

Table I: Means of Analyzed Soil Parameters in Mashi LGA

Sites	Sand (%)	Silt (%)	Clay (%)	pH (H ₂ O)	EC (mmhOS/cm)	OC (%)	Tot. N (%)	Av. P (ppm)	Av. Ca	Av. Mg	Av. K	Av. Na	CEC	PBS (%)	OM (%)
Site A	55.11	8.9	18.2	6.5	0.4	1.8	0.1	2.7	2.0	1.6	1.3	1.1	21.3	40.9	1.7
Site B	43.1	22.2	29.7	6.2	0.5	2.3	0.3	1.8	2.6	1.7	1.6	1.4	50.6	36.6	2.4
Site C	47.0	20.8	21.1	6.1	0.3	2.5	0.1	5.7	3.8	2.6	1.1	0.4	22.0	46.8	2.3
Site D	65.9	25.4	21.9	6.0	0.4	1.6	0.1	10.5	2.2	3.6	1.0	1.5	19.9	53.1	2.0
Mean of means	52.8	21.8	22.7	6.2	0.4	2.1	0.2	5.2	2.7	2.4	1.2	1.1	28.5	44.4	2.1

Table II: Means of Analyzed Soil Parameters in Kaita LGA

Sites	Sand (%)	Silt (%)	Clay (%)	pH (H ₂ O)	EC (mmhOS/cm)	OC (%)	Tot. N (%)	Av. P (ppm)	Av. Ca	Av. Mg	Av. K	Av. Na	CEC	PBS (%)	OM (%)
Site A	65.1	15.8	19.2	6.2	0.6	0.7	0.3	5.5	4.1	4.0	3.8	7.0	22.8	33.6	0.6
Site B	58.7	17.3	25.0	5.9	6.4	0.7	0.2	5.5	6.1	5.6	6.9	7.74	9.23	0.7	0.9
Site C	48.2	31.1	26.6	5.8	2.6	1.4	0.2	5.2	3.6	3.6	4.5	5.32	7.5	40.6	1.5
Site D	48.9	17.8	30	5.5	1.1	4.4	0.1	1.1	2.4	6.3	3.0	0.7	22.4	54.8	3.9
Mean of means	55.2	21.0	25.2	5.9	2.7	1.8	0.2	4.3	4.1	4.9	4.6	5.2	30.5	40.7	1.7

Table III: Means of Analyzed Soil Parameters in Mai-adia LGA

Sites	Sand (%)	Silt (%)	Clay (%)	pH (H ₂ O)	EC (mmhOS/cm)	OC (%)	Tot. N (%)	Av. P (ppm)	Av. Ca	Av. Mg	Av. K	Av. Na	CEC	PBS (%)	OM (%)
Site A	54.6	20.2	17.9	6.0	0.5	1.0	0.1	1.2	2.3	1.9	6.5	1.3	30.1	39.7	2.5
Site B	59.0	27.1	22.3	6.9	1.9	4.6	0.2	2.1	2.8	2.5	3.6	1.3	29.2	44.2	4.2
Site C	71.0	20.4	12.7	6.7	0.5	3.5	0.1	4.6	3.2	3.6	4.1	2.7	29.4	36.6	4.1
Site D	60.1	21.3	23.1	6.9	0.5	2.5	0.3	4.5	5.5	4.5	5.1	1.6	31.9	39.4	2.2
Mean of means	61.2	22.3	19.0	6.6	0.85	2.9	0.2	3.1	3.5	3.1	4.8	1.7	30.2	39.98	3.3

Table IV: Exchangeable Sodium Percentage (ESP) of Soils in Mashi LGA

Sites	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean	Remark
Site 1	23.39	25.71	2.55	2.1	15.67	2.15	4.38	30.41	2.64	12.11	Sensitive
Site 2	2.7	2.99	23.08	22.44	12.5	20	15.46	3.69	89.13	21.33	Moderately tolerant
Site 3	6.45	2.1	14.12	3.32	0	0	1.95	1.21	3.35	3.61	Extremely sensitive
Site 4	7.14	2.12	2.52	5.39	2.73	25.28	21.1	1.69	37	11.66	Sensitive
Mean of means										12.18	Sensitive

Table V: Exchangeable Sodium Percentage (ESP) of Soils in Kaita LGA

Sites	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean	Remark
Site 1	2.12	37.4	38.86	38.04	48.67	1.69	39.82	35.07	28	29.96	Moderately tolerant
Site 2	16.07	39.84	41.52	17.38	23.33	29.26	34.03	34.03	17.56	28.11	Moderately tolerant
Site 3	25.76	17.65	35.28	22.53	38.1	19.36	26.57	35.76	0.72	24.64	Moderately tolerant
Site 4	12.5	4.43	0.22	7.14	1.07	12.37	8.08	2.21	18.21	7.36	Extremely sensitive
Mean of means										7.49	Extremely sensitive

Table VI: Exchangeable Sodium Percentage (ESP) of Soils in Mai-adua LGA

Sites	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean	Remark
Site 1	0.5	19.2	1.3	30.26	20.9	0.97	13.55	9	3.06	10.97	Sensitive
Site 2	6.41	14.29	18.87	2.7	1.59	1.53	2.2	14.09	19.85	9.06	Extremely sensitive
Site 3	1.16	23.18	16.67	20.69	20.83	19.4	19.27	21.31	21.62	18.24	Sensitive
Site 4	5.68	17.65	6.52	3.69	19.91	19.27	18.66	0.35	3.08	10.53	Sensitive
Mean of means										12.2	Sensitive

Table VII: Sodium Adsorption Ratio (SAR) of Soils in Mashi LGA

Sites	Sample1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean
Site 1	3.15	1.8	1.81	1.45	0.46	1.3	1.15	3.5	1.55	1.8
Site 2	1.7	2.45	0.3	3.95	2.75	2.3	4.56	1.1	0.1	2.13
Site 3	0.75	1.45	4.8	2.9	0.3	0.15	14.05	3.55	1.05	3.22
Site 4	0.2	1.5	1.95	7.8	1.85	1.8	2.75	2.5	5.85	2.91
Mean of means										2.52

Table VIII: Sodium Adsorption Ratio (SAR) of Soils in Kaita LGA

Sites	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean
Site1	1.5	1.75	5.06	7.05	3.5	2.5	6.85	7.05	1.1	4.04
Site 2	3.9	4.9	5.1	11.35	4.15	3.75	8.35	7.1	3.9	5.83
Site 3	3.15	0.3	7.75	4.7	5.55	0.1	3.55	7	0.2	3.59
Site 4	0.12	0.66	4.4	0.65	2.75	6.7	9.66	12.8	1.62	4.37
Mean of means										4.46

Table IX: Sodium Adsorption Ratio (SAR) of Soils in Mai-adua LGA

Sites	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Mean
Site 1	0.81	4.05	1.55	2.05	4.1	2.15	0.39	0.29	3.15	1.8
Site 2	1.5	6.05	4.6	1.05	1.85	1.3	0.12	3.5	3.75	2.64
Site 3	0.63	3.16	2.5	4.9	4.5	3.7	2.7	5	3.64	3.41
Site 4	0.91	4.3	10.9	1.1	3.92	4.5	3.1	2.9	18	5.51
Mean of means										3.34

Table X: Crop Tolerance to Exchangeable Sodium Percentage

ESP	Class of tolerance	Growth response under field Conditions	Crops
2 – 10	Extremely Sensitive	Na toxicity symptoms even at low ESP values.	Deciduous fruits, nuts, cassava, and citrus. Beans, sugarcane.
10 – 20	Sensitive	Stunted growth at low values even though the physical condition of the soil may be good.	
20 – 40	Moderately tolerant	Stunted growth due to both nutritional factors and adverse soil condition.	Oats, rice, tomatoes, beets
40 – 60	Tolerant	Stunted growth usually due to adverse physical conditions of the soil.	Wheat, cotton,
>60	Most tolerant	Stunted growth usually due to adverse physical conditions of the soil.	Grass

Source: Landon, 1991

Table XI: Soil Salinity Class and Crop Growth

Soil Salinity Class	Conductivity of saturation extract (EC) (ds/m)	Effect on crop plants
Negligible	0 – 2	Salinity effects negligence
Slightly Saline	2 – 4	Yields of sensitive crops may be restricted
Moderately Saline	4 – 8	Yields of many crops are restricted
Strongly Saline	8 – 16	Only tolerant crops yield are satisfactory
Very strong Saline	> 16	Only a few very tolerant crops yields satisfactory

Source: FAO, 1997

Table XII: Soil Quality Indicators and their Expected Ranges based on Harris *et. al.*, (1996)

Data set	Parameter	Expected range	Type of curve		
			Plant production	Environmental quality	Integrated
Nutrient availability	Bray P	7.5 to 150 mg kg ⁻¹	Optimum	Optimum	Optimum
	Exchangeable K	45 to 525 mg kg ⁻¹	Optimum	Optimum	Optimum
	pH	3.5 to 9.5	Optimum	Optimum	Optimum
	Organic C	5 to 65 g kg ⁻¹	More is better	More is better	More is better
	NO ₃ -N	3 to 50 mg kg ⁻¹	Optimum	Optimum	Optimum
Water availability	Surface residue	1000 to 18000 kg ha ⁻¹	Optimum	Optimum	Optimum
	Porosity	20 to 80%	Optimum	Optimum	Optimum
	Organic C	5 to 65 g kg ⁻¹	More is better	More is better	More is better
	Aggregate stability	15 to 70%	More is better	More is better	More is better
Rooting environment	pH	3.5 to 9.5	Optimum	Optimum	Optimum
	Bulk density	1.2 to 2.1 g cm ⁻³	Less is better	Less is better	Less is better
	Rooting depth	60 to 250 cm	More is better	More is better	More is better
	Organic C	5 to 65 g kg ⁻¹	More is better	More is better	More is better

Source: Harris, *et. al.* (1996)