



2019 North American Proficiency Testing Program
Quarter 2 Soil Report - Monday, July 08, 2019

Laboratory ID
General

Soil	Soil 2019-106				Soil 2019-107			Soil 2019-108			Soil 2019-109			Soil 2019-110			
Analysis	Units	n	Median	MAD	Lab ^{1,2}	Median	MAD	Lab ^{1,2}	Median	MAD	Lab ^{1,2}	Median	MAD	Lab ^{1,2}	Median	MAD	Lab ^{1,2}
Salinity																	
Sat. Paste Moisture	%	19	22.0	2.80		56.7	2.34		41.6	1.83		45.1	2.43		50.0	2.48	
pH - sp	Unit	26	7.07	0.115		7.00	0.095		7.63	0.170		6.51	0.080		5.26	0.075	
ECe - sp	dS/m	25	1.40	0.180		1.40	0.120		0.758	0.077		0.880	0.080		0.312	0.066	
HCO ₃ - sp	mmolc/L	12	2.22	0.398		2.36	0.380		2.88	0.469		1.39	0.325		1.10	0.191	
Ca - sp	mmolc/L	23	7.66	0.590		7.73	0.660		5.50	0.630		6.40	0.676		1.78	0.316	
Mg - sp	mmolc/L	23	0.820	0.124		5.41	0.337		1.85	0.152		1.04	0.157		0.640	0.110	
Na - sp	mmolc/L	23	0.700	0.096		0.190	0.024		0.970	0.100		0.187	0.033		0.130	0.012	
SAR - sp	value	22	0.310	0.020		0.095	0.012		0.482	0.045		0.100	0.020		0.100	0.008	
Cl - sp	mmolc/L	14	0.780	0.116		0.276	0.037		0.362	0.063		0.200	0.029		0.200	0.016	
SO ₄ - sp	mmolc/L	16	1.15	0.135		1.63	0.144		1.30	0.110		0.385	0.037		0.458	0.062	
NO ₃ - sp	mmolc/L	11	7.36	1.14		8.71	0.933		3.16	0.460		5.60	1.19		0.170	0.026	
B - sp	mg/L	11	0.040	0.005		0.077	0.014		0.230	0.040		0.060	0.011		0.070	0.010	
Soil pH & EC																	
Soil EC (1:1)	(dS/m)	39	0.327	0.046		0.780	0.066		0.260	0.060		0.410	0.030		0.190	0.028	
Soil EC (1:2)	(dS/m)	38	0.230	0.030		0.505	0.054		0.215	0.039		0.241	0.019		0.125	0.012	
pH (1:1) Water	Unit	78	7.20	0.070		7.07	0.046		7.88	0.075		6.62	0.045		5.27	0.040	
pH (1:2) Water	Unit	27	7.32	0.070		7.14	0.060		8.06	0.090		6.76	0.050		5.37	0.060	
pH (1:1) 0.01M CaCl ₂	Unit	28	6.82	0.040		6.81	0.061		7.45	0.050		6.29	0.030		4.76	0.052	
pH (1:2) 0.01M CaCl ₂	Unit	13	6.80	0.070		6.87	0.040		7.42	0.100		6.31	0.066		4.79	0.075	
Buffer pH, Lime Req.																	
SMP Buffer pH	Unit	23	7.32	0.050		7.13	0.040		7.48	0.059		7.14	0.040		6.50	0.090	
Adams-Evans Buf pH	Unit	5	7.92	0.050		7.68	0.080		7.93	0.060		7.73	0.080		7.43	0.030	
Woodruff Buf. pH	Unit	19	6.99	0.020		6.95	0.040		7.08	0.026		6.89	0.040		6.46	0.050	
Mehlich Buffer pH	Unit	7	6.62	0.050		6.57	0.050		6.75	0.050		6.45	0.040		5.96	0.100	
Sikora Buffer pH	Unit	31	7.45	0.050		7.19	0.050		7.51	0.040		7.14	0.060		6.54	0.065	
Titrateable Acidity	cmol/kg																
Inorganic Nitrogen (NO₃-N & NH₄-N)																	
NO ₃ -N Cd. Rd.	mg/kg	61	33.2	2.91		83.9	3.10		25.8	1.28		42.8	1.89		14.9	1.00	
NO ₃ -N ISE	mg/kg	9	33.1	1.82		88.0	2.55		28.5	2.70		43.2	0.800		15.0	1.49	
NO ₃ -N CTA	mg/kg	2	25.4	1.32		71.1	11.9		21.2	0.151		36.0	2.41		13.4	0.301	
NO ₃ -N Ion Chr.	mg/kg	3	37.0	5.80		93.0	7.80		27.0	2.50		46.0	2.40		16.3	0.700	
NO ₃ -N Other	mg/kg	6	36.0	3.88		87.1	7.36		25.5	1.70		45.5	1.37		15.5	1.65	
NH ₄ - N (KCl Extr.)	mg/kg	48	15.2	1.42		12.2	0.950		5.19	0.490		2.62	0.375		5.72	0.645	
Phosphorus and Sulfur																	
PO ₄ -P Bray P (1:10)	mg/kg	47	60.2	4.50		218	10.0		46.3	3.30		28.2	1.53		61.2	2.83	
PO ₄ -P Bray P1 (1:7)	mg/kg	5	52.0	2.05		143	1.60		36.7	2.90		23.2	2.28		49.8	2.29	
PO ₄ -P Olsen/Bicarb	mg/kg	54	15.9	2.00		143	12.8		19.8	1.80		21.8	2.08		36.0	3.00	
PO ₄ -P AB-DTPA	mg/kg	2	13.3	0.665		74.3	5.20		16.8	1.79		11.8	0.982		16.8	0.672	
PO ₄ -P Modified Morgan	mg/kg	4	5.60	0.170		70.1	2.45		32.6	2.40		4.22	0.165		4.53	0.125	
PO ₄ -P True Morgan	mg/kg	7	6.00	0.200		71.0	8.00		32.4	1.60		5.30	0.120		5.70	0.300	
PO ₄ -P Mod. Kewlona	mg/kg																
PO ₄ -P Stong Bray (1:10)	mg/kg	10	74.5	7.25		460	13.6		152	10.8		60.8	2.22		80.3	4.15	
PO ₄ -P Water Soluble	mg/kg																
SO ₄ - S (PO ₄ Extr.)	mg/kg	31	6.20	1.15		16.0	2.50		10.3	2.15		4.37	0.45		6.25	1.35	

1 - Values flagged exceed Warning Limits " * " 2.5 x MAD (Median Absolute Deviation) and Control Limits " * * " 4 x MAD.
2 - Limits not compared to lab data for methods with less than 7 labs reporting.

Bases												
K Ammonium Acetate	mg/kg	71	175	13.4	489	23.0	118	8.30	242	11.0	226	10.4
Ca Ammonium Acetate	mg/kg	65	581	59.1	3,580	185	1,650	111	2,110	106	1,080	53.5
Mg Ammonium Acetate	mg/kg	64	25.4	5.73	896	44.6	155	11.8	130	8.10	155	7.18
Na Ammonium Acetate	mg/kg	52	12.5	2.34	12.3	2.25	26.1	3.39	10.7	1.18	09.7	1.34
Bray Extractable K	mg/kg	6	168	15.5	334	25.6	107	10.2	191	8.85	171	6.05
K- Olsen/Bicarb.	mg/kg	5	160	5.00	463	18.0	134	1.00	221	4.00	225	9.00
K Modified Morgan	mg/kg	3	154	6.00	487	2.00	115	1.00	238	4.00	229	2.00
K True Morgan	mg/kg	5	133	12.0	314	17.0	100	4.50	159	12.0	166	12.5
Ca Modified Morgan	mg/kg	2	512	42.0	3,780	52.8	1,760	93.2	2,150	116	1,090	76.2
Aluminum KCL Extr.	mg/kg	5	1.00	0.100	0.584	0.450	0.800	0.400	0.300	0.197	9.40	1.00

Mehlich-1 Multi Element (scoop)												
Scoop Soil Mass	g	4	5.00	0.000	5.00	0.000	5.00	0.000	5.00	0.000	5.00	0.000
P	mg/kg	8	33.8	1.46	191	29.0	120	11.1	31.7	1.57	31.6	1.10
K	mg/kg	8	159	9.54	318	20.6	110	5.34	166	10.4	159	7.58
Ca	mg/kg	8	649	45.9	3,930	339	2,060	93.3	1,940	69.3	943	36.6
Mg	mg/kg	8	25.6	3.32	842	58.2	175	8.56	116	2.00	131	3.36
Mn	mg/kg	7	8.95	0.651	58.8	3.06	50.4	3.00	23.9	0.750	90.7	3.79
Zn	mg/kg	7	1.42	0.060	12.5	1.74	1.62	0.120	2.53	0.160	2.53	0.150

Mehlich-3 Multi-Element (scoop)												
Scoop Soil Mass	g	23	2.46	0.080	2.03	0.090	2.11	0.070	2.06	0.060	1.94	0.100
Assumed Density	g/cm ³	20	1.22	0.042	1.05	0.090	1.12	0.060	1.07	0.072	0.990	0.075
Volume of Scoop	cm ³	23	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000
Extractant Volume mL	mL	17	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000
P Colorimetric	mg/kg	9	61.1	1.40	269	16.0	70.9	2.20	33.0	2.00	63.9	1.20
P ICP-AES	mg/kg	46	75.9	3.54	294	11.8	74.0	5.12	35.8	1.86	72.9	3.13
K	mg/kg	47	187	10.7	495	17.3	128	7.70	251	11.0	221	12.8
Ca	mg/kg	45	669	60.1	4,030	158	2,000	109	2,230	72.0	1,090	71.1
Mg	mg/kg	45	35.0	5.56	983	40.0	198	8.00	144	8.00	160	9.60
Na	mg/kg	31	15.0	2.93	13.4	3.05	28.2	4.30	12.2	2.36	11.0	2.53
S	mg/kg	39	12.0	1.34	24.1	1.70	17.2	1.48	7.80	1.60	11.1	1.20
Al	mg/kg	29	752	35.7	496	34.0	369	23.3	683	36.0	828	54.8
Zn	mg/kg	41	2.36	0.210	16.4	1.67	1.74	0.160	3.27	0.230	3.34	0.240
Mn	mg/kg	41	10.0	0.720	45.7	4.09	70.2	3.80	140	9.51	170	9.94
Fe	mg/kg	41	146	8.69	439	49.6	185	11.8	214	9.99	248	11.6
Cu	mg/kg	40	0.705	0.105	4.39	0.590	1.86	0.135	4.33	0.170	1.16	0.095
B	mg/kg	33	0.270	0.023	1.70	0.130	1.06	0.110	0.530	0.100	0.390	0.085

Micronutrients												
Zn - DTPA	mg/kg	61	0.624	0.108	10.6	0.718	0.500	0.066	2.04	0.152	2.20	0.170
Mn - DTPA	mg/kg	46	4.11	0.507	19.8	3.01	17.2	1.40	11.3	1.59	82.1	9.26
Fe - DTPA	mg/kg	50	23.8	2.80	168	22.4	21.0	2.88	43.4	6.16	95.2	12.7
Cu - DTPA	mg/kg	51	0.270	0.052	3.29	0.290	0.652	0.058	2.36	0.170	0.960	0.110
Zn - HCl	mg/kg	3	1.80	0.460	20.9	3.56	2.03	0.130	3.60	0.600	3.70	0.200
Mn-H3PO4	mg/kg	12	7.46	0.515	30.5	2.65	37.8	2.75	12.5	1.05	72.7	6.26
Cl - Ca(NO3)2 Extr.	mg/kg	15	9.50	1.71	4.98	0.50	6.20	1.20	3.00	0.33	3.09	0.590
B - Hot Wat.	mg/kg	27	0.130	0.030	0.890	0.190	0.620	0.110	0.357	0.088	0.320	0.058
B-DTPA/Sorbitol	mg/kg	18	0.072	0.010	0.705	0.070	0.450	0.060	0.235	0.026	0.200	0.050

Soil Organic Matter												
Soil Kjeldahl N	%	11	0.040	0.006	0.294	0.010	0.058	0.006	0.105	0.005	0.150	0.005
Soil TN (combustion)	%	30	0.044	0.007	0.321	0.014	0.063	0.007	0.114	0.006	0.163	0.013
Soil TOC (Combustion)	%	8	0.424	0.035	3.41	0.100	0.576	0.018	0.888	0.017	1.58	0.045
Soil Total C (Combustion)	%	25	0.460	0.020	3.53	0.099	0.600	0.038	0.894	0.026	1.57	0.050

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SOM - Walkley-Black	%	27	0.940	0.130	5.52	0.220	1.10	0.100	1.50	0.144	2.80	0.140
SOM - LOI (% Wt loss)	%	63	1.00	0.070	5.83	0.230	1.30	0.100	2.06	0.140	3.27	0.135
Other												
CaCO3 Content	%	10	0.470	0.086	2.06	0.478	0.630	0.098	0.490	0.074	0.370	0.076
CEC - Cation Displacement	cmol/kg	11	3.20	0.330	29.3	4.29	7.03	1.08	13.1	1.60	10.5	1.85
CEC - Estimation	cmol/kg	13	3.80	0.200	28.5	1.70	10.6	0.550	13.3	0.650	12.2	1.20
Soil Density (Scoop)	g/cc	10	1.42	0.020	1.16	0.020	1.24	0.014	1.20	0.015	1.10	0.025
Particle Size Analysis-Hydrometer												
Sand 2000 - 50 um	%	29	78.0	1.60	19.2	3.27	65.0	2.80	15.0	3.00	13.3	1.83
Silt 50 - 2 um	%	29	13.2	1.20	52.8	2.80	27.7	3.70	64.0	3.00	69.0	3.30
Clay 2 - 0 um	%	29	7.60	1.60	28.7	3.10	6.10	1.30	21.0	1.75	17.8	1.60
Particle Size Analysis- Pipette												
Sand 2000 - 50 um	%	3	80.0	0.000	12.0	1.70	74.0	1.00	8.00	2.00	3.00	1.16
Silt 50 - 2 um	%	3	16.0	0.300	57.0	2.00	23.0	2.00	71.0	1.00	79.0	0.400
Clay 2 - 0 um	%	3	5.00	0.690	29.9	1.10	4.00	0.890	21.0	0.200	18.0	0.800
Solvita CO2												
Solvita CO2	ppm	5	16.0	9.00	89.0	26.4	29.6	8.60	48.6	11.4	141	7.00