



2018 North American Proficiency Testing Program  
 Quarter 4 Soil Report - Thursday, January 10, 2019

Laboratory ID  
 General

Soil	Soil 2018-116				Soil 2018-117			Soil 2018-118			Soil 2018-119			Soil 2018-120			
Analysis	Units	n	Median	MAD	Lab <sup>1,2</sup>	Median	MAD	Lab <sup>1,2</sup>	Median	MAD	Lab <sup>1,2</sup>	Median	MAD	Lab <sup>1,2</sup>	Median	MAD	Lab <sup>1,2</sup>
<b>Salinity</b>																	
Sat. Paste Moisture	%	19	56.9	4.11		39.0	1.73		46.2	1.84		45.0	1.90		46.7	2.70	
pH - sp	Unit	29	7.71	0.110		5.80	0.110		5.90	0.100		6.40	0.090		5.97	0.070	
ECe - sp	dS/m	27	4.46	0.460		0.980	0.170		0.850	0.141		1.00	0.200		3.40	0.290	
HCO3 - sp	mmolc/L	10	2.34	0.524		0.680	0.135		0.770	0.134		3.92	0.840		1.21	0.229	
Ca - sp	mmolc/L	24	22.2	3.02		4.00	0.820		4.72	0.780		5.50	0.61		15.2	1.46	
Mg - sp	mmolc/L	24	6.56	0.790		1.96	0.330		1.97	0.234		2.28	0.246		8.74	0.955	
Na - sp	mmolc/L	24	19.8	1.75		0.380	0.043		0.250	0.060		0.636	0.149		1.67	0.260	
SAR - sp	value	20	5.11	0.250		0.230	0.045		0.125	0.011		0.318	0.035		0.500	0.095	
Cl - sp	mmolc/L	14	17.0	1.38		0.370	0.065		1.17	0.125		0.460	0.070		1.52	0.185	
SO4 - sp	mmolc/L	15	23.2	1.50		0.540	0.100		0.670	0.080		1.47	0.170		1.50	0.130	
NO <sub>3</sub> - sp	mmolc/L	10	7.07	0.800		5.35	0.970		3.66	0.754		1.17	0.238		21.7	4.04	
B - sp	mg/L	12	0.304	0.050		0.043	0.003		0.055	0.012		0.080	0.005		0.124	0.006	
<b>Soil pH &amp; EC</b>																	
Soil EC (1:1)	(dS/m)	38	2.27	0.270		0.405	0.085		0.368	0.032		0.435	0.045		1.20	0.235	
Soil EC (1:2)	(dS/m)	46	1.56	0.124		0.281	0.040		0.257	0.023		0.302	0.042		0.922	0.125	
pH (1:1) Water	Unit	87	7.93	0.070		5.82	0.060		5.91	0.068		6.46	0.060		6.00	0.040	
pH (1:2) Water	Unit	31	8.03	0.130		6.00	0.050		6.00	0.090		6.56	0.080		6.10	0.080	
pH (1:1) 0.01M CaCl <sub>2</sub>	Unit	28	7.80	0.050		5.51	0.010		5.55	0.035		6.13	0.045		5.83	0.032	
pH (1:2) 0.01M CaCl <sub>2</sub>	Unit	12	7.80	0.020		5.52	0.055		5.60	0.055		6.12	0.040		5.89	0.020	
<b>Buffer pH, Lime Req.</b>																	
SMP Buffer pH	Unit	26	7.54	0.040		6.55	0.090		6.98	0.051		7.00	0.070		6.97	0.050	
Adams-Evans Buf pH	Unit	7	7.79	0.060		7.40	0.080		7.66	0.055		7.62	0.055		7.60	0.035	
Woodruff Buf. pH	Unit	22	7.16	0.040		6.50	0.065		6.77	0.030		6.82	0.035		6.76	0.035	
Mehlich Buffer pH	Unit	7	6.91	0.060		6.10	0.035		6.24	0.025		6.34	0.020		6.27	0.025	
Sikora Buffer pH	Unit	29	7.55	0.030		6.60	0.065		6.95	0.050		6.98	0.035		6.95	0.050	
Titrateable Acidity	cmol/kg																
<b>Inorganic Nitrogen (NO3-N &amp; NH4-N)</b>																	
NO3-N Cd. Rd.	mg/kg	62	69.0	2.75		53.9	2.58		40.8	1.62		43.2	1.75		197	11.4	
NO3-N ISE	mg/kg	9	63.6	3.60		51.5	3.35		38.0	1.00		42.0	6.00		168	15.2	
NO3-N CTA	mg/kg	1	54.0	0.000		42.2	0.000		36.2	0.000		37.0	0.000		114	0.000	
NO3-N Ion Chr.	mg/kg	2	75.6	4.60		58.5	3.50		45.2	3.25		50.4	0.350		133	86.8	
NO3-N Other	mg/kg	6	68.7	5.00		52.8	2.15		40.5	3.54		41.4	3.80		207	10.0	
NH4 - N (KCl Extr.)	mg/kg	47	3.30	0.700		21.0	1.50		8.30	0.830		38.5	2.70		3.44	0.644	
<b>Phosphorus and Sulfur</b>																	
PO4-P Bray P (1:10)	mg/kg	45	7.00	1.05		166	22.9		20.7	1.58		96.5	7.38		120	8.10	
PO4-P Bray P1 (1:7)	mg/kg	7	5.15	2.98		118	24.0		19.1	1.63		84.5	5.90		105	4.07	
PO4-P Olsen/Bicarb	mg/kg	51	10.7	0.800		46.0	4.63		12.2	1.02		39.5	2.80		72.0	4.03	
PO4-P AB-DTPA	mg/kg	2	4.31	0.858		26.2	0.308		10.7	1.77		22.3	2.10		48.1	0.986	
PO4-P Modified Morgan	mg/kg	5	38.2	0.200		6.00	0.810		3.90	0.750		23.9	1.90		37.8	2.20	
PO4-P True Morgan	mg/kg	6	29.9	1.15		6.44	0.250		4.62	0.400		26.2	1.05		41.2	0.550	
PO4-P Mod. Kewlona	mg/kg	2	23.7	0.300		101	3.00		15.2	2.85		74.2	2.85		104	6.50	
PO4-P Stong Bray (1:10)	mg/kg	10	118	5.15		322	7.88		27.4	1.50		235	10.8		199	9.18	
PO4-P Water Soluble	mg/kg																
SO4 - S (PO4 Extr.)	mg/kg	29	181	31.4		12.2	2.65		5.98	1.28		12.3	1.70		12.4	2.47	

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	75	422	24.7	285	10.5	114	6.91	445	25.0	929	63.1
Ca Ammonium Acetate	mg/kg	69	6,090	787	892	57.5	1,710	75.0	1,930	145	1,530	68.4
Mg Ammonium Acetate	mg/kg	69	637	36.5	109	8.65	251	18.0	275	18.0	302	14.7
Na Ammonium Acetate	mg/kg	57	635	43.0	14.3	2.88	13.0	2.68	22.0	3.57	38.3	3.77
Bray Extractable K	mg/kg	5	257	3.10	220	18.7	97.0	4.00	330	15.0	736	173
K- Olsen/Bicarb.	mg/kg	3	287	4.00	274	2.00	102	2.00	361	7.00	813	28.0
K Modified Morgan	mg/kg	3	382	0.000	260	10.0	106	4.50	446	21.0	966	26.0
K True Morgan	mg/kg	5	195	14.0	243	15.0	80.2	17.8	291	23.0	717	19.0
Ca Modified Morgan	mg/kg	2	17,300	1,900	853	115	1,760	156	2,180	184	1,520	170
Aluminum KCL Extr.	mg/kg	4	1.10	0.200	2.20	1.25	0.650	0.150	0.550	0.285	2.00	1.68

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	7	11.2	0.857	63.0	9.89	14.7	1.26	156	15.7	125	12.3
K	mg/kg	7	115	11.3	224	15.5	69.5	1.18	281	13.4	713	57.7
Ca	mg/kg	7	5,310	935	1,090	14.1	1,480	63.8	2,210	134	1,700	62.9
Mg	mg/kg	7	403	27.5	105	2.22	205	5.08	263	21.8	290	9.75
Mn	mg/kg	6	3.22	0.825	94.2	6.40	83.6	2.48	164	8.12	24.7	0.610
Zn	mg/kg	6	0.285	0.083	3.66	0.031	1.90	0.030	3.41	0.100	4.46	0.020

Mehlich-3 Multi-Element (scoop)												
Scoop Soil Mass	g	27	2.18	0.080	2.14	0.080	1.94	0.090	1.90	0.096	2.00	0.050
Assumed Density	g/cm <sup>3</sup>	21	1.11	0.046	1.08	0.050	0.984	0.069	0.960	0.055	1.00	0.036
Volume of Scoop	cm <sup>3</sup>	27	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000	2.00	0.000
Extractant Volume mL	mL	22	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	49.2	5.10	141	7.50	23.2	1.60	127	7.90	136	4.80
P ICP-AES	mg/kg	51	52.0	2.90	150	10.4	28.8	1.60	141	7.99	154	8.88
K	mg/kg	54	439	23.3	277	19.9	110	6.18	449	27.9	966	39.1
Ca	mg/kg	51	7,900	452	1,060	71.0	1,820	95.6	2,160	108	1,720	67.7
Mg	mg/kg	51	783	42.0	124	8.43	265	16.8	300	16.0	329	19.9
Na	mg/kg	39	654	45.2	16.9	3.24	13.3	3.08	22.1	3.60	39.8	3.22
S	mg/kg	42	299	17.0	23.8	1.76	11.0	1.48	19.4	1.44	18.8	1.19
Al	mg/kg	33	244	35.5	1,610	90.5	530	47.8	849	59.0	721	57.8
Zn	mg/kg	44	2.92	0.245	3.90	0.105	2.54	0.180	4.82	0.295	5.20	0.210
Mn	mg/kg	44	118	9.64	99.0	4.86	149	10.4	252	18.0	50.4	3.63
Fe	mg/kg	43	83.7	5.05	187	10.9	195	14.6	192	15.0	174	13.0
Cu	mg/kg	43	3.36	0.210	2.99	0.110	1.49	0.100	3.00	0.250	1.50	0.120
B	mg/kg	39	2.69	0.290	0.670	0.090	0.451	0.079	0.700	0.100	0.795	0.070

Micronutrients												
Zn - DTPA	mg/kg	64	1.15	0.117	1.90	0.120	1.56	0.090	2.06	0.160	3.01	0.276
Mn - DTPA	mg/kg	48	3.90	0.831	75.0	5.10	82.1	5.51	124	11.4	13.0	1.45
Fe - DTPA	mg/kg	51	8.10	0.900	94.5	12.8	55.2	5.80	40.7	5.80	41.9	5.20
Cu - DTPA	mg/kg	53	1.50	0.100	1.97	0.140	0.960	0.080	1.75	0.210	0.740	0.060
Zn - HCl	mg/kg	2	0.430	0.370	4.80	0.500	2.72	0.275	12.7	8.48	5.86	0.440
Mn-H3PO4	mg/kg	10	3.51	0.700	88.4	5.87	75.9	4.33	147	11.0	19.5	1.46
Cl - Ca(NO3)2 Extr.	mg/kg	14	337	20.6	5.25	0.730	18.5	1.47	7.30	1.54	24.8	3.23
B - Hot Wat.	mg/kg	31	1.40	0.200	0.408	0.062	0.300	0.055	0.505	0.104	0.700	0.085
B-DTPA/Sorbitol	mg/kg	17	1.86	0.100	0.245	0.018	0.198	0.028	0.305	0.038	0.345	0.045

Soil Organic Matter												
Soil Kjeldahl N	%	12	0.067	0.006	0.194	0.006	0.120	0.003	0.140	0.003	0.189	0.008
Soil TN (combustion)	%	35	0.080	0.012	0.213	0.013	0.130	0.010	0.150	0.010	0.210	0.010
Soil TOC (Combustion)	%	12	0.687	0.073	2.35	0.070	1.28	0.062	1.65	0.060	1.82	0.068
Soil Total C (Combustion)	%	26	1.27	0.040	2.36	0.072	1.28	0.045	1.66	0.062	1.87	0.105

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<b>SOM - Walkley-Black</b>	%	25	<b>1.16</b>	0.110	<b>4.20</b>	0.207	<b>2.10</b>	0.110	<b>2.80</b>	0.190	<b>3.12</b>	0.190
<b>SOM - LOI (% Wt loss)</b>	%	70	<b>1.89</b>	0.240	<b>4.78</b>	0.185	<b>2.55</b>	0.109	<b>3.38</b>	0.210	<b>3.91</b>	0.220
<b>Other</b>												
<b>CaCO3 Content</b>	%	9	<b>5.83</b>	0.280	<b>0.385</b>	0.042	<b>0.335</b>	0.034	<b>0.640</b>	0.101	<b>0.579</b>	0.095
<b>CEC - Cation Displacement</b>	cmol/kg	13	<b>26.6</b>	3.38	<b>11.7</b>	2.50	<b>14.4</b>	2.18	<b>16.3</b>	2.72	<b>14.2</b>	2.50
<b>CEC - Estimation</b>	cmol/kg	12	<b>40.2</b>	5.78	<b>10.1</b>	2.00	<b>12.0</b>	1.70	<b>14.5</b>	1.88	<b>14.0</b>	1.88
<b>Soil Density (Scoop)</b>	g/cc	12	<b>1.26</b>	0.015	<b>1.27</b>	0.036	<b>1.10</b>	0.044	<b>1.11</b>	0.051	<b>1.18</b>	0.024
<b>Particle Size Analysis-Hydrometer</b>												
<b>Sand 2000 - 50 um</b>	%	30	<b>30.0</b>	3.10	<b>61.2</b>	3.12	<b>15.0</b>	3.40	<b>24.4</b>	3.62	<b>69.4</b>	2.64
<b>Silt 50 - 2 um</b>	%	30	<b>26.1</b>	2.90	<b>30.0</b>	3.00	<b>66.2</b>	3.68	<b>56.8</b>	3.84	<b>23.4</b>	2.88
<b>Clay 2 - 0 um</b>	%	30	<b>44.1</b>	3.87	<b>8.24</b>	0.97	<b>18.3</b>	2.50	<b>19.2</b>	3.24	<b>8.10</b>	1.02
<b>Particle Size Analysis- Pipette</b>												
<b>Sand 2000 - 50 um</b>	%	3	<b>29.0</b>	0.200	<b>63.0</b>	1.00	<b>4.30</b>	0.300	<b>20.0</b>	0.500	<b>69.0</b>	3.10
<b>Silt 50 - 2 um</b>	%	3	<b>28.0</b>	1.00	<b>28.0</b>	0.500	<b>77.0</b>	1.70	<b>60.0</b>	0.600	<b>20.9</b>	1.60
<b>Clay 2 - 0 um</b>	%	3	<b>43.0</b>	0.800	<b>8.60</b>	0.400	<b>19.0</b>	1.50	<b>20.0</b>	0.100	<b>11.7</b>	0.300
<b>Solvita CO2</b>												
<b>Solvita CO2</b>	ppm	5	<b>28.0</b>	3.00	<b>113</b>	9.00	<b>98.0</b>	10.0	<b>172</b>	48.0	<b>113</b>	2.40