



2019 North American Proficiency Testing Program  
Quarter 1 Soil Report - Tuesday, April 16, 2019

Laboratory ID  
# 352129

Soil	Soil 2019-101					Soil 2019-102			Soil 2019-103			Soil 2019-104			Soil 2019-105		
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	%	20	48.0	2.55	42.1	36.5	3.74	31.3	50.3	5.01	45.3	41.7	3.90	37.2	50.7	4.60	43.8
pH - sp	Unit	29	7.78	0.110	7.7	5.43	0.070	5.3	5.20	0.100	5	7.10	0.100	7	6.33	0.070	6.2
ECe - sp	dS/m	29	0.810	0.082	1	0.780	0.084	1	* H 0.380	0.062	0.5	3.28	0.250	3.5	0.400	0.050	0.51
HCO3 - sp	mmolc/L	11	4.57	0.768	4.87	1.22	0.119	0.89	* L 0.968	0.238	0.73	4.68	0.745	5.52	2.69	0.400	2.62
Ca - sp	mmolc/L	26	3.41	0.405	3.91	3.15	0.450	4.18	1.98	0.345	2.69	21.6	3.22	26.9	3.03	0.466	3.61
Mg - sp	mmolc/L	27	1.87	0.210	2.08	1.97	0.274	2.5	0.717	0.127	0.79	7.74	1.04	8.59	1.08	0.170	1.15
Na - sp	mmolc/L	27	3.02	0.450	3.17	0.960	0.160	1.02	0.130	0.010	0.12	11.0	1.09	11.2	0.163	0.016	0.18
SAR - sp	value	20	1.82	0.090	1.83	0.555	0.055	0.56	0.120	0.030	0.09	2.83	0.120	2.66	0.110	0.010	0.11
Cl - sp	mmolc/L	15	1.81	0.445	3.05	* H 0.590	0.080	0.764	0.226	0.054	0.227	2.96	0.483	3.84	0.200	0.043	0.243
SO4 - sp	mmolc/L	17	1.30	0.224	1.9	* H 1.91	0.230	2.02	0.430	0.090	0.43	29.4	3.30	36.4	0.950	0.210	0.83
NO3 - sp	mmolc/L	9	0.015	0.003	0.007	* L 2.02	0.356	3.92	** H 0.945	0.190	2.23	** H 1.44	0.150	1.55	0.010	0.002	0.003
B - sp	mg/L	16	0.100	0.011	0.15	** H 0.712	0.071	0.7	0.075	0.016	0.088	0.728	0.092	0.84	0.070	0.006	0.083
<b>Soil pH &amp; EC</b>																	
Soil EC (1:1)	(dS/m)	40	0.400	0.038	0.4	0.264	0.044	0.3	0.192	0.022	0.2	1.27	0.125	1.7	* H 0.213	0.028	0.2
Soil EC (1:2)	(dS/m)	48	0.278	0.028	0.3	0.190	0.017	0.2	0.126	0.018	0.1	0.942	0.160	1	0.122	0.018	0.1
pH (1:1) Water	Unit	90	8.10	0.100	7.9	5.60	0.065	5.7	5.28	0.045	5.3	7.34	0.057	7.3	6.50	0.070	6.5
pH (1:2) Water	Unit	30	8.28	0.126	8.6	* H 5.72	0.070	6.3	** H 5.40	0.080	5.9	** H 7.51	0.075	7.8	* H 6.62	0.080	6.9
pH (1:1) 0.01M CaCl2	Unit	27	7.66	0.060		5.15	0.070		4.77	0.050		7.15	0.070		6.02	0.080	
pH (1:2) 0.01M CaCl2	Unit	13	7.60	0.100		5.14	0.060		4.80	0.070		7.15	0.150		6.00	0.060	
<b>Buffer pH, Lime Req.</b>																	
SMP Buffer pH	Unit	27	7.48	0.060	7.4	6.81	0.070	7.1	** H 6.50	0.090	6.9	** H 7.35	0.050	7.4	6.94	0.040	7.2
Adams-Evans Buf pH	Unit	7	7.85	0.080		7.61	0.075		7.56	0.080		7.79	0.060		7.66	0.060	
Woodruff Buf. pH	Unit	20	7.12	0.025		6.68	0.060		6.46	0.065		7.06	0.035		6.80	0.030	
Mehlich Buffer pH	Unit	8	6.85	0.065		6.12	0.050		5.96	0.060		6.65	0.025		6.28	0.020	
Sikora Buffer pH	Unit	29	7.50	0.030		6.80	0.070		6.52	0.065		7.36	0.040		6.99	0.060	
Titratable Acidity	cmol/kg	1	0.000	0.000		0.103	0.000		0.123	0.000		0.000	0.000		0.000	0.000	
<b>Inorganic Nitrogen (NO3-N &amp; NH4-N)</b>																	
NO3-N Cd. Rd.	mg/kg	69	2.60	0.400		15.2	0.750		15.2	0.800		31.8	1.64		2.53	0.400	
NO3-N ISE	mg/kg	11	5.00	0.74		15.9	1.58		15.1	2.10		33.4	3.30		4.30	0.700	
NO3-N CTA	mg/kg	2	2.40	0.628		14.2	0.852		14.8	1.51		27.1	2.38		3.02	0.475	
NO3-N Ion Chr.	mg/kg	1	2.69	0.000		15.1	0.000		16.0	0.000		31.9	0.000		2.71	0.000	
NO3-N Other	mg/kg	8	2.52	0.500	2	15.0	1.03	13	15.0	1.76	13	29.1	1.78	26	3.00	0.185	3
NH4 - N (KCl Extr.)	mg/kg	55	2.25	0.420	5	** H 7.05	0.705	9	* H 5.60	0.620	10	** H 5.28	0.605	8	** H 29.4	2.46	32
<b>Phosphorus and Sulfur</b>																	
PO4-P Bray P (1:10)	mg/kg	48	51.0	4.60		104	6.90		61.0	4.43		43.0	3.31		33.0	2.42	
PO4-P Bray P1 (1:7)	mg/kg	8	43.2	8.98		109	17.0		54.8	7.20		40.9	6.76		36.0	5.50	
PO4-P Olsen/Bicarb	mg/kg	57	24.7	1.58	23	55.5	5.72	53	34.1	3.37	32	21.0	1.65	19	18.4	1.45	16
PO4-P AB-DTPA	mg/kg	4	11.1	0.313	10.7	28.7	0.786	29.1	15.6	1.29	14.3	11.0	0.778	10.4	12.4	1.07	11.6
PO4-P Modified Morgan	mg/kg	5	36.0	1.40		11.9	0.900		5.00	0.180		20.3	0.600		4.09	0.090	
PO4-P True Morgan	mg/kg	7	33.2	4.80		14.8	1.10		5.60	0.300		21.0	1.10		5.80	0.600	
PO4-P Mod. Kewlona	mg/kg	1	47.0	0.000		75.0	0.000		50.0	0.000		38.0	0.000		24.0	0.000	
PO4-P Stong Bray (1:10)	mg/kg	11	319	26.6		286	11.2		80.8	6.60		144	3.67		55.9	4.20	
PO4-P Water Soluble	mg/kg																
SO4 - S (PO4 Extr.)	mg/kg	34	11.3	1.78		11.9	1.74		5.61	0.76		151	28.0		9.00	1.65	

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Bases																						
K Ammonium Acetate	mg/kg	78	833	65.5	1030	* H	434	19.5	509	* H	230	14.5	291	** H	308	18.7	353	284	11.5	349	** H	
Ca Ammonium Acetate	mg/kg	74	4,490	483	6070	* H	1,030	59.6	1070		1,100	63.0	1240		4,060	379	5280	* H	2,100	102	2340	
Mg Ammonium Acetate	mg/kg	74	656	35.7	785	* H	270	15.0	292		158	10.5	180		449	25.6	519	* H	295	15.3	338	* H
Na Ammonium Acetate	mg/kg	65	143	16.6	180		26.3	2.25	36	** H	10.0	2.34	8.8		250	20.3	272		11.6	1.50	16	* H
Bray Extractable K	mg/kg	7	505	34.0			366	18.8			181	5.20			216	10.3			215	10.0		
K- Olsen/Bicarb.	mg/kg	5	594	8.00			419	13.0			232	13.0			240	13.0			225	3.00		
K Modified Morgan	mg/kg	4	769	61.0			401	14.0			227	12.0			266	14.0			258	17.5		
K True Morgan	mg/kg	5	439	7.00			301	15.0			180	12.0			162	12.0			170	10.0		
Ca Modified Morgan	mg/kg	4	11,300	461			1,010	118			1,050	89.5			6,100	634			2,000	118		
Aluminum KCL Extr.	mg/kg	4	0.637	0.290			3.40	1.20	4.6		12.6	1.60	18		0.725	0.300			0.870	0.348		

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	34.1	03.1			227	16.6			32.5	2.16			69.0	11.0			31.3	2.26		
K	mg/kg	9	243	28.1			311	18.4			157	6.29			142	19.2			166	8.64		
Ca	mg/kg	9	5,650	658			1,260	34.4			886	33.4			5,160	580			1,840	32.0		
Mg	mg/kg	9	509	24.5			231	7.28			130	7.50			458	23.8			245	5.42		
Mn	mg/kg	8	1.78	0.271			56.3	2.80			81.6	6.86			39.4	3.84			120	5.36		
Zn	mg/kg	8	0.127	0.019			9.07	0.452			2.43	0.075			3.80	0.700			2.05	0.091		

Mehlich-3 Multi-Element (scoop)																						
Scoop Soil Mass	g	25	1.96	0.050			2.20	0.090			1.87	0.100			2.20	0.080			2.00	0.050		
Assumed Density	g/cm <sup>3</sup>	18	1.01	0.055			1.12	0.062			0.945	0.060			1.15	0.054			1.01	0.045		
Volume of Scoop	cm <sup>3</sup>	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	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	11	67.2	5.10			124	3.00			64.5	4.00			50.9	3.33			37.6	3.73		
P ICP-AES	mg/kg	49	75.0	2.71			137	8.50			73.1	4.81			55.6	3.36			45.9	2.56		
K	mg/kg	54	823	52.3			449	22.0			219	11.6			314	13.9			280	13.3		
Ca	mg/kg	51	6,150	423			1,130	79.0			1,100	71.7			5,100	278			2,190	149		
Mg	mg/kg	52	784	42.0			298	19.0			160	14.8			548	30.6			316	18.8		
Na	mg/kg	42	132	12.6			27.4	2.55			10.1	1.62			259	19.5			13.5	2.83		
S	mg/kg	45	21.0	1.65			19.6	1.65			11.6	1.36			252	13.5			16.0	1.95		
Al	mg/kg	34	598	31.1			547	47.3			811	58.2			451	38.5			598	43.7		
Zn	mg/kg	45	6.03	0.290			11.8	0.610			3.46	0.260			7.30	0.300			2.90	0.200		
Mn	mg/kg	44	168	11.8			69.0	4.24			170	11.8			134	9.35			148	7.16		
Fe	mg/kg	45	55.2	3.72			256	14.0			244	18.0			96.6	9.60			284	23.4		
Cu	mg/kg	45	2.39	0.110			2.81	0.170			1.13	0.090			7.81	0.510			2.77	0.180		
B	mg/kg	37	1.87	0.220			0.890	0.090			0.440	0.100			3.05	0.380			0.710	0.142		

Micronutrients																						
Zn - DTPA	mg/kg	67	2.44	0.190	2.5		6.70	0.510	6.1		2.21	0.148	2.3		2.90	0.200	2.7		1.79	0.110	1.8	
Mn - DTPA	mg/kg	50	5.00	0.48	4.7		43.8	2.70	41.2		75.5	7.00	76.7		24.4	2.66	22.2		120	10.3	132	
Fe - DTPA	mg/kg	53	11.2	1.15	10		78.1	8.80	64		88.8	10.3	82		16.2	1.80	13		100	9.25	97	
Cu - DTPA	mg/kg	54	0.830	0.085	0.73		2.90	0.200	2.6		0.950	0.050	1		3.67	0.330	3.3		2.12	0.080	2.1	
Zn - HCl	mg/kg	3	5.10	0.800			13.3	0.090			2.90	0.030			7.80	0.850			2.60	0.000		
Mn-H3PO4	mg/kg	11	1.61	0.363			42.2	2.50			67.4	2.55			30.8	3.55			97.0	4.25		
Cl - Ca(NO3)2 Extr.	mg/kg	14	31.5	4.08			8.22	1.23			3.10	0.313			50.5	3.80			3.59	0.55		
B - Hot Wat.	mg/kg	30	0.780	0.093	0.42	* L	0.800	0.120	0.44	* L	0.310	0.060	0.14	* L	1.92	0.213	1.2	* L	0.430	0.070	0.15	* L
B-DTPA/Sorbitol	mg/kg	16	1.02	0.070			0.500	0.075			0.200	0.050			2.36	0.221			0.327	0.042		

Soil Organic Matter																						
Soil Kjeldahl N	%	19	0.119	0.008	0.0728	** L	0.083	0.008	0.056	* L	0.149	0.009	0.106	** L	0.099	0.009	0.0672	* L	0.147	0.017	0.106	
Soil TN (combustion)	%	40	0.126	0.014			0.090	0.010			0.162	0.012			0.102	0.008			0.160	0.012		
Soil TOC (Combustion)	%	12	1.18	0.078	1.06		0.854	0.055	63	** H	1.57	0.051	1.52		0.968	0.035	0.94		1.69	0.052	1.59	
Soil Total C (Combustion)	%	31	1.61	0.034	1.53		0.850	0.031	0.8		1.60	0.042	1.57		1.11	0.034	1.06		1.72	0.043	1.63	

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<b>SOM - Walkley-Black</b>	%	26	<b>1.92</b>	0.110	2.5	<b>** H</b>	<b>1.60</b>	0.105	2.1	<b>** H</b>	<b>2.71</b>	0.105	3.7	<b>** H</b>	<b>1.72</b>	0.100	2.4	<b>** H</b>	<b>2.89</b>	0.165	3.9	<b>** H</b>
<b>SOM - LOI (% Wt loss)</b>	%	72	<b>3.12</b>	0.208	5.5	<b>** H</b>	<b>1.80</b>	0.100	2.8	<b>** H</b>	<b>3.26</b>	0.130	4.7	<b>** H</b>	<b>2.17</b>	0.155	4	<b>** H</b>	<b>3.12</b>	0.135	4.5	<b>** H</b>
<b>Other</b>																						
<b>CaCO3 Content</b>	%	15	<b>4.60</b>	0.800	5.3		<b>0.630</b>	0.155	0.7		<b>0.365</b>	0.063	0.2	<b>* L</b>	<b>1.30</b>	0.145	1.9	<b>** H</b>	<b>0.445</b>	0.081	0.4	
<b>CEC - Cation Displacement</b>	cmol/kg	19	<b>25.2</b>	2.52	27.5		<b>11.7</b>	1.70	12.8		<b>15.0</b>	2.00	17.4		<b>19.0</b>	1.96	22.3		<b>19.0</b>	1.90	21.2	
<b>CEC - Estimation</b>	cmol/kg	12	<b>32.2</b>	3.10			<b>11.3</b>	0.800			<b>11.3</b>	1.35			<b>26.7</b>	2.46			<b>14.3</b>	1.15		
<b>Soil Density (Scoop)</b>	g/cc	11	<b>1.13</b>	0.020			<b>1.29</b>	0.030			<b>1.11</b>	0.043			<b>1.31</b>	0.024			<b>1.17</b>	0.030		
<b>Particle Size Analysis-Hydrometer</b>																						
<b>Sand 2000 - 50 um</b>	%	32	<b>38.0</b>	3.35	38		<b>50.0</b>	4.72	40		<b>12.5</b>	1.63	8	<b>* L</b>	<b>40.8</b>	3.02	32	<b>* L</b>	<b>15.9</b>	1.93	4	<b>** L</b>
<b>Silt 50 - 2 um</b>	%	32	<b>40.0</b>	5.05	50		<b>40.0</b>	5.05	59	<b>* H</b>	<b>69.5</b>	2.80	84	<b>** H</b>	<b>36.5</b>	5.00	54	<b>* H</b>	<b>64.7</b>	4.10	88	<b>** H</b>
<b>Clay 2 - 0 um</b>	%	32	<b>23.2</b>	2.00	12	<b>** L</b>	<b>10.0</b>	1.70	1	<b>** L</b>	<b>18.0</b>	2.40	8	<b>** L</b>	<b>22.2</b>	2.20	14	<b>* L</b>	<b>19.7</b>	2.17	8	<b>** L</b>
<b>Particle Size Analysis- Pipette</b>																						
<b>Sand 2000 - 50 um</b>	%	3	<b>43.0</b>	2.00			<b>53.0</b>	3.00			<b>9.00</b>	5.00			<b>43.0</b>	0.000			<b>9.00</b>	0.000		
<b>Silt 50 - 2 um</b>	%	3	<b>33.0</b>	1.00			<b>41.0</b>	1.00			<b>76.0</b>	2.00			<b>36.0</b>	0.000			<b>69.0</b>	4.00		
<b>Clay 2 - 0 um</b>	%	3	<b>18.0</b>	1.00			<b>8.00</b>	2.00			<b>15.0</b>	0.000			<b>21.0</b>	2.00			<b>19.0</b>	1.00		
<b>Solvita CO2</b>																						
<b>Solvita CO2</b>	ppm	5	<b>85.5</b>	5.46			<b>110</b>	8.15			<b>162</b>	17.7			<b>108</b>	62.0			<b>185</b>	30.0		