.16-3.33	20.95-36.40	3.45-27.70	3.04-19.35	0.29-1.44
	(1.85)*	(1.53)	(5.23)	(0.13)	(0.94)	(1.8)	(5.20)	(1.07)	(27.34)	(16.80)	(7.46)	(0.72)
Ranavav	1.4-2.4	0.4-2.4	2.86-8.75	0.04-0.18	0.8-1.6	1.6-2.4	3.4-5.4	0.16-4.68	23.55-31.35	4.10-25.05	4.73-10.31	0.39-1.81
	(1.76)	(1.47)	(4.96)	(0.11)	(1.13)	(1.89)	(4.45)	(1.06)	(26.52)	(13.09)	(6.84)	(0.79)
Porbandar	0.8-16.0	0.4-29.0	1.50-54.00	0.02-2.42	0.4-2.8	0.8-3.0	2.2-82.8	0.08-15.09	14.90-40.40	0.75-47.55	3.70-13.42	0.25-4.78
	(3.27)	(2.45)	(10.02)	(0.18)	(1.07)	(1.74)	(11.75)	(1.68)	(25.89)	(16.57)	(7.54)	(0.86)
Overall	0.6-16.0	04.-29.0	1.25-54.00	0.02-2.42	0.0-2.8	0.8-3.0	1.6-82.8	0.08-15.09	14.90-40.40	0.75-47.55	3.04-19.35	0.25-4.78
	(2.65)	(2.05)	(7.95)	(0.15)	(1.08)	(1.78)	(8.86)	(1.42	(26.38	(16.10)	(7.41)	(0.81)

* Figure in the parenthesis indicates the mean values

Table 2 : Talukawise range and mean values of salinity/sodicity indices of soils and their classification

Name of taluka	ECe(dSm^{-1})	pH	ESP	Percentage distribution			
				Saline	Saline-sodic	Sodic	Normal
Kutiyana	1.61-6.45	7.50-8.23	6.65-29.15	10.0	15.0	15.0	60.0
	(3.10)*	(7.97)	(14.07)	(2)**	(3)	(3)	(12)
Ranavav	1.85-4.45	7.50-8.15	9.52-21.51	18.2	00	27.3	54.5
	(2.70)	(8.00)	(14.61)	(2)	(00)	(3)	(6)
Porbandar	1.65-25.65	7.13-8.20	8.48-26.08	19.0	19.0	21.5	40.5
	(5.14)	(7.78)	(15.09)	(8)	(8)	(9)	(17)
Overall	1.61-25.65	7.13-8.23	6.65-29.15	16.4	15.1	20.5	48.0
	(4.21)	(7.86)	(14.73)	(12)	(11)	(15)	(35)

* Values in the parenthesis indicate the mean values and ** number of soil samples.

to 47.55, 3.04 to 19.35 and 0.25 to 4.78 with their corresponding mean values of 26.38, 16.10, 7.41 and 0.81 cmol (P^+) kg^{-1}, respectively. The exchangeable Ca^{++} was found highest (27.34 cmol(p^+)kg^{-1}) in the soils of Kutiyana taluka as compared to that noted in the soils of other talukas. The soils of Porbandar taluka registered the highest values of exchangeable Na^+ (7.54 cmol(P^+) kg^{-1}) and K^+ (0.86 cmol (P^+) kg^{-1}).

The overall ECe, pHs and ESP values ranged from 1.61 to 25.65 dSm^{-1}, 7.13 to 8.23 and 6.65 to 29.15 with their corresponding mean value of 4.21 dSm^{-1}, 7.86 and 14.73, respectively. The ECe was found highest (25.65 dSm^{-1}) in the soils of Porbandar taluka, whereas pHs and ESP were found highest (8.23 and 29.15, respectively) in the soils of Kutiyana taluka as compared to that noted in the soils of other talukas. Overall, 16.4, 15.1, 20.5 and 48.0 per cent soils of coastal Porbandar district were classified into saline, saline-sodic, sodic and normal soil, respectively.

The information generated in the present investigation can be used in developing management practices for the culivated coastal soils of Porbandar district of Gujarat.

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REFERENCES

Kabaria, B.D. and Polara, J.V. (2006). Characterization and classification of cultivated soils of coastal Amreli district of Gujarat. *J. Indian Soc. Coastal Agric. Res.*, **24** (1) : 61-63.

Polara, K.B., Polara, J.V. and Patel, M.S. (2004). Inter-relationships among different physico-chemical characteristics of salt affected soils of north west agro-climatic zone of Gujarat. *J. Indian Soc. Coastal Agric. Res.*, **22** (1&2) : 65-68.

Richards, L.A. (1954). *Diagnosis and Improvement of Saline and Alkali Soils*. Hand Book No. 60, Oxford and IBH Pub. Co., New Delhi.

Yadav, J.S.P., Bandyopadhyay, A.K. and Bandyopadhyay, B.K. (1983). Extent of coastal saline soils of India *J. Indian Soc. Coastal Agric. Res.*, **1** : 1-6.

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