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(Short Communication)

Soil Fertility Status of Surha Tal Land Soils of Ballia district, Uttar Pradesh

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Surha Tal is one of the largest floodplains of river Ganga in eastern Uttar Pradesh. In general, soils of Surha Tal are fertile and sustain higher productivity of *kharif* rice, wheat, maize, mustard and vegetables. Earlier Diwakar and Singh (1992 a&b, 1993) studied the genesis, mineralogy, aggregation *etc.* of the Tal land of Bihar but virtually no information is available about soil fertility status of Tal land and in particular Surha Tal of Ballia district and hence present study was conducted.

The Surha lake with circumference of 25.6 km is openly connected with river Ganga through Katahar nala. Its length is about 32.6 km (25° 48'–25° 52'N and 84° 8'–84° 13'E at an altitude of 166 m) which is drained and filled according to the water level of the river. Soil samples (0-15, 15-30, 30-45, 45-60 cm) were collected from four sites (site 1: near standing water mostly cultivated for *kharif* paddy; site 2: cultivated for wheat and mustard; site 3: cultivated for *kharif* and *rabi* crop; site 4: under grassland). The elevation of sites increased from site 1 to 4. The soils (2kg) collected in June 2012 were processed and analysed for pH, EC, bulk density, organic carbon, available N, P, K, S, exchangeable Ca and Mg following the standard procedures.

The bulk density of the soils varied from 1.20 to 1.53 Mg m^{-3} at different sites. The p^H ranged from 6.48 to 8.30 (Table 1) and increased with depth at all the sites. The lower p^H at upper layer might be due to higher organic carbon or leaching of salts from a surface layer. The EC of the soils ranged from 1.00 to 1.01 with depth at different sites.

Soil organic carbon at different sites decreased with depth. Tal land (Black soil) possessed higher organic carbon to the tune of 3.40 per cent at 0-15 cm and decreased to 0.55 per cent at 45-60 cm. Lowest organic carbon content (0.30 %) was found at site 4 (45-60 cm). The decrease / increase in organic carbon content seem to be dependent on its accumulation from higher elevation, decomposition of fallen foliages and residues. The available N in soils ranged from 206.6 to 583.3 kg ha^{-1} through the depth (Table 1) of different sites. The higher availability of N at site 1 is in consonance of organic carbon accumulation in low lying site which usually remains submerged for 4 to 5 months.

The site 1 had relatively higher available P (21.93 kg ha^{-1}) in 0-15 cm layer owing to decomposition and release of P from deposited organic carbon. and it decreased with depth (Table 2) The other sites followed similar trend of P distribution with depth. Tarafdar (2008) reported that microorganisms can lower the pH *via* release of CO_2 during respiration thereby releasing more P in soil. In general, available K varied from 130.7 to 1049.0 kg ha^{-1} (1^{st} layer of site 1) and decreased with depth at all the sites.

Data indicated that surface soil had higher available S than the under lying layers (Table 2). In general, it followed the distribution pattern as of organic carbon. Trivedi *et. al.* (1998) also reported that organic carbon regulates the sulphate-S in soils of northern Madhya Pradesh. The site 1 had higher available sulphur than the other sites due to its submergence for 4-5 months. The site 1 had higher exchangeable Ca [10.0 to 12.6 cmol (p+) kg^{-1}] and lowest was associated with site 3 with a tendency to increase with depth. There was little variation in exchangeable Mg at different sites (Table 2). It ranged from 6.5 to 6.6 cmol (p+) kg^{-1}, 5.2 to 5.8 cmol (p+) kg^{-1}, 5.2 to 6.9 cmol (p+) kg^{-1} and 6.0 to 7.0 cmol (p+) kg^{-1} at site 1, site 2, site 3 and site 4 respectively. The higher content of exchangeable Mg was found in lower layers than the surface layers.

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Table 1. Depth-wise distribution of soil pH, EC, organic carbon and available N

Soil depth (cm)	Soil pH				EC (dSm^{-1})				Organic carbon (%)				Available N ($kgha^{-1}$)			
	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4
0-15	6.48	7.17	7.71	8.16	1.007	1.009	1.003	1.003	3.403	1.737	1.857	1.767	583.3	478.3	396.6	400.0
15-30	6.76	7.73	7.82	8.05	1.009	1.009	1.003	1.003	2.316	1.010	1.216	0.964	402.0	454.3	326.6	398.3
30-45	6.67	8.01	7.96	8.26	1.009	1.009	1.003	1.003	1.089	0.661	0.641	0.772	323.3	367.3	235.0	341.6
45-60	6.62	8.30	8.15	8.25	1.007	1.010	1.003	1.003	0.550	0.706	0.375	0.300	295.0	265.0	206.6	216.6

Table 2. Depth-wise distribution of available P, K, S, Ca, Mg

Soil depth (cm)	Available P ($kgha^{-1}$)				Available K ($kgha^{-1}$)				Available S ($kgha^{-1}$)				Exchangeable Ca (cmol (p+) kg^{-1})				Exchangeable Mg (cmol (p+) kg^{-1})			
	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4
0-15	21.93	20.36	20.20	20.20	1049	448	619.7	354.6	6.13	4.13	3.75	3.38	10.5	9.6	8.4	9.2	6.5	5.2	6.1	6.2
15-30	17.56	15.53	15.20	15.10	84.6	421.8	612.2	362.1	6.75	4.75	4.00	4.38	10.0	9.2	7.4	9.0	6.0	4.5	5.2	6.0
30-45	14.20	12.90	12.26	11.40	44.5	358.4	392.0	264.9	5.75	5.25	5.50	4.25	12.5	9.0	9.4	9.2	6.4	5.5	6.4	6.8
45-60	8.96	8.16	7.16	6.3	970.6	230.9	280.0	130.6	5.00	5.63	3.63	3.25	12.6	9.4	9.9	10.1	6.6	5.8	6.9	7.0