

Table (3): Some physical and chemical properties of the studied soil profiles.

Profile No.	Depth (Cm)	Partical size distribution			Texture grade	O.M %	CaCO ₃ %	pH 1 :1	EC	Soluble cations meq/L				Soluble anions meq/L					
		Sand %	Silt %	Clay %						Ca ⁺²	Mg ⁺²	Na ⁺	K ⁺	CO ₃ ⁻	HCO ₃ ⁻	Cl ⁻	SO ₄ ⁻	CEC	ESP %
	15 - 45	69.9	19.11	10.99	sandy loam	1.24	1.46	7.96	1.20	2.50	6.50	2.70	0.25	1.00	4.50	3.00	3.50	9.60	1.68
	45 - 150	90.69	1.49	7.82	sand	0.19	0.42	8.11	1.16	3.00	5.50	3.00	0.12	1.00	4.50	2.00	4.10	6.26	0.76
2	0 - 25	59.23	21.45	19.32	sandy loam	1.91	3.68	8.12	2.42	7.50	11.50	4.00	1.28	1.50	3.75	4.50	14.40	17.09	2.34
	25 - 65	67.85	12.99	19.16	sandy loam	1.22	1.13	8.11	1.73	2.50	10.00	4.50	0.24	1.00	3.50	4.00	8.70	16.08	3.54
	65 - 150	32.1	23.87	44.03	loam	1.11	2.89	8.06	3.18	9.00	17.00	5.65	0.17	1.00	3.00	4.00	23.80	29.10	3.96
3	0 - 10	67.67	21.13	11.2	sandy loam	2.29	3.39	7.98	1.66	5.50	6.50	4.00	0.66	1.50	2.25	4.00	8.85	9.59	0.76
	10 - 30	59.35	29.15	11.5	sandy loam	1.97	2.17	8.16	1.93	2.00	13.50	3.50	0.29	2.00	3.50	3.50	10.30	9.18	1.50
	30 - 150	79.38	8.51	12.11	sandy loam	0.68	3.35	8.23	1.55	2.50	8.50	4.00	0.20	1.00	3.50	3.50	7.20	10.84	0.03
4	0 - 25	44.17	33.35	22.48	loam	1.86	1.03	8.13	2.08	4.50	9.00	6.00	1.17	1.00	5.00	7.00	7.00	23.23	2.93
	25 - 45	42.92	34.37	22.71	loam	1.45	1.13	8.20	1.98	3.00	12.00	3.60	1.20	2.00	3.50	6.00	8.30	20.64	2.20
	45 - 150	28.4	36.54	35.06	clay loam	1.50	1.42	8.19	1.35	2.50	7.00	3.80	0.10	0.00	5.50	4.00	4.00	32.70	2.34

Table (6): Frequency distribution of minerals in the heavy fraction.

Profile No.	Depth (Cm)	Opaq-ues	Epid-otes	Pyroxenes					Amphiboles				Bio-tite	Sph-ene	Zircon	Garnet	Rutile	Tourm.	Sturo.	Apatit
				Aug.	Diop.	Hyp	Enst	Total	Horn	Alt.Chlor	Trem	Total								
1	0-15	39.83	6.93	19.05	6.93	4.33	3.90	34.20	3.03	5.63	0.43	9.09	2.16	3.03	3.46	1.30	0.00	0.00	0.00	0.00
	15-45	41.15	5.74	12.44	8.13	7.66	3.83	32.06	4.78	6.22	0.00	11.00	2.87	2.87	1.91	1.44	0.96	0.00	0.00	0.00
	45-150	32.80	5.91	13.44	12.90	8.06	3.23	37.63	6.45	4.30	0.00	10.75	4.30	4.30	2.69	1.08	0.54	0.00	0.00	0.00
2	0-25	40.61	7.61	13.17	6.60	5.58	5.08	30.43	2.03	4.06	0.00	6.09	4.09	5.08	3.05	1.53	0.51	0.00	0.51	0.51
	25-65	28.57	7.14	14.24	10.20	6.63	4.59	35.67	3.57	8.16	0.51	12.24	9.75	2.55	1.02	2.04	0.00	0.00	1.02	0.00
	65-150	39.88	4.91	9.20	10.43	4.29	7.98	31.90	2.45	1.84	0.00	4.29	2.45	3.07	6.75	3.68	0.61	0.61	1.84	0.00
3	0-10	45.45	6.82	9.94	1.99	2.84	2.27	17.05	2.56	4.55	0.28	7.39	0.28	3.41	10.80	4.83	2.84	1.14	0.00	0.00
	10 30	35.14	8.78	15.88	2.70	4.39	2.03	25.00	2.03	4.73	1.69	8.45	1.01	6.42	5.74	5.74	1.35	2.36	0.00	0.00
	30-150	37.36	6.04	12.08	4.53	3.77	4.53	24.91	4.15	3.40	0.38	7.92	2.64	2.64	11.32	3.77	2.64	0.75	0.00	0.00
4	0-25	19.26	6.67	13.70	4.07	2.59	0.74	21.11	5.19	16.67	1.48	23.33	20.00	5.19	1.85	1.48	0.74	0.37	0.00	0.00
	25-45	24.13	3.49	11.75	2.22	0.00	2.22	16.19	3.17	6.98	0.63	10.79	40.63	3.49	0.63	0.00	0.63	0.00	0.00	0.00
	45-150	34.82	10.53	8.91	2.02	3.24	1.21	15.38	3.24	19.84	0.81	23.89	10.93	0.40	2.02	1.62	0.40	0.00	0.00	0.00

*Aug.: augite, Diop.: diopside, Hyp.: hypersthene, Enst.: enstatite, Horn.: hornblende, Alt.Chlor.: altered to chlorite, Trem.: tremolite, Tourm.: tourmaline, Sturo.: staurolite.

Table(10): Frequency distribution of heavy and light minerals in the studied soil samples.

Profile No.	Depth (Cm)	Heavy	Opaq- Ues	Epid- otes	Pyroxens					Amphiboles				Bio- tite	Sph- ene	Zircon	Garnet	Rutile	Tourm.	Ligh.	Quartz	Feldspars		Total	Calci
					Aug.	Diop.	Hyp	Enst	Total	Horn	Alt.Chlor	Trem	Total									Fresh	Alter		
1	0-15	2.52	1.00	0.17	0.48	0.17	0.11	0.10	0.86	0.08	0.14	0.01	0.23	0.05	0.08	0.09	0.03	0.00	0.00	38.26	33.16	2.04	2.81	4.85	0.26
	15-45	1.7	0.70	0.10	0.21	0.14	0.13	0.07	0.54	0.08	0.11	0.00	0.19	0.05	0.05	0.03	0.02	0.02	0.00	26.72	24.39	1.22	0.90	2.12	0.21
	45-150	7.28	2.39	0.43	0.98	0.94	0.59	0.23	2.74	0.47	0.31	0.00	0.78	0.31	0.31	0.20	0.08	0.04	0.00	75.88	65.63	2.56	6.67	9.23	1.03
2	0-25	0.5	0.20	0.04	0.06	0.03	0.04	0.03	0.15	0.01	0.02	0.00	0.03	0.02	0.03	0.02	0.01	0.00	0.00	20.26	18.49	0.32	0.96	1.29	0.48
	25-65	0.14	0.04	0.01	0.02	0.01	0.01	0.01	0.05	0.01	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	21.78	18.37	1.33	1.14	2.46	0.95
	65-150	0.22	0.09	0.01	0.02	0.02	0.01	0.02	0.07	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	11.34	10.07	0.53	0.53	1.06	0.21
3	0-10	0.52	0.24	0.04	0.05	0.01	0.01	0.01	0.09	0.01	0.02	0.00	0.04	0.00	0.02	0.06	0.03	0.01	0.01	24.2	21.66	0.45	1.05	1.49	1.05
	10 30	0.68	0.24	0.06	0.11	0.02	0.03	0.01	0.17	0.01	0.03	0.01	0.06	0.01	0.04	0.04	0.04	0.01	0.02	16.56	14.69	0.40	0.93	1.34	0.53
	30-150	0.54	0.20	0.03	0.07	0.02	0.02	0.02	0.13	0.02	0.02	0.00	0.04	0.01	0.01	0.06	0.02	0.01	0.00	30.64	25.20	1.61	2.22	3.83	1.61
4	0-25	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	8.64	7.80	0.21	0.49	0.70	0.14
	25-45	0.1	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	8.644	7.59	0.12	0.82	0.93	0.12
	45-150	0.06	0.02	10.53	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	2.3	2.06	0.06	0.15	0.21	0.03