



2021 North American Proficiency Testing Program
Quarter 2 Soil Report - Tuesday, July 27, 2021

Laboratory ID
General

Soil	Soil 2021-106				Soil 2021-107			Soil 2021-108			Soil 2021-109			Soil 2021-110			
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	%	15	49.0	4.70		44.0	3.00		49.2	2.40		56.1	5.30		26.9	2.10	
pH - sp	Unit	26	6.11	0.120		6.29	0.160		6.38	0.090		6.60	0.060		7.55	0.085	
ECe - sp	dS/m	24	0.820	0.125		1.07	0.110		0.914	0.111		0.580	0.054		2.78	0.350	
HCO ₃ - sp	mmolc/L	10	1.66	0.278		1.94	0.430		1.99	0.428		4.14	0.768		2.60	0.490	
Ca - sp	mmolc/L	20	5.41	0.930		3.29	0.490		3.96	0.460		3.68	0.476		14.8	2.40	
Mg - sp	mmolc/L	20	2.49	0.530		1.83	0.370		1.59	0.208		2.27	0.200		7.05	1.37	
Na - sp	mmolc/L	20	0.260	0.050		1.32	0.132		0.225	0.035		0.372	0.036		10.2	1.70	
SAR - sp	value	16	0.119	0.019		0.810	0.080		0.130	0.030		0.210	0.020		3.06	0.235	
Cl - sp	mmolc/L	13	0.240	0.060		0.895	0.114		1.56	0.205		0.240	0.040		2.66	0.285	
SO ₄ - sp	mmolc/L	14	1.22	0.055		3.00	0.195		1.19	0.074		0.810	0.065		20.3	2.72	
NO ₃ - sp	mmolc/L	9	4.97	1.00		4.12	0.83		3.51	0.72		0.350	0.077		6.95	1.18	
B - sp	mg/L	12	0.203	0.023		0.177	0.042		0.124	0.024		0.110	0.020		0.088	0.018	
Soil pH & EC																	
Soil EC (1:1)	(dS/m)	34	0.470	0.036		0.430	0.052		0.400	0.040		0.348	0.048		0.668	0.065	
Soil EC (1:2)	(dS/m)	37	0.310	0.030		0.340	0.032		0.300	0.030		0.200	0.022		0.501	0.086	
pH (1:1) Water	Unit	79	6.11	0.060		6.28	0.050		6.43	0.050		6.75	0.060		7.76	0.050	
pH (1:2) Water	Unit	24	6.25	0.059		6.42	0.096		6.58	0.060		6.85	0.070		7.85	0.150	
pH (1:1) 0.01M CaCl ₂	Unit	21	5.81	0.030		5.87	0.040		6.05	0.040		6.33	0.030		7.50	0.030	
pH (1:2) 0.01M CaCl ₂	Unit	10	5.77	0.035		5.80	0.055		6.02	0.070		6.30	0.050		7.38	0.045	
Buffer pH, Lime Req.																	
SMP Buffer pH	Unit	24	6.88	0.046		6.94	0.060		6.97	0.055		6.95	0.050		7.50	0.035	
Adams-Evans Buf pH	Unit	9	7.59	0.070		7.68	0.050		7.66	0.060		7.52	0.070		7.92	0.020	
Woodruff Buf. pH	Unit	21	6.75	0.040		6.78	0.030		6.81	0.020		6.84	0.040		7.08	0.030	
Mehlich Buffer pH	Unit	9	6.18	0.060		6.34	0.040		6.39	0.040		6.32	0.020		6.69	0.020	
Sikora Buffer pH	Unit	32	6.91	0.045		7.03	0.045		7.00	0.075		6.96	0.040		7.55	0.030	
Titrateable Acidity	cmol/kg																
Inorganic Nitrogen (NO₃-N & NH₄-N)																	
NO ₃ -N Cd. Rd.	mg/kg	61	48.0	2.50		42.0	2.50		33.0	2.10		13.0	0.600		29.6	2.39	
NO ₃ -N ISE	mg/kg	7	48.0	4.75		44.2	8.18		35.2	3.25		17.2	3.05		30.8	7.90	
NO ₃ -N CTA	mg/kg	1	47.0	0.000		37.0	0.000		113	0.000		10.0	0.000		20.0	0.000	
NO ₃ -N Ion Chr.	mg/kg	1	53.0	0.000		48.0	0.000		38.0	0.000		15.0	0.000		31.0	0.000	
NO ₃ -N Other	mg/kg	10	43.0	5.69		40.7	1.36		32.3	1.99		12.7	0.800		26.7	1.58	
NH ₄ - N (KCl Extr.)	mg/kg	47	8.00	0.800		71.2	5.42		110	5.30		10.9	1.20		1.04	0.167	
Phosphorus and Sulfur																	
PO ₄ -P Bray P (1:10)	mg/kg	42	36.2	2.25		469	45.2		26.7	3.90		38.0	2.00		60.7	5.19	
PO ₄ -P Bray P1 (1:7)	mg/kg	7	36.9	1.60		361	29.0		19.9	5.92		38.4	4.45		52.0	1.30	
PO ₄ -P Olsen/Bicarb	mg/kg	50	24.0	1.40		99.7	8.65		26.7	2.05		21.8	1.53		27.0	2.56	
PO ₄ -P AB-DTPA	mg/kg	1	24.4	0.000		140	0.000		25.0	0.000		18.9	0.000		33.5	0.000	
PO ₄ -P Modified Morgan	mg/kg	3	12.8	0.100		38.4	2.90		5.50	1.20		6.70	0.200		41.2	1.50	
PO ₄ -P True Morgan	mg/kg	7	13.4	0.900		38.2	2.30		6.10	0.200		7.50	0.300		39.8	2.92	
PO ₄ -P Mod. Kewlona	mg/kg	2	23.7	1.70		232	43.0		11.9	1.10		27.6	2.05		36.2	4.95	
PO ₄ -P Stong Bray (1:10)	mg/kg	11	84.8	4.17		736	36.0		81.5	6.82		65.0	3.53		149	12.7	
PO ₄ -P Water Soluble	mg/kg	1	3.76	0.000		27.3	0.000		3.51	0.000		1.75	0.000		2.00	0.000	
SO ₄ - S (PO ₄ Extr.)	mg/kg	24	8.40	0.915		19.4	1.57		8.25	1.90		6.80	0.93		73.6	13.3	

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	65	257	12.0	441	23.9	216	11.0	417	22.2	99.1	9.10	
Ca Ammonium Acetate	mg/kg	59	2,580	123	904	51.0	1,350	64.3	2,870	162	1,250	96.0	
Mg Ammonium Acetate	mg/kg	59	414	13.9	147	7.00	183	7.80	676	35.5	217	11.8	
Na Ammonium Acetate	mg/kg	50	15.3	2.90	32.0	3.94	10.9	1.40	21.0	2.94	130	9.55	
Bray Extractable K	mg/kg	6	194	10.6	366	29.4	178	7.30	279	15.3	104	5.79	
K- Olsen/Bicarb.	mg/kg	4	210	1.56	421	11.0	201	2.66	308	2.02	112	5.14	
K Modified Morgan	mg/kg	3	254	21.5	448	8.50	222	10.0	396	14.5	86.5	5.50	
K True Morgan	mg/kg	5	163	5.00	375	12.0	160	13.7	238	9.50	74.0	12.6	
Ca Modified Morgan	mg/kg	2	2,740	50.0	1,050	68.8	1,550	113	3,160	63.0	1,300	99.0	
Aluminum KCL Extr.	mg/kg	3	0.700	0.350	0.850	0.188	0.930	0.812	0.237	0.063	0.224	0.076	

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	9	72.8	2.98	459	15.0	13.3	1.17	44.0	3.39	143	4.05	
K	mg/kg	9	154	10.9	366	10.9	163	7.05	234	11.8	92.3	3.18	
Ca	mg/kg	9	2,560	122	1,580	72.0	1,440	20.5	2,540	80.7	1,540	41.4	
Mg	mg/kg	9	387	21.7	162	3.84	177	5.07	567	13.2	252	13.3	
Mn	mg/kg	8	120	13.4	46.4	2.18	647	34.1	98.8	3.02	23.4	1.20	
Zn	mg/kg	8	2.98	0.100	18.8	1.04	3.57	0.100	3.34	0.105	16.1	0.665	

Mehlich-3 Mult-Element (scoop)													
Scoop Soil Mass	g	27	2.02	0.055	1.92	0.080	1.94	0.080	1.92	0.080	2.36	0.106	
Assumed Density	g/cm3	22	1.02	0.048	0.961	0.071	0.987	0.074	0.990	0.072	1.18	0.045	
Volume of Scoop	cm3	28	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000	
Extractant Volume mL	mL	20	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	
P Colorimetric	mg/kg	10	39.8	1.86	600	45.6	34.1	4.45	41.1	1.74	94.7	10.6	
P ICP-AES	mg/kg	56	49.0	2.65	679	29.9	38.3	4.60	50.0	2.56	95.9	6.18	
K	mg/kg	55	248	7.80	440	20.0	220	9.75	396	22.7	114	7.00	
Ca	mg/kg	54	2,820	110	1,390	81.8	1,520	61.3	3,010	148	1,510	70.0	
Mg	mg/kg	54	444	19.4	170	9.50	200	8.35	692	29.7	288	16.4	
Na	mg/kg	45	16.4	2.40	39.1	2.40	12.7	2.46	21.0	1.96	146	8.42	
S	mg/kg	48	14.6	1.05	34.3	1.85	14.8	0.800	15.0	1.00	127	10.3	
Al	mg/kg	35	392	12.0	952	44.6	531	26.5	762	28.9	335	20.9	
Zn	mg/kg	50	4.13	0.239	20.8	1.04	3.18	0.170	4.82	0.285	18.5	0.980	
Mn	mg/kg	49	264	20.9	44.0	2.40	500	22.7	179	10.7	90.6	5.39	
Fe	mg/kg	49	134	6.99	400	37.0	590	51.2	142	7.96	111	9.90	
Cu	mg/kg	47	1.68	0.080	25.7	2.20	0.770	0.116	2.68	0.125	29.1	1.83	
B	mg/kg	43	1.12	0.120	0.795	0.095	0.765	0.178	1.12	0.110	0.530	0.060	

Micronutrients													
Zn - DTPA	mg/kg	55	2.50	0.140	6.47	0.470	1.97	0.170	3.01	0.214	5.67	0.790	
Mn - DTPA	mg/kg	44	99.6	7.52	27.5	1.76	292	18.0	87.0	5.82	4.50	0.870	
Fe - DTPA	mg/kg	47	46.0	4.20	120	17.3	195	17.0	41.4	3.97	8.68	1.28	
Cu - DTPA	mg/kg	48	0.910	0.073	19.4	1.59	2.15	0.195	1.50	0.105	11.4	1.54	
Zn - HCl	mg/kg	1	4.30	0.000	20.2	0.000	4.76	0.000	4.74	0.000	17.9	0.000	
Mn-H3PO4	mg/kg	11	87.5	5.61	39.0	1.81	418	40.4	73.6	5.58	14.9	1.59	
Cl - Ca(NO3)2 Extr.	mg/kg	15	3.60	0.28	12.2	1.61	23.1	0.800	4.60	1.14	28.7	3.36	
B - Hot Wat.	mg/kg	25	0.810	0.190	0.580	0.130	0.421	0.055	0.710	0.160	0.260	0.059	
B-DTPA/Sorbitol	mg/kg	19	0.430	0.030	0.357	0.060	0.430	0.100	0.500	0.020	0.220	0.025	

Soil Organic Matter													
Soil Kjeldahl N	%	8	0.206	0.003	0.176	0.006	0.152	0.004	0.258	0.009	0.040	0.005	
Soil TN (combustion)	%	39	0.205	0.006	0.180	0.010	0.160	0.010	0.266	0.014	0.039	0.008	
Soil TOC (Combustion)	%	12	2.25	0.115	1.70	0.100	1.54	0.066	2.75	0.155	0.290	0.014	
Soil Total C (Combustion)	%	33	2.23	0.070	1.70	0.060	1.57	0.044	2.73	0.110	0.320	0.020	

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SOM - Walkley-Black	%	18	3.70	0.090	3.10	0.050	2.73	0.135	4.76	0.240	0.615	0.114
SOM - LOI (% Wt loss)	%	65	3.88	0.170	3.29	0.110	3.06	0.080	5.18	0.180	0.720	0.080
Other												
CaCO3 Content	%	7	0.410	0.140	0.400	0.100	0.590	0.110	0.500	0.200	0.500	0.100
CEC - Cation Displacement	cmol/kg	8	20.9	1.16	9.88	1.52	13.2	1.59	25.7	1.20	6.10	0.850
CEC - Estimation	cmol/kg	11	19.1	0.900	10.2	2.40	10.2	0.810	22.0	1.60	9.35	0.550
Soil Density (Scoop)	g/cc	12	1.18	0.015	1.10	0.024	1.12	0.025	1.12	0.032	1.40	0.050
Particle Size Analysis-Hydrometer												
Sand 2000 - 50 um	%	28	60.0	2.60	32.8	3.00	13.4	3.00	17.3	3.72	54.0	2.80
Silt 50 - 2 um	%	28	20.5	4.43	53.0	3.00	69.0	3.75	55.0	4.95	35.2	3.20
Clay 2 - 0 um	%	28	18.9	3.15	13.5	1.40	18.0	3.18	28.4	2.50	10.0	1.21
Particle Size Analysis- Pipette												
Sand 2000 - 50 um	%	3	62.0	1.00	34.5	0.530	11.0	2.71	11.0	3.00	58.0	1.94
Silt 50 - 2 um	%	3	19.0	0.900	58.0	1.00	77.0	1.00	61.0	0.050	34.0	1.00
Clay 2 - 0 um	%	3	17.4	2.61	11.4	3.55	15.0	4.01	28.0	3.99	8.00	0.080
Solvita CO2												
	ppm	8	116	24.9	111	22.1	109	23.2	154	22.1	11.3	1.51

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