

3.6. Soil Environment

Soil quality in the study area was monitored by collecting surface soil samples in polythene packs from 12 sites. The locations are shown in Table 3.32. The samples after collection were thoroughly dried in sunshade, stone, pebbles, and plant debris were removed, and ground in a mortar into a fine powder. The samples were analyzed for 28 physical and chemical properties as per standard procedure. The results are presented in Tables 3.33 (a, b).

The soil pH was mostly alkaline (> 7.0) except in one or two locations. All the samples are sandy in texture with considerable amount of clay but very little silt. The soil generally possesses good water-holding capacity and all the samples are rich in NPK nutrients. The soil has large chloride content and all the sites show soil with high metal content, particularly iron and manganese. The soil contains some amount of oil and grease content. Among the heavy metals, the soil contains large amounts of Pb and Cd.

As a whole, the soil does not show any unusual stress.

Table 3.32: Soil sampling sites

S/N	Soil sample	Sampling Locations
1	S1	Jonai bazaar
2	S2	Jonai bazaar(paddy field.)
3	S3	Mohmora (private residence)
4	S4	Mohmora (paddy field)
5	S5	Bijaypur
6	S6	Ujani Bijaypur, (paddy field)
7	S7	Maj Ratanpur (private residence)
8	S8	Maj Ratanpur (paddy field)
9	S9	Maj bijoypur (Bijoypur M.E. school)
10	S10	Kuligaon, Ratke (private residence)
11	S11	kuligaon (kuligaon tiniali, private residence)
12	S12	Tinimile Forest

Table 3.33a: Soil quality of the study area

S/N	Parameter	S1	S2	S3	S4	S5	S6
Physical							
1	pH (1: 5 suspension)	7.6	8.1	6.7	9.9	9.8	6.5
2	Conductance (ms)	0.24	0.05	0.13	0.03	0.35	0.09
3	Soil Texture (up to 60 cm depth)						
4	Sand (%)	91.9	91.7	79.6	83.7	89.4	82.4
5	Silt (%)	0.0	0.01	0.01	0.01	0.01	0.01
6	Clay (%)	8.1	8.3	10.4	16.2	10.6	17.6
7	Water Holding Capacity (%)	65.8	46.4	51.8	54.8	43.4	51.2
8	Bulk Density (gcm ⁻³)	1.13	1.12	1.34	1.10	1.34	1.14
9	Hydraulic Conductivity (cm/min)	0.329	0.249	0.312	0.246	0.192	0.276
Chemical							
10	Nitrogen (%)	0.06	0.04	0.03	0.04	0.06	0.04
11	Potassium (mg/kg)	2.0	7.9	7.7	12.9	1.9	3.2
12	Sodium (mg/kg)	2.7	12.9	10.1	7.7	4.3	7.9
13	Calcium (mg/kg)	224.4	993.9	865.8	1026.0	769.4	384.8
14	Magnesium (mg/kg)	136.5	58.4	136.5	39.0	117.0	78.0
15	Phosphorous (mg/kg)	55.2	146.8	153.4	78.5	52.2	46.8
16	Boron (mg/kg)	2.3	4.5	10.2	6.5	7.5	6.5
17	Chloride (mg/kg)	319.5	142.0	71.0	71.0	390.0	248.5
18	Organic matter (%)	1.02	0.49	1.10	0.08	0.54	1.15
19	Oil and Grease (mg/kg)	2.3	3.6	2.1	0.8	0.7	2.4
Heavy Metals							
20	Iron (g/kg)	0.87	4.6	1.2	0.58	2.5	7.8
21	Manganese (g/kg)	0.22	0.06	0.14	0.44	0.32	0.09
22	Zinc (mg/kg)	6.9	8.5	10.2	16.2	12.3	8.4
23	Lead (mg/kg)	36.5	45.2	32.5	14.6	96.4	112.6
24	Chromium (mg/kg)	BDL	1.6	BDL	BDL	3.8	11.0
25	Copper (mg/kg)	38.4	42.6	12.6	10.9	85.4	73.1
26	Cobalt (mg/kg)	21.0	31.5	16.9	35.4	42.1	32.9
27	Cadmium (mg/kg)	1.6	0.90	0.80	2.6	3.7	1.1
28	Nickel (mg/Kg)	86.5	46.5	106.3	79.5	56.8	95.6

Table 3.33b: Soil quality of the study area

S/N	Parameter	S7	S8	S9	S10	S11	S12
Physical							
1	pH (1: 5 suspension)	8.3	8.5	10.1	8.5	7.1	9.9
2	Conductance (ms)	0.17	0.19	0.10	0.60	0.24	0.07
3	Soil Texture (up to 60 cm depth)						
4	Sand (%)	89.4	89.4	84.9	82.4	82.5	83.7
5	Silt (%)	3.9	0.01	3.01	0.01	0.02	0.01
6	Clay (%)	6.6	10.6	13.0	17.6	17.4	16.2
7	Water Holding Capacity (%)	46.8	43.4	51.2	51.9	47.6	29.7
8	Bulk Density (gcm-3)	1.12	1.34	1.25	0.99	0.89	1.20
9	Hydraulic Conductivity (cm/min)	0.184	0.260	0.246	0.098	0.192	0.276
Chemical							
10	Nitrogen (%)	0.04	0.06	0.02	0.04	0.03	0.05
11	Potassium (mg/kg)	3.3	9.5	13.5	7.9	5.7	12.7
12	Sodium (mg/kg)	3.7	4.7	2.9	3.3	3.9	11.2
13	Calcium (mg/kg)	961.9	1154.3	128.3	128.3	769.4	224.4
14	Magnesium (mg/kg)	58.0	78.8	429.0	78.0	97.5	117.0
15	Phosphorous (mg/kg)	124.0	15.6	40.2	36.2	72.0	82.5
16	Boron (mg/kg)	21.2	18.5	12.0	7.8	9.6	5.8
17	Chloride (mg/kg)	35.5	35.5	248.5	71.0	142.0	248.5
18	Organic matter (%)	0.49	1.17	0.48	1.18	1.24	3.45
19	Oil and Grease (mg/kg)	3.2	1.6	1.2	0.6	3.0	0.9
Heavy Metals							
20	Iron (g/kg)	1.03	0.69	4.2	3.0	0.49	8.6
21	Manganese (g/kg)	0.47	0.50	0.15	0.23	0.08	0.11
22	Zinc (mg/kg)	7.2	6.8	12.0	11.6	8.4	14.3
23	Lead (mg/kg)	47.4	13.6	49.5	58.4	172.4	68.4
24	Chromium (mg/kg)	BDL	BDL	BDL	4.6	8.6	4.8
25	Copper (mg/kg)	34.0	69.5	16.5	56.8	26.4	54.2
26	Cobalt (mg/kg)	13.5	16.8	14.6	31.8	29.5	27.6
27	Cadmium (mg/kg)	0.70	BDL	BDL	1.2	1.9	2.1
28	Nickel (mg/Kg)	132.0	32.1	13.9	45.8	73.4	60.5