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ZINC STATUS OF SOME SOIL SERIES OF BALUCHISTAN

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Five important agricultural soils of Quetta district, Baluchistan were examined, on the profile basis, for their Zn status. DTPA – extractable Zn did not show any significant correlation with pH, O.M., $CaCO_3$ and C.E.C.

INTRODUCTION

Zinc deficiency in agricultural crops is one of the most common micronutrient deficiencies [1]. Usually Zn deficiencies appear early in the growing season; therefore, a reliable soil test is needed to determine Zn fertilizer needs prior to planting. Observations in the cultivated area of Baluchistan have revealed symptoms of zinc deficiency in wheat and the application of zinc has increased the yield of wheat. The purpose of this investigation was to determine zinc status and its relationship with pH, O.M., $CaCO_3$, and C.E.C in some soils of Baluchistan.

MATERIALS AND METHODS

Soil samples were collected from five different soil series of Quetta district, Baluchistan. From each series, four soil samples according to the horizons were collected. Zinc was extracted by the procedure described by Lindsay and Norvell [2]. The extracting solution consisted of 0.005 M DTPA (diethylenetriamine penta acetic acid), 0.01 M $CaCl_2$, and 0.1 M TEA (Triethanolamine) adjusted to pH 7.3. Ten gram soil samples were shaken with 20 ml of extracting solution for two hours then filtered. Zinc concentrations in soil extracts were determined with atomic absorption spectrophotometer model 1272 Beckman. Soils were classified according to U.S.D.A. and F.A.O. [3] (Table 1).

RESULTS AND DISCUSSION

Table 2 shows that DTPA-extractable zinc ranges between 0.57 to 0.73, 0.52 to 0.68, 0.49 to 0.68, 0.52 to 0.68 and 0.52 to 1.61 ppm. with the mean values of 0.64, 0.59, 0.57, 0.6 and 0.89 ppm in Seriab Shabaq, Shamozai, Chiltan and Lak series respectively. Correlation studies given in table 3 show that zinc does not possess any significant correlation with pH, organic matter, $CaCO_3$ and cation exchange capacity. However, $CaCO_3$ has got negative correlation with extractable Zn. The investigated soils are strongly calcareous and fall in the pH range of 7.60 to 8.90.

The solubility of Zn^{+2} in soils decreases with increase in pH. Hence a greater incidence of zinc deficiencies would be expected in calcarous soils and indeed such is obtained in the present investigation which is supported by Thorne [4]. Leeper [5], and Jurinak and Bauer [6] reported that adsorption of zinc by carbonates might be the reason for low availability on calcareous soils. The results of the present investigation are also in conformity with that of Udo, *et. al* [7], who showed no significant correlation between zinc content and calcium carbonate. Follett and Lindsay [8] while working on Colorado soils also reported that there were no significant correlations between DTPA-extractable Zn and soil pH or lime content. In view of Lindsay and Norvell [2] who proposed 0.8 ppm as the critical level of DTPA-extractable zinc. The investigated soils except B_{21} horizon of Lak series are deficient in zinc.

Table 1. The classification of the soil series used in this study.

S.No.	Soil series	Classification according to U.S.D.A.	Classification according to FAO.
1.	Sariab	Typic camborthids	Haplic yermosol.
2.	Shabaq	Typic calciorids	Haplic yermosol.
3.	Shamozoi	Typic camborthids	Haplic yermosol.
4.	Chiltan	Typic camborthids	Haplic yermosol.
5.	Lak	Halic camborthids	Orthic sono chaks.

Table 2. DTPA–extractable Zn and other soil analysis

Series	Horizon	Depth in cms	Texture			C.E.C. Meq/100 g	pH	$CaCO_3$ %	O.M %	DTPA-extractable Zn ppm.
			Sa %	Si %	C %					
Sariab	A_p	0-12	27	65	08	07.00	08.10	19.00	0.41	0.63
	B_{21}	12-32	23	66	11	09.80	08.20	20.00	0.40	0.63
	B_{22}	32-59	41	49	10	08.10	08-15	21.50	0.23	0.73
	C_1	59-81	46	45	09	07.90	08.20	21.50	0.20	0.57
Shabaq	A_1	00-06	38	48	14	06.10	08.00	26.00	0.21	0.68
	B_{21}	06-17	36	40	24	10.20	08.00	26.50	0.28	0.52
	B_{22}	17-30	38	38	25	10.40	08.00	34.20	0.38	0.57
	C_1	30-80	42	43	15	06.60	08.10	33.50	0.12	0.57
Shamozai	A_1	00-06	32	49	19	08.50	07.75	19.00	0.24	0.68
	B_{21}	06-50	24	58	18	08.20	08.00	22.00	0.22	0.49
	B_{22}	50-81	26	57	17	07.20	08.00	24.00	0.10	0.52
	C	81-150	60	29	11	06.40	08.90	21.00	0.06	0.57
Chiltan	A_{11}	00-06	42	48	10	09.90	08.10	29.00	0.27	0.57
	A_{12}	06-20	48	43	09	08.20	08.20	30.00	0.35	0.63
	B_{22}	20-38	41	49	10	10.10	08.30	38.00	0.25	0.68
	C	38-74	49	42	09	08.20	08.10	64.00	0.18	0.52
Lak	A	00-12	32	49	19	08.50	08.10	21.00	0.40	0.73
	B_{21}	12-55	15	56	29	09.90	08.20	24.00	0.29	1.61
	B_{22}	55-95	11	51	38	11.40	08.50	28.00	0.20	0.68
	B_{23}	95-150	19	52	29	09.90	07.60	21.00	0.11	0.52

Table 3. Correlation coefficient between DTPA – Extractable Zn and other soil properties

Soil properties	DTPA-extractable Zn.
pH	0.246
O.M	0.241
$CaCO_3$	–0.143
C.E.C	0.196

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