



2020 North American Proficiency Testing Program
Quarter 1 Soil Report - Tuesday, May 12, 2020

Laboratory ID
General

Soil	Soil 2020-101				Soil 2020-102				Soil 2020-103				Soil 2020-104				Soil 2020-105			
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	%	25	37.7	3.79		59.9	3.10		33.6	3.20		56.0	3.00		65.0	3.89				
pH - sp	Unit	32	5.33	0.060		5.84	0.085		7.80	0.095		6.36	0.070		7.00	0.085				
ECe - sp	dS/m	31	0.581	0.067		0.350	0.050		0.730	0.084		0.920	0.130		0.899	0.109				
HCO ₃ - sp	mmolc/L	17	1.53	0.291		0.637	0.060		5.00	1.03		2.08	0.37		3.52	0.590				
Ca - sp	mmolc/L	29	2.70	0.350		1.74	0.310		4.96	0.535		6.19	1.15		7.45	0.778				
Mg - sp	mmolc/L	29	1.36	0.216		0.490	0.080		1.89	0.167		2.20	0.260		1.15	0.100				
Na - sp	mmolc/L	27	0.100	0.008		0.247	0.034		0.970	0.110		1.04	0.090		0.200	0.030				
SAR - sp	value	24	0.085	0.007		0.210	0.020		0.500	0.030		0.490	0.030		0.100	0.010				
Cl - sp	mmolc/L	19	0.170	0.023		0.452	0.068		1.12	0.213		0.438	0.072		0.190	0.024				
SO ₄ - sp	mmolc/L	21	0.760	0.110		0.924	0.124		1.51	0.220		0.880	0.104		0.410	0.050				
NO ₃ - sp	mmolc/L	12	1.63	0.369		0.320	0.060		0.055	0.011		1.67	0.40		3.56	0.75				
B - sp	mg/L	17	0.110	0.020		0.055	0.011		0.090	0.013		0.049	0.008		0.090	0.020				
Soil pH & EC																				
Soil EC (1:1)	(dS/m)	39	0.220	0.030		0.180	0.030		0.310	0.029		0.518	0.068		0.370	0.053				
Soil EC (1:2)	(dS/m)	48	0.144	0.015		0.144	0.030		0.219	0.021		0.320	0.030		0.303	0.054				
pH (1:1) Water	Unit	80	5.50	0.060		5.87	0.068		8.11	0.082		6.51	0.060		7.10	0.065				
pH (1:2) Water	Unit	32	5.65	0.070		5.94	0.115		8.18	0.075		6.62	0.085		7.15	0.095				
pH (1:1) 0.01M CaCl ₂	Unit	26	4.99	0.020		5.35	0.030		7.68	0.040		6.16	0.030		6.72	0.060				
pH (1:2) 0.01M CaCl ₂	Unit	11	4.99	0.010		5.33	0.030		7.58	0.040		6.18	0.050		6.78	0.060				
Buffer pH, Lime Req.																				
SMP Buffer pH	Unit	30	6.66	0.065		6.52	0.130		7.50	0.045		6.96	0.074		7.14	0.060				
Adams-Evans Buf pH	Unit	7	7.58	0.060		7.40	0.110		7.81	0.050		7.58	0.070		7.79	0.120				
Woodruff Buf. pH	Unit	19	6.55	0.050		6.52	0.030		7.12	0.030		6.79	0.030		6.96	0.050				
Mehlich Buffer pH	Unit	8	6.00	0.050		6.06	0.045		6.90	0.055		6.30	0.030		6.58	0.080				
Sikora Buffer pH	Unit	35	6.74	0.060		6.60	0.060		7.54	0.035		6.94	0.060		7.20	0.055				
Titrateable Acidity	cmol/kg																			
Inorganic Nitrogen (NO₃-N & NH₄-N)																				
NO ₃ -N Cd. Rd.	mg/kg	72	13.4	0.700		16.3	1.95		4.70	0.560		49.0	1.70		46.1	4.92				
NO ₃ -N ISE	mg/kg	3	15.0	0.970		20.3	1.21		5.25	0.250		49.0	3.51		52.0	0.620				
NO ₃ -N CTA	mg/kg	2	14.4	2.05		17.9	2.20		5.65	0.386		50.6	4.29		49.3	3.54				
NO ₃ -N Ion Chr.	mg/kg	1	12.7	0.000		17.0	0.000		5.20	0.000		53.9	0.000		52.5	0.000				
NO ₃ -N Other _____	mg/kg	12	14.0	2.16		16.4	0.550		5.25	1.04		49.8	3.92		48.0	7.10				
NH ₄ - N (KCl Extr.)	mg/kg	56	9.02	0.885		9.22	1.23		5.42	0.855		7.50	0.845		3.61	0.688				
Phosphorus and Sulfur																				
PO ₄ -P Bray P (1:10)	mg/kg	47	69.0	5.80		140	17.0		28.4	2.50		13.5	1.50		149	12.8				
PO ₄ -P Bray P1 (1:7)	mg/kg	9	59.0	3.10		82.7	15.0		21.0	2.20		10.7	1.31		88.8	16.2				
PO ₄ -P Olsen/Bicarb	mg/kg	58	38.1	2.84		48.0	6.74		11.4	1.46		8.70	1.15		67.8	8.43				
PO ₄ -P AB-DTPA	mg/kg	3	24.1	3.28		17.7	2.16		5.78	0.057		7.08	2.15		39.4	4.27				
PO ₄ -P Modified Morgan	mg/kg	4	9.85	0.425		4.61	0.540		24.2	2.95		1.95	0.510		40.1	1.70				
PO ₄ -P True Morgan	mg/kg	8	12.2	0.800		5.28	0.695		26.6	0.790		2.88	0.675		38.2	3.25				
PO ₄ -P Mod. Kewlona	mg/kg	3	54.9	2.09		66.8	1.65		29.0	3.20		12.0	0.100		170	14.0				
PO ₄ -P Stong Bray (1:10)	mg/kg	10	102	3.12		230	8.50		130	3.25		35.6	1.32		365	19.5				
PO ₄ -P Water Soluble	mg/kg	1	3.36	0.000		1.12	0.000		0.880	0.000		0.400	0.000		1.28	0.000				
SO ₄ - S (PO ₄ Extr.)	mg/kg	32	5.12	0.920		19.1	3.17		9.90	1.02		8.95	1.68		5.00	0.59				

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	78	482	19.7	342	58.4	368	19.4	112	8.79	374	60.5
Ca Ammonium Acetate	mg/kg	74	1,110	60.0	894	124	4,130	501	3,410	188	4,050	650
Mg Ammonium Acetate	mg/kg	74	197	10.8	66.0	9.00	374	24.3	497	28.5	146	21.4
Na Ammonium Acetate	mg/kg	61	8.50	1.33	13.7	2.84	29.9	3.58	46.3	3.70	13.0	1.20
Bray Extractable K	mg/kg	7	380	28.0	228	12.7	281	7.00	73.0	4.79	309	12.1
K- Olsen/Bicarb.	mg/kg	5	422	1.00	348	3.00	234	4.00	81.6	4.40	346	9.00
K Modified Morgan	mg/kg	3	442	0.300	380	5.90	317	3.60	106	8.40	390	16.7
K True Morgan	mg/kg	6	354	11.5	315	9.00	176	7.00	64.8	5.75	293	10.5
Ca Modified Morgan	mg/kg	3	1,140	62.0	1,160	33.0	7,280	17.0	3,350	72.0	6,050	220
Aluminum KCL Extr.	mg/kg	5	0.900	0.100	1.74	0.550	0.700	0.390	0.190	0.020	0.300	0.140

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	63.4	5.18	61.0	5.45	23.1	3.12	20.8	4.17	099	17.8
K	mg/kg	9	338	23.5	247	7.98	162	18.9	55.0	2.86	276	43.9
Ca	mg/kg	9	1,180	97.8	958	49.6	4,990	1,230	2,710	189	5,090	556
Mg	mg/kg	9	187	13.6	62.0	4.80	395	54.5	377	10.4	162	8.83
Mn	mg/kg	7	186	16.9	23.6	0.585	15.5	3.39	47.0	1.17	49.8	14.3
Zn	mg/kg	7	4.08	0.290	3.03	0.140	0.250	0.183	1.57	0.100	4.67	1.72

Mehlich-3 Mult-Element (scoop)												
Scoop Soil Mass	g	25	2.20	0.090	1.45	0.100	2.45	0.101	1.94	0.080	1.53	0.087
Assumed Density	g/cm3	19	1.10	0.045	0.745	0.064	1.22	0.060	0.970	0.060	0.755	0.050
Volume of Scoop	cm3	25	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000
Extractant Volume mL	mL	18	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000
P Colorimetric	mg/kg	11	70.7	4.10	118	9.20	37.2	2.82	13.4	1.85	204	3.72
P ICP-AES	mg/kg	50	88.4	4.82	118	11.1	43.2	2.80	21.6	1.17	217	7.60
K	mg/kg	52	490	16.3	298	23.5	421	20.8	112	7.23	413	30.9
Ca	mg/kg	50	1,280	70.1	895	67.6	5,270	433	3,430	194	4,810	418
Mg	mg/kg	50	220	11.6	68.4	5.38	510	26.4	525	28.9	184	14.9
Na	mg/kg	40	10.5	1.56	14.3	1.90	32.0	3.05	47.0	3.85	27.1	1.40
S	mg/kg	45	11.1	1.04	29.2	2.40	22.0	1.66	15.5	1.74	11.0	1.05
Al	mg/kg	31	425	32.7	1,550	57.0	415	31.9	659	44.1	999	50.0
Zn	mg/kg	48	5.22	0.270	3.18	0.290	2.11	0.140	2.27	0.185	7.80	0.381
Mn	mg/kg	46	218	10.7	24.1	2.14	125	8.06	75.8	4.12	123	19.2
Fe	mg/kg	46	180	12.5	132	13.7	42.6	2.66	182	11.6	312	18.8
Cu	mg/kg	44	0.600	0.070	4.21	0.400	3.26	0.260	3.24	0.240	1.14	0.099
B	mg/kg	37	0.390	0.080	0.400	0.080	1.80	0.170	0.530	0.080	1.08	0.115

Micronutrients												
Zn - DTPA	mg/kg	69	3.48	0.290	1.92	0.359	0.758	0.075	1.34	0.100	2.99	0.390
Mn - DTPA	mg/kg	54	165	13.9	19.2	2.70	11.4	1.41	43.9	3.28	9.29	2.23
Fe - DTPA	mg/kg	57	72.0	10.0	38.3	4.68	6.73	0.930	56.5	6.46	57.9	7.77
Cu - DTPA	mg/kg	57	0.590	0.060	2.44	0.385	1.34	0.165	2.46	0.190	0.431	0.059
Zn - HCl	mg/kg	2	4.89	0.095	3.34	0.235	2.18	0.015	2.37	0.070	9.12	0.375
Mn-H3PO4	mg/kg	11	140	9.56	26.0	5.62	9.57	1.72	37.2	3.92	29.8	6.65
Cl - Ca(NO3)2 Extr.	mg/kg	14	3.00	0.55	7.59	0.65	14.0	1.20	8.81	1.75	3.90	0.71
B - Hot Wat.	mg/kg	27	0.300	0.046	0.350	0.059	0.650	0.147	0.320	0.070	0.590	0.112
B-DTPA/Sorbitol	mg/kg	20	0.155	0.017	0.139	0.020	0.790	0.130	0.180	0.020	0.330	0.045

Soil Organic Matter												
Soil Kjeldahl N	%	16	0.131	0.008	0.200	0.010	0.098	0.006	0.186	0.014	0.227	0.019
Soil TN (combustion)	%	37	0.140	0.010	0.211	0.011	0.102	0.008	0.200	0.010	0.250	0.010

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Soil TOC (Combustion)	%	17	1.32	0.081	2.42	0.170	0.966	0.084	2.12	0.090	3.80	0.110
Soil Total C (Combustion)	%	30	1.38	0.072	2.54	0.080	1.09	0.055	2.08	0.095	3.87	0.150
SOM - Walkley-Black	%	29	2.30	0.110	4.19	0.210	1.70	0.120	3.43	0.225	6.13	0.470
SOM - LOI (% Wt loss)	%	72	2.40	0.100	5.11	0.150	1.80	0.100	4.26	0.230	5.80	0.210
Other												
CaCO3 Content	%	12	0.330	0.058	0.330	0.058	2.15	0.455	0.640	0.095	1.70	0.298
CEC - Cation Displacement	cmol/kg	15	11.4	1.33	15.9	1.95	14.1	1.31	26.8	2.31	21.7	4.43
CEC - Estimation	cmol/kg	13	12.3	1.10	8.60	1.20	26.0	3.00	23.6	0.900	22.6	2.76
Soil Density (Scoop)	g/cc	14	1.25	0.039	0.863	0.043	1.40	0.040	1.15	0.052	0.900	0.030
Particle Size Analysis-Hydrometer												
Sand 2000 - 50 um	%	34	78.8	2.15	23.0	3.95	57.2	2.75	14.4	3.50	26.3	4.85
Silt 50 - 2 um	%	34	10.0	2.00	58.4	3.76	24.0	5.39	56.4	2.50	58.5	3.50
Clay 2 - 0 um	%	34	11.2	2.48	20.0	4.00	18.4	4.00	28.0	3.80	13.9	2.20
Particle Size Analysis- Pipette												
Sand 2000 - 50 um	%	4	80.4	1.00	18.5	1.90	58.5	1.20	7.00	3.12	23.0	6.00
Silt 50 - 2 um	%	4	9.10	0.600	61.6	2.00	23.0	1.50	61.4	1.00	64.5	0.900
Clay 2 - 0 um	%	4	10.4	1.00	19.5	0.750	17.6	1.15	33.8	1.00	17.0	0.500
Solvita CO2												
Solvita CO2	ppm	6	83.0	12.9	69.5	19.2	55.0	12.6	134	10.2	128	42.4

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