



2018 North American Proficiency Testing Program Quarter 1 Soil Report - Apr 09, 2018

Laboratory ID
352129

Soil	Soil 2018-101				Soil 2018-102				Soil 2018-103				Soil 2018-104				Soil 2018-105			
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	%	21	44.8	1.80	44.2	56.2	4.48	51.7	65.3	4.19	65.3	26.4	2.07	22.1	30.7	2.72	28.6			
pH - sp	Unit	28	5.81	0.110	5.6	5.93	0.070	5.7 * L	7.15	0.110	7	6.45	0.095	6.1 * L	7.21	0.075	7.2			
ECe - sp	dS/m	27	0.870	0.170	1.1	0.550	0.095	0.7	0.890	0.103	1	0.950	0.150	1.4 * H	4.28	0.570	3.9			
HCO3 - sp	mmolc/L	12	0.535	0.093	0.21 * L	1.03	0.157	1.44 * H	4.42	0.765	318 ** H	1.31	0.303	1.45	2.47	0.420	2.47			
Ca - sp	mmolc/L	24	5.19	0.700	6.86	1.53	0.315	1.96	4.75	0.545	5.38	4.45	0.776	7.15 * H	37.9	2.87	46.6 * H			
Mg - sp	mmolc/L	24	2.01	0.254	2.66 * H	0.725	0.136	0.89	3.25	0.361	3.92	1.16	0.105	1.87 ** H	7.31	0.760	9.42 * H			
Na - sp	mmolc/L	24	0.272	0.052	0.28	0.555	0.105	0.63	0.703	0.103	0.84	0.265	0.065	0.4	4.97	0.510	5.9			
SAR - sp	value	20	0.130	0.025	0.13	0.490	0.075	0.53	0.365	0.044	0.39	0.130	0.008	0.19 ** H	1.06	0.066	1.12			
Cl - sp	mmolc/L	14	1.22	0.215	1.36	1.34	0.194	1.74	0.790	0.081	0.791	0.380	0.075	0.34	7.38	1.25	8.97			
SO4 - sp	mmolc/L	14	0.600	0.085	0.49	1.09	0.175	0.85	2.60	0.233	2.6	0.805	0.143	0.58	25.0	2.42	28.3			
NO3 - sp	mmolc/L	11	5.18	1.03	7.48	0.045	0.007	0.045	0.173	0.034	0.136	4.38	0.797	9.41 ** H	17.2	2.96	24			
B - sp	mg/L	14	0.070	0.005	0.055 * L	0.130	0.019	0.0137 ** L	0.052	0.010	0.047	0.033	0.002	0.033	0.170	0.021	0.191			
Soil pH & EC																				
Soil EC (1:1)	(dS/m)	42	0.375	0.041	0.51 * H	0.296	0.045	0.34	0.400	0.040	0.37	0.259	0.059	0.36	1.52	0.200	1.75			
Soil EC (1:2)	(dS/m)	50	0.248	0.025	0.26	0.205	0.025	0.21	0.305	0.046	0.35	0.180	0.020	0.17	1.01	0.164	1.07			
pH (1:1) Water	Unit	96	5.84	0.065	5 ** L	6.06	0.060	5.3 ** L	7.29	0.060	6.7 ** L	6.59	0.065	6 ** L	7.42	0.060	7.1 ** L			
pH (1:2) Water	Unit	32	6.00	0.060	5.4 ** L	6.19	0.090	5.4 ** L	7.41	0.110	6.6 ** L	6.73	0.050	6 ** L	7.59	0.105	7 ** L			
pH (1:1) 0.01M CaCl2	Unit	29	5.50	0.040		5.50	0.040		6.93	0.030		6.18	0.020		7.30	0.050				
pH (1:2) 0.01M CaCl2	Unit	11	5.58	0.050		5.50	0.040		6.96	0.070		6.17	0.070		7.34	0.070				
Buffer pH, Lime Req.																				
SMP Buffer pH	Unit	29	6.93	0.050	7.2 ** H	6.43	0.130	6.8 * H	7.20	0.050	7.4 * H	7.09	0.076	7.4 ** H	7.49	0.080	7.7 * H			
Adams-Evans Buf pH	Unit	9	7.70	0.060		7.32	0.100		7.77	0.100		7.81	0.060		7.94	0.100				
Woodruff Buf. pH	Unit	23	6.74	0.040		6.40	0.060		7.01	0.020		6.85	0.030		7.06	0.040				
Mehlich Buffer pH	Unit	11	6.28	0.040		6.00	0.080		6.70	0.085		6.46	0.030		6.69	0.050				
Sikora Buffer pH	Unit	35	6.94	0.040		6.43	0.090		7.29	0.030		7.16	0.050		7.51	0.030				
Titrateable Acidity	cmol/kg																			
Inorganic Nitrogen (NO3-N & NH4-N)																				
NO3-N Cd. Rd.	mg/kg	72	41.8	3.00		9.07	1.10		11.9	1.40		27.6	1.90		91.3	6.61				
NO3-N ISE	mg/kg	11	42.8	4.52		10.4	2.42		13.6	2.48		32.0	2.00		99.0	9.48				
NO3-N CTA	mg/kg	2	39.7	3.74		11.6	1.03		13.9	0.838		26.1	1.94		79.4	6.36				
NO3-N Ion Chr.	mg/kg	2	50.9	18.2		3.27	3.27		4.60	4.56		40.9	20.2		175.0	97.7				
NO3-N Other	mg/kg	10	38.5	4.43	38	8.64	0.870	8	11.1	0.900	12	27.6	2.20	25	83.8	10.6	82			
NH4 - N (KCl Extr.)	mg/kg	61	7.70	0.980	9.3	111	17.2	119	57.9	6.42	61	19.8	1.64	19	6.72	0.870	8.2			
Phosphorus and Sulfur																				
PO4-P Bray P (1:10)	mg/kg	50	20.2	1.20		88.7	4.59		21.0	2.60		117	7.54		40.0	2.20				
PO4-P Bray P1 (1:7)	mg/kg	6	19.3	2.95		65.9	8.14		13.5	2.84		96.0	4.73		36.5	3.92				
PO4-P Olsen/Bicarb	mg/kg	57	12.9	1.24	12	85.7	9.20	78	28.3	3.20	27	23.0	2.10	21	23.4	2.20	24			
PO4-P AB-DTPA	mg/kg	4	9.40	2.35	6.6	31.4	9.93	19.8	14.7	2.81	12.1	14.9	2.63	11.3	14.2	1.78	11.2			
PO4-P Modified Morgan	mg/kg	6	3.77	0.823		11.8	1.09		5.09	0.178		4.2	0.545		18.8	3.65				
PO4-P True Morgan	mg/kg	7	4.30	0.300		12.8	0.800		4.80	0.200		4.9	0.100		20.0	0.700				
PO4-P Mod. Kewlona	mg/kg																			
PO4-P Stong Bray (1:10)	mg/kg	10	25.8	1.35		226	17.3		69.5	8.51		141	14.76		93.5	4.35				
PO4-P Water Soluble	mg/kg																			
SO4 - S (PO4 Extr.)	mg/kg	33	5.40	0.700		8.40	1.9		24.80	4.48		5.94	0.654		124	30.0				

Bases																	
K Ammonium Acetate	mg/kg	84	113	7.55	130	850	108	1010	95.4	9.70	111	170	11.4	182	207	13.0	214
Ca Ammonium Acetate	mg/kg	80	1730	97.0	1740	1940	177	2120	2400	295	3120	670	60.0	607	3070	303	3000
Mg Ammonium Acetate	mg/kg	80	253	14.8	258	306	30.8	341	437	45.3	496	55.3	6.73	44	268	21.5	259
Na Ammonium Acetate	mg/kg	66	13.0	1.39	39	** H 27.8	5.15	40	27.0	4.17	51	** H 9.19	1.55	51	** H 79.2	7.32	93
Bray Extractable K	mg/kg	6	88.7	3.67		592	19.0		65.1	4.24		157	4.55		175	7.85	
K- Olsen/Bicarb.	mg/kg	6	105	9.00		759	10.0		92.8	5.30		167	8.00		218	4.50	
K Modified Morgan	mg/kg	4	109	6.50		774	128		101	2.00		148	19.2		185	19.5	
K True Morgan	mg/kg	5	88.9	9.90		665	23.0		85.7	9.30		146	7.00		161	5.00	
Ca Modified Morgan	mg/kg	4	1840	98.5		2230	92.0		4950	72.0		691	120		3190	263	
Aluminum KCL Extr.	mg/kg	6	0.434	0.110	0.28	0.550	0.204	0.36	0.255	0.147	0.14	1.35	1.04	0.32	0.530	0.280	0.76

Mehlich-1 Multi Element (scoop)																	
Scoop Soil Mass	g	6	5.00	0.000		5.00	0.000		5.00	0.000		5.00	0.000		5.00	0.000	
P	mg/kg	9	15.9	1.32		37.2	8.96		2.19	0.170		45.9	1.90		83.3	8.65	
K	mg/kg	9	73.5	3.41		579	19.6		64.8	3.20		146	12.9		151	15.1	
Ca	mg/kg	9	1470	71.0		2000	210		3650	505		740	66.2		2350	223	
Mg	mg/kg	9	207	6.44		265	17.5		565	33.6		57.4	6.63		217	14.2	
Mn	mg/kg	7	73.5	3.02		323	27.3		197	19.9		9.90	0.860		29.3	3.03	
Zn	mg/kg	7	1.87	0.124		11.0	0.480		6.38	0.676		1.40	0.123		1.49	0.060	

Mehlich-3 Multi-Element (scoop)																	
Scoop Soil Mass	g	28	1.94	0.060		1.65	0.103		1.72	0.095		2.33	0.106		2.43	0.090	
Assumed Density	g/cm3	19	0.972	0.097		0.843	0.065		0.857	0.073		1.18	0.060		1.21	0.045	
Volume of Scoop	cm3	26	2.00	0.000		2.00	0.000		2.00	0.000		2.00	0.000		2.00	0.000	
Extractant Volume mL	mL	24	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	21.6	0.600		110	10.2		33.0	3.30		118	6.55		46.4	2.52	
P ICP-AES	mg/kg	56	26.7	1.68		116	9.31		32.8	3.22		136	7.25		51.1	3.52	
K	mg/kg	61	114	6.87		802	78.9		92.7	8.36		176	12.2		227	17.0	
Ca	mg/kg	57	1800	98.3		2060	162		3160	303		775	79.1		3300	273	
Mg	mg/kg	57	263	11.9		304	22.6		491	37.3		68.2	6.65		305	24.0	
Na	mg/kg	43	13.5	2.82		27.6	4.40		26.3	4.84		11.0	1.92		82.1	9.58	
S	mg/kg	46	9.50	1.52		13.7	1.92		30.2	2.16		18.1	1.83		221	23.3	
Al	mg/kg	35	553	38.0		881	70.5		704	53.0		1330	104		312	19.6	
Zn	mg/kg	50	2.52	0.175		8.22	0.560		5.19	0.320		2.79	0.207		2.20	0.220	
Mn	mg/kg	50	143	7.89		328	29.2		162	13.8		10.0	1.00		67.9	5.11	
Fe	mg/kg	49	199	12.1		475	57.2		495	50.0		228	17.2		80.8	7.10	
Cu	mg/kg	47	1.47	0.110		0.796	0.134		0.820	0.115		3.50	0.250		1.80	0.200	
B	mg/kg	39	0.460	0.080		0.720	0.098		1.35	0.180		0.420	0.100		0.810	0.110	

Micronutrients																	
Zn - DTPA	mg/kg	73	1.57	0.103	1.4	6.67	0.740	6.8	4.23	0.520	4	0.800	0.106	0.58	0.788	0.118	0.61
Mn - DTPA	mg/kg	55	65.6	6.70	61.3	242	30.0	258	37.4	6.67	32.4	6.90	0.782	5.9	4.00	0.942	3
Fe - DTPA	mg/kg	58	58.4	6.08	58	244	29.4	214	232	35.7	226	69.6	7.45	58	12.0	1.82	9.2
Cu - DTPA	mg/kg	60	0.900	0.080	0.85	2.10	0.155	2	3.20	0.315	3.2	2.10	0.286	1.7	0.673	0.100	0.53
Zn - HCl	mg/kg	4	2.71	0.265		15.3	2.72		14.6	1.07		1.93	0.285		2.27	0.385	
Mn-H3PO4	mg/kg	12	62.1	5.56		279	12.6		125	27.5		9.48	0.915		15.5	0.760	
Cl - Ca(NO3)2 Extr.	mg/kg	14	18.1	2.90		21.3	2.90		16.2	2.57		4.63	0.681		84.9	7.78	
B - Hot Wat.	mg/kg	29	0.300	0.042		0.600	0.130		0.570	0.120		0.140	0.028		0.500	0.120	
B-DTPA/Sorbitol	mg/kg	19	0.210	0.040		0.520	0.072		0.705	0.150		0.170	0.020		0.500	0.090	

Soil Organic Matter																	
Soil Kjeldahl N	%	18	0.125	0.005	0.089	** L 0.248	0.012	0.134	** L 0.293	0.010	0.196	** L 0.091	0.008	0.056	** L 0.049	0.009	0.028
Soil TN (combustion)	%	45	0.130	0.010		0.270	0.012		0.310	0.015		0.093	0.007		0.052	0.008	
Soil Total C (Combustion)	%	13	1.27	0.060	1.1	* L 3.37	0.084	2.8	** L 3.51	0.150	3.51	0.990	0.046	0.58	** L 0.288	0.019	0.28
Soil Total C (Combustion)	%	34	1.28	0.030	1.14	** L 3.34	0.070	3.02	** L 3.84	0.066	3.84	1.02	0.029	0.75	** L 0.339	0.038	0.28

SOM - Walkley-Black	%	30	2.15	0.125	2.9	** H	5.64	0.355	0.7	** L	5.32	0.475	7.6	** H	1.81	0.110	2.7	** H	0.600	0.085	1	** H
SOM - LOI (% Wt loss)	%	76	2.58	0.150	3.6	** H	6.41	0.250	8.1	** H	5.99	0.200	8.6	** H	1.99	0.100	2.9	** H	1.02	0.120	1.8	** H
Other																						
CaCO3 Content	%	11	0.480	0.076	0.4		0.790	0.128	0.7		4.38	0.450	4.9		0.500	0.075	0.2	* L	0.750	0.180	0.7	
CEC - Cation Displacement	cmol/kg	21	14.5	1.70	14.5		25.5	3.10	24.6		19.1	2.63	19.1		5.30	0.910	5.7		13.4	1.74	12	
CEC - Estimation	cmol/kg	11	13.4	1.53			20.0	1.80			17.4	2.96			5.00	1.00			21.1	1.45		
Soil Density (Scoop)	g/cc	12	1.12	0.059			0.960	0.040			0.960	0.036			1.34	0.044			1.41	0.038		
Particle Size Analysis-Hydrometer																						
Sand 2000 - 50 um	%	41	12.4	2.60	10		29.0	2.60	22	* L	20.7	4.30	16		72.4	2.40	70		68.0	2.90	68	
Silt 50 - 2 um	%	41	68.0	3.20	78	* H	50.0	4.30	64	* H	53.0	4.00	67	* H	15.0	2.60	23	* H	16.0	3.00	21	
Clay 2 - 0 um	%	41	19.0	2.00	12	* L	20.7	2.32	14	* L	26.0	6.00	17		12.0	2.00	7		16.7	2.30	11	
Particle Size Analysis- Pipette																						
Sand 2000 - 50 um	%	3	4.77	1.18			22.5	0.310			13.0	0.280			74.0	0.400			66.6	1.33		
Silt 50 - 2 um	%	3	76.1	1.16			54.3	0.420			59.9	2.40			16.0	0.220			18.5	1.87		
Clay 2 - 0 um	%	3	19.1	0.010			23.2	0.740			22.6	1.56			10.4	0.170			13.6	0.500		
Solvita CO2																						
Solvita CO2	ppm	6	70.3	19.3			153	36.0			152	33.4			68.8	29.3			54.3	4.35		



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Laboratory ID
352129

Soil	Soil 2017-111			Soil 2017-112			Soil 2017-113			Soil 2017-114			Soil 2017-115									
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	%	20	47.5	3.09	45.6	53.8	3.90	54.5	55.9	4.00	56.6	42.8	3.29	39.5	43.9	3.15	40.7					
pH - sp	Unit	26	7.59	0.080	7.5	6.53	0.110	6.3	5.30	0.100	5.2	6.77	0.135	6.6	6.58	0.145	6.4					
ECe - sp	dS/m	27	0.910	0.120	1.2	0.800	0.110	0.9	0.980	0.090	1.1	0.700	0.060	0.7	0.370	0.050	0.4					
HCO ₃ - sp	mmolc/L	11	8.48	1.06	10.1	5.77	1.02	6.54	0.990	0.210	0.94	3.45	0.600	4	2.25	0.460	2.33					
Ca - sp	mmolc/L	24	3.85	0.885	5.34	5.72	1.20	7.63	1.89	0.210	2.07	3.92	0.525	4.81	2.24	0.246	2.52					
Mg - sp	mmolc/L	24	2.02	0.491	3.03	2.54	0.515	3.13	3.17	0.354	3.91	1.78	0.177	2.41	*H	0.749	0.107	0.86				
Na - sp	mmolc/L	25	0.557	0.127	0.73	0.148	0.023	0.14	0.390	0.090	0.41	0.110	0.018	0.22	**H	0.200	0.040	0.22				
SAR - sp	value	21	0.350	0.050	0.36	0.090	0.014	0.06	0.235	0.045	0.23	0.080	0.011	0.11	*H	0.175	0.027	0.17				
Cl - sp	mmolc/L	14	0.320	0.038	0.178	*L	0.570	0.049	0.594	0.612	0.055	0.623	0.170	0.026	0.102	*L	0.395	0.050	0.373			
SO ₄ - sp	mmolc/L	15	1.00	0.060	1	2.16	0.190	2.22	0.600	0.070	0.42	*L	0.640	0.080	0.91	*H	0.624	0.084	0.66			
NO ₃ - sp	mmolc/L	10	0.150	0.036		0.029	0.006		5.54	0.635	7.3	*H	1.41	0.280	0.275	**L	0.047	0.007				
B - sp	mg/L	13	0.300	0.032		0.140	0.029		0.086	0.016		0.166	0.034		0.070	0.012						
Soil pH & EC																						
Soil EC (1:1)	(dS/m)	39	0.420	0.040	0.48	0.350	0.044	0.4	0.417	0.097	0.56	0.302	0.031	0.32	0.190	0.017	0.18					
Soil EC (1:2)	(dS/m)	51	0.310	0.045	0.36	0.230	0.029	0.23	0.306	0.056	0.33	0.192	0.026	0.27	*H	0.120	0.012	0.12				
pH (1:1) Water	Unit	93	7.91	0.060	7.5	**L	6.56	0.060	6.1	**L	5.35	0.050	4.8	**L	6.83	0.060	6.2	**L	6.57	0.065	5.9	**L
pH (1:2) Water	Unit	31	8.06	0.080	7.7	**L	6.68	0.080	6	**L	5.49	0.090	4.7	**L	6.93	0.076	6.1	**L	6.70	0.060	5.8	**L
pH (1:1) 0.01M CaCl ₂	Unit	26	7.45	0.050		6.19	0.065		4.94	0.045		6.42	0.052		6.06	0.045						
pH (1:2) 0.01M CaCl ₂	Unit	11	7.40	0.070		6.20	0.136		4.99	0.060		6.40	0.050		6.04	0.069						
Buffer pH, Lime Req.																						
SMP Buffer pH	Unit	29	7.45	0.050	7.3	*L	6.86	0.060	6.4	**L	5.94	0.120	5.4	**L	7.27	0.060	7.2	7.11	0.055	7.2		
Adams-Evans Buf pH	Unit	10	7.80	0.050		7.56	0.065		7.12	0.080		7.82	0.070		7.78	0.085						
Woodruff Buf. pH	Unit	22	7.17	0.040		6.77	0.030		6.05	0.105		6.96	0.027		6.85	0.035						
Mehlich Buffer pH	Unit	9	6.83	0.090		6.29	0.040		5.73	0.065		6.49	0.025		6.39	0.045						
Sikora Buffer pH	Unit	30	7.50	0.035		6.90	0.030		6.11	0.065		7.29	0.050		7.12	0.030						
Titrateable Acidity	cmol/kg																					
Inorganic Nitrogen (NO₃-N & NH₄-N)																						
NO ₃ -N Cd. Rd.	mg/kg	68	15.6	0.710		6.92	0.425		53.0	3.67		25.4	1.45		10.1	0.489						
NO ₃ -N ISE	mg/kg	14	17.2	1.45		8.00	1.23		56.4	4.45		26.9	2.75		11.4	1.02						
NO ₃ -N CTA	mg/kg	2	17.0	0.263		9.31	1.19		51.9	4.05		25.4	1.10		11.4	0.325						
NO ₃ -N Ion Chr.	mg/kg	1	12.9	0.000		5.96	0.000		51.7	0.000		22.0	0.000		8.27	0.000						
NO ₃ -N Other _____	mg/kg	9	15.1	2.60	14	6.45	0.630	6.45	53.0	3.82	52.5	25.6	1.50	24.5	9.70	0.520	9.45					
NH ₄ - N (KCl Extr.)	mg/kg	59	5.45	0.640	13	**H	11.9	1.01	12	91.2	8.40	99	4.32	0.510	4.6	24.5	1.80	24				
Phosphorus and Sulfur																						
PO ₄ -P Bray P (1:10)	mg/kg	51	178	8.65		97.5	6.07		8.88	1.40		20.6	1.10		18.0	1.20						
PO ₄ -P Bray P1 (1:7)	mg/kg	5	132	26.9		82.3	11.5		5.41	1.55		15.2	1.89		14.0	0.19						
PO ₄ -P Olsen/Bicarb	mg/kg	55	124	9.00	110	48.1	4.10	39	14.6	2.60	7.8	*L	12.9	1.30	13	12.9	1.48	10				
PO ₄ -P AB-DTPA	mg/kg	3	80.3	12.0		20.4	1.66		23.4	9.78		11.7	1.39		10.6	1.80						
PO ₄ -P Modified Morgan	mg/kg	8	179	13.5		25.7	3.15		2.19	0.226		13.1	1.30		3.80	0.900						
PO ₄ -P True Morgan	mg/kg	8	169	19.0		27.4	1.35		1.78	0.230		12.6	0.600		3.62	0.400						
PO ₄ -P Mod. Kewlona	mg/kg																					
PO ₄ -P Stong Bray (1:10)	mg/kg	9	565	11.0		156	10.7		17.0	2.00		62.1	4.10		42.0	1.35						
PO ₄ -P Water Soluble	mg/kg																					
SO ₄ - S (PO ₄ Extr.)	mg/kg	33	8.29	0.924		17.0	2.55		22.6	4.45		5.18	0.763		4.88	0.980						

Bases																						
K Ammonium Acetate	mg/kg	78	1410	60.5	1650	* H	444	24.4	557	** H	80.4	8.15	109	* H	235	13.2	291	** H	163	9.87	198	* H
Ca Ammonium Acetate	mg/kg	74	3010	241	3800	* H	3040	234	3530		420	30.5	394		1920	90.8	2010		1510	100	1570	
Mg Ammonium Acetate	mg/kg	74	531	22.5	596	* H	466	30.5	516		173	9.00	174		280	14.2	289		179	8.50	184	
Na Ammonium Acetate	mg/kg	66	25.5	3.49	35	* H	11.0	2.57	10.3		15.0	2.80	13.6		8.95	2.22	5.53		10.6	1.12	9.2	
Bray Extractable K	mg/kg	5	1050	173			311	8.50			54.0	6.10			203	8.70			131	4.00		
K- Olsen/Bicarb.	mg/kg	4	1120	39.5			362	6.00			82.6	4.90			221	1.00			155	5.50		
K Modified Morgan	mg/kg	5	1350	58.0			420	40.0			73.0	4.00			211	9.00			152	7.00		
K True Morgan	mg/kg	6	1000	86.0			291	12.0			72.5	3.80			190	11.5			129	6.00		
Ca Modified Morgan	mg/kg	4	4830	142			3480	136			393	37.0			1960	140			1570	110		
Aluminum KCL Extr.	mg/kg	7	0.411	0.311	0.411		0.463	0.263			12.8	1.30	23.4		0.400	0.085	0.33		0.750	0.275	0.45	

Mehlich-1 Multi Element (scoop)																						
Scoop Soil Mass	g	6	5.00	0.000			5.00	0.000			5.00	0.000			5.00	0.000			5.00	0.000		
P	mg/kg	8	395	57.1			84.5	8.31			10.2	1.51			57.73	4.285			24	2.77		
K	mg/kg	8	903	69.9			254	20.28			61	2.9			173	10.1			114	5.61		
Ca	mg/kg	8	4280	475.4			2989	362			507	32			2205	155			1432	68.4		
Mg	mg/kg	8	590	62.00			446	32.4			176	9.7			294	20.9			164	8.20		
Mn	mg/kg	7	37.4	5.26			80.1	6.710			75.3	6.46			54.29	5.130			112.2	6.56		
Zn	mg/kg	7	2.61	0.580			4.87	0.504			6.280	0.250			2.640	0.238			1.5	0.085		

Mehlich-3 Multi-Element (scoop)																						
Scoop Soil Mass	g	30	2.03	0.070			1.86	0.090			1.90	0.089			2.14	0.060			2.00	0.100		
Assumed Density	g/cm ³	19	1.04	0.065			0.935	0.068			0.969	0.069			1.07	0.033			1.01	0.100		
Volume of Scoop	cm ³	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	24	20.0	0.000			20.0	0.000			20.0	0.000			20.0	0.000			20.0	0.000		
P Colorimetric	mg/kg	8	233	10.8			106	6.55			7.50	1.50			23.5	1.79			20.0	1.00		
P ICP-AES	mg/kg	53	254	13.4			121	6.70			12.0	1.90			34.8	2.87			24.7	1.45		
K	mg/kg	57	1420	79.7			437	20.6			75.0	6.30			236	11.8			163	10.0		
Ca	mg/kg	56	3840	194			3260	175			462	42.5			2200	122			1580	109		
Mg	mg/kg	56	658	35.8			479	28.3			180	10.5			316	16.6			188	8.58		
Na	mg/kg	44	26.6	4.37			11.0	1.80			17.1	2.01			9.48	1.47			12.0	1.68		
S	mg/kg	48	18.3	1.84			27.6	2.79			36.3	2.78			13.0	1.66			9.85	1.64		
Al	mg/kg	36	419	33.2			763	41.5			1850	112			264	14.2			520	28.0		
Zn	mg/kg	52	6.61	0.530			7.13	0.555			5.30	0.375			3.36	0.265			1.83	0.171		
Mn	mg/kg	52	155	12.0			149	12.3			67.3	5.25			171	12.4			218	15.7		
Fe	mg/kg	52	71.8	5.78			158	10.9			404	37.5			88.8	6.71			266	14.7		
Cu	mg/kg	53	2.10	0.130			2.54	0.190			1.68	0.280			0.845	0.080			1.80	0.140		
B	mg/kg	39	2.71	0.200			1.06	0.090			0.46	0.088			1.54	0.140			0.530	0.096		

Micronutrients																						
Zn - DTPA	mg/kg	65	2.76	0.160	2.5		4.40	0.230	4.7		4.40	0.380	4.4		1.70	0.100	1.6		1.00	0.100	0.97	
Mn - DTPA	mg/kg	52	16.1	2.20	12.7		73.6	7.26	75.6		62.5	5.09	68.1		32.1	3.98	27.5		79.1	9.61	78.8	
Fe - DTPA	mg/kg	53	11.0	1.15	8.3		53.1	4.08	59		298	27.6	328		21.9	2.70	19		80.5	6.72	82	
Cu - DTPA	mg/kg	55	0.790	0.050	0.66	* L	1.70	0.100	1.8		1.40	0.100	1.4		0.300	0.020	0.262		1.20	0.100	1.22	
Zn - HCl	mg/kg	3	7.22	0.580			7.70	0.170			8.20	0.090			3.50	0.070			1.90	0.020		
Mn-H3PO4	mg/kg	8	29.5	5.52			62.5	3.02			64.6	5.29			39.3	3.50			82.6	5.46		
Cl - Ca(NO3)2 Extr.	mg/kg	14	4.81	0.942			10.5	2.35			11.8	1.81			3.03	0.440			5.55	0.870		
B - Hot Wat.	mg/kg	33	1.47	0.320			0.833	0.135			0.360	0.070			0.790	0.160			0.318	0.078		
B-DTPA/Sorbitol	mg/kg	16	1.49	0.135			0.500	0.080			0.340	0.065			0.600	0.050			0.250	0.050		

Soil Organic Matter																						
Soil Kjeldahl N	%	17	0.250	0.023	0.174	* L	0.265	0.015	0.258		0.320	0.020	0.263	* L	0.168	0.012	0.168		0.130	0.010	0.129	
Soil TN (combustion)	%	41	0.255	0.008			0.270	0.013			0.345	0.020			0.175	0.008			0.134	0.009		
Soil TOC (Combustion)	%	12	2.53	0.223	2.31		2.90	0.099	3		4.71	0.465	3.98		1.71	0.155	1.49		1.29	0.050	1.36	
Soil Total C (Combustion)	%	34	2.87	0.085	3.22	** H	2.93	0.110	3.28	* H	5.05	0.210	7.52	** H	1.86	0.098	2.06		1.30	0.039	1.45	* H

SOM - Walkley-Black	%	26	4.36	0.250	4.8		4.79	0.200	5.8	** H	7.85	0.870	9.56		3.08	0.200	4.16	** H	2.26	0.138	2.67	* H
SOM - LOI (% Wt loss)	%	77	4.46	0.140	6.4	** H	5.30	0.210	8.15	** H	9.48	0.380	10.88	* H	3.03	0.120	4.02	** H	2.78	0.092	3.98	** H
Other																						
CaCO3 Content	%	13	2.700	0.348	3.7	* H	1.02	0.190	1.1		0.525	0.070			0.550	0.076	0.6		0.446	0.059	0.4	
CEC - Cation Displacement	cmol/kg	17	20.7	2.40	22.5		27.0	3.10	30.8		17.8	3.73	25.9		13.8	2.24	13.2		13.5	1.10	14.6	
CEC - Estimation	cmol/kg	13	23.4	1.85			22.7	1.78			13.8	1.82			13.9	1.23			10.1	0.645		
Soil Density (Scoop)	g/cc	11	1.17	0.029			1.07	0.040			1.12	0.031			1.22	0.040			1.14	0.050		
Particle Size Analysis-Hydrometer																						
Sand 2000 - 50 um	%	38	52.2	2.80	44	* L	15.5	2.45	6	* L	63.0	4.70	56		82.1	3.01	82		22.0	3.55	15	
Silt 50 - 2 um	%	38	31.2	4.60	44	* H	61.1	4.40	78	* H	27.5	2.50	40	** H	9.00	1.37	14	* H	63.3	4.30	76	* H
Clay 2 - 0 um	%	38	17.8	2.25	12	* L	24.5	4.69	16		9.55	1.42	4	* L	8.00	1.12	4	* L	15.0	3.05	9	
Particle Size Analysis- Pipette																						
Sand 2000 - 50 um	%	5	53.0	2.000			10.0	3.00			62.2	0.200			83.0	1.30			15.8	0.500		
Silt 50 - 2 um	%	5	29.2	1.50			64.0	3.55			28.0	2.00			7.20	0.400			68.0	2.70		
Clay 2 - 0 um	%	5	17.8	2.00			26.0	2.69			10.2	2.78			10.0	1.20			16.0	2.07		
Solvita CO2																						
Solvita CO2	ppm	7	169	45.3			186	73.4			98.0	20.0			113	15.0			123	21.3		



**2017 North American Proficiency Testing Program
1st Quarter Report - April 14, 2017**

Laboratory ID

352129

Soil Analysis	Units	n	Soil 2017-101			Soil 2017-102			Soil 2017-103			Soil 2017-104			Soil 2017-105							
			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	%	22	47.5	3.20	45.2	45.1	2.40	41.8	40.1	2.65	36.6	55.6	3.68	59.8	31.2	2.26	28.2					
pH - sp	Unit	28	6.13	0.230	6.3	6.75	0.075	6.6	5.77	0.085	5.5 * L	7.19	0.080	6.9 * L	7.35	0.090	7 * L					
ECe - sp	dS/m	29	1.01	0.070	1.1	0.680	0.080	0.8	1.08	0.190	1.4	0.630	0.041	0.7	3.62	0.550	3.9					
HCO ₃ - sp	mmolc/L	12	6.06	1.03	5.46	2.40	0.320	3.63 * H	0.416	0.045	0.34	4.23	0.503	5.4	2.03	0.257	2.48					
Ca - sp	mmolc/L	26	9.52	1.56	9.42	4.22	0.405	4.72	5.10	0.815	6.14	3.47	0.300	3.28	25.9	2.41	31.5					
Mg - sp	mmolc/L	26	1.88	0.295	1.71	1.88	0.219	2.1	2.25	0.485	2.85	1.97	0.220	1.84	7.50	1.38	9.04					
Na - sp	mmolc/L	26	0.565	0.080	0.51	0.096	0.014	0.11	0.325	0.075	0.41	0.122	0.016	0.15	0.200	0.033	0.61 ** H					
SAR - sp	value	24	0.230	0.042	0.22	0.060	0.010	0.06	0.185	0.040	0.19	0.080	0.010	0.1	0.050	0.007	0.14 ** H					
Cl - sp	mmolc/L	15	0.358	0.058	0.331	0.170	0.021	0.207	0.320	0.060	0.3	0.316	0.033	0.297	1.05	0.180	1.49					
SO ₄ - sp	mmolc/L	16	2.46	0.410	2.73	0.605	0.060	0.53	0.320	0.045	0.25	0.675	0.082	0.47	2.52	0.420	2.9					
NO ₃ - sp	mmolc/L	9	1.74	0.360		2.77	0.582		7.90	0.820		0.033	0.008		26.0	5.79						
B - sp	mg/L	15	0.034	0.005	0	** L	0.170	0.030	0.1	0.060	0.010	0	** L	0.112	0.019	0	** L	0.229	0.021	0.2		
Soil pH & EC																						
Soil EC (1:1)	(dS/m)	40	0.278	0.050		0.290	0.039		0.370	0.070		0.320	0.025		1.06	0.215						
Soil EC (1:2)	(dS/m)	46	0.202	0.037	0.5	** H	0.193	0.023	0.4	** H	0.272	0.041	0.6	** H	0.240	0.040	0.6	** H	0.750	0.098	1.6	** H
pH (1:1) Water	Unit	94	6.03	0.135		6.85	0.060		5.89	0.062		7.47	0.080		7.60	0.075						
pH (1:2) Water	Unit	29	6.10	0.100	5.9	6.92	0.080	6.4	** L	5.97	0.080	5.5	** L	7.58	0.110	6.9	** L	7.65	0.130	7	** L	
pH (1:1) 0.01M CaCl ₂	Unit	24	5.75	0.105		6.50	0.040		5.54	0.035		6.95	0.055		7.41	0.090						
pH (1:2) 0.01M CaCl ₂	Unit	10	5.80	0.150		6.47	0.075		5.55	0.050		6.95	0.065		7.37	0.095						
Buffer pH, Lime Req.																						
SMP Buffer pH	Unit	29	6.73	0.150	6.8	7.28	0.080	7.4	6.60	0.070	6.9	** H	7.29	0.043	7.4	* H	7.56	0.044	7.6			
Adams-Evans Buf pH	Unit	11	7.54	0.030		7.80	0.030		7.48	0.040		7.74	0.035		7.96	0.035						
Woodruff Buf. pH	Unit	23	6.70	0.080		6.97	0.030		6.53	0.030		7.03	0.030		7.06	0.040						
Mehlich Buffer pH	Unit	11	6.18	0.090		6.50	0.050		6.08	0.010		6.58	0.060		6.68	0.070						
Sikora Buffer pH	Unit	31	6.76	0.110		7.30	0.040		6.62	0.080		7.28	0.040		7.57	0.050						
Titrateable Acidity	cmol/kg																					

1 - Values flagged exceed Warning Limits " * " 2.5 x MAD (Median Absolute Deviation) and Control Limits " ** " 4 x MAD. "<" and "ND" values not recorded.

2 - Limits not compared to lab data for methods with < 7 labs reporting.

Inorganic Nitrogen (NO3-N & NH4-N)

NO3-N Cd. Rd.	mg/kg	68	14.0	1.30		25.7	1.55		54.0	2.67		2.50	0.460		152	13.5			
NO3-N ISE	mg/kg	14	14.5	1.55		26.8	3.15		53.5	4.60		3.50	0.365		177	27.9			
NO3-N CTA	mg/kg	2	15.4	0.56		26.3	2.59		51.0	5.09		5.33	0.648		126	24.0			
NO3-N Ion Chr.	mg/kg	2	6.22	6.08		20.6	2.27		72.7	21.9		1.01	0.873		252	110			
NO3-N Other _____	mg/kg	8	12.8	1.53	14	25.3	2.56	22	49.3	7.16	45	3.30	0.308	2	** L	169	10.8	139	* L
NH4 - N (KCl Extr.)	mg/kg	59	9.35	1.25	10	3.88	0.670	4	18.6	1.70	18	6.40	0.880	7	** L	2.09	0.271	2	

Phosphorus and Sulfur

PO4-P Bray P (1:10)	mg/kg	52	25.5	2.46		20.4	1.72		156	14.0		195	20.5		73.2	6.80						
PO4-P Bray P1 (1:7)	mg/kg	5	21.6	1.09		17.7	0.910		92.6	11.7		166	3.03		54.8	5.75						
PO4-P Olsen/Bicarb	mg/kg	55	12.1	1.10	0	** L	12.1	0.900	1	** L	51.5	4.69	5	** L	128	14.0	13	** L	32.4	4.08	3	** L
PO4-P AB-DTPA	mg/kg	3	12.9	1.87		12.7	1.99		24.7	1.49		84.6	24.5		28.4	0.158						
PO4-P Modified Morgan	mg/kg	8	2.35	0.405		12.7	1.60		6.30	0.450		96.5	6.75		50.4	5.85						
PO4-P True Morgan	mg/kg	7	2.00	0.180		12.3	0.900		6.80	0.320		102	12.2		51.1	4.20						
PO4-P Mod. Kewlona	mg/kg	1	19.0	0.000		15.0	0.000		75.0	0.000		200	0.000		47.0	0.000						
PO4-P Stong Bray (1:10)	mg/kg	9	32.0	1.50		61.0	8.75		333	14.8		379	17.0		104	7.70						
PO4-P Water Soluble	mg/kg																					
SO4 - S (PO4 Extr.)	mg/kg	36	19.3	4.38		5.00	0.823		9.27	2.08		6.34	1.04		16.0	3.40						

Bases

K Ammonium Acetate	mg/kg	79	97.1	10.6	127	* H	235	13.4	260	285	18.0	314	1110	86.1	1120	202	22.6	188
Ca Ammonium Acetate	mg/kg	75	1380	201	1610		1930	122	1890	878	69.0	825	3660	296	4230	966	109	881
Mg Ammonium Acetate	mg/kg	75	91.0	7.86	96		282	12.8	286	113	8.65	106	602	43.5	647	100	13.5	80
Na Ammonium Acetate	mg/kg	61	18.2	3.78	35	** H	9.60	1.57	11	12.8	3.20	19	11.0	1.75	14	8.00	1.14	10
Bray Extractable K	mg/kg	6	82.9	4.45		208	3.35		233	14.1		797	53.0		234	7.90		
K- Olsen/Bicarb.	mg/kg	6	107	7.46		226	9.50		285	4.09		979	13.0		192	5.50		
K Modified Morgan	mg/kg	5	100	6.50		219	23.0		272	11.5		1060	84.5		181	24.0		
K True Morgan	mg/kg	5	82.0	1.80		199	12.0		257	4.00		796	17.0		166	14.0		
Ca Modified Morgan	mg/kg	4	2120	204		1980	250		911	74.0		6050	838		1300	163		
Aluminum KCL Extr.	mg/kg	5	1.00	0.200		0.700	0.320		3.00	1.10		0.600	0.400		2.00	0.600		

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Mehlich-1 Multi Element (scoop)													
Scoop Soil Mass	g	5	5.00	0.000	5.00	0.000	5.00	0.000	5.00	0.000	5.00	0.000	5.00
P	mg/kg	8	12.4	1.66	55.7	7.28	73.5	12.0	145	20.2	108	11.1	
K	mg/kg	8	74.1	2.96	182	22.3	240	12.8	641	60.1	206	18.5	
Ca	mg/kg	8	1790	87.5	2170	283	1170	76.9	4330	474	1640	179	
Mg	mg/kg	8	94.3	3.67	287	35.4	121	4.51	631	69.3	131	10.8	
Mn	mg/kg	7	80.5	5.71	47.8	3.31	102	9.75	84.5	9.74	33.2	0.830	
Zn	mg/kg	7	2.07	0.125	2.55	0.381	4.09	0.388	2.41	0.861	2.04	0.316	
Mehlich-3 Multi-Element (scoop)													
Scoop Soil Mass	g	28	1.85	0.175	2.20	0.079	2.23	0.110	1.88	0.090	2.66	0.090	
Assumed Density	g/cm ³	17	0.932	0.102	1.10	0.060	1.12	0.075	0.953	0.057	1.32	0.045	
Volume of Scoop	cm ³	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	25	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	
P Colorimetric	mg/kg	13	22.5	2.30	22.6	2.85	141	9.90	243	15.8	77.0	2.20	
P ICP-AES	mg/kg	52	35.6	1.70	33.4	2.52	146	11.5	266	16.6	90.6	8.36	
K	mg/kg	58	99.4	11.2	238	12.2	277	16.9	1070	60.7	241	24.5	
Ca	mg/kg	56	1640	167	2230	95	1020	76.4	4570	340	1380	128	
Mg	mg/kg	56	101	8.65	323	15.5	125	8.21	676	37.0	135	12.9	
Na	mg/kg	45	17.3	2.55	8.00	1.39	13.6	2.60	11.0	2.30	7.53	1.38	
S	mg/kg	47	32.4	3.40	11.1	1.15	20.0	2.03	14.0	1.47	24.9	2.90	
Al	mg/kg	35	943	59.0	267	23.0	1630	140	266	39.7	137	15.0	
Zn	mg/kg	51	2.39	0.228	3.36	0.241	4.08	0.280	6.77	0.520	2.51	0.270	
Mn	mg/kg	52	111	8.59	167	15.2	100	4.99	121	13.0	81.6	8.35	
Fe	mg/kg	51	133	10.5	94.2	9.50	210	17.7	343	35.3	46.2	5.88	
Cu	mg/kg	52	0.750	0.150	0.890	0.125	2.71	0.170	3.32	0.315	0.312	0.027	
B	mg/kg	40	0.300	0.070	1.60	0.210	0.700	0.100	1.53	0.180	0.850	0.193	

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Micronutrients																			
Zn - DTPA	mg/kg	66	1.50	0.200	1.4	1.70	0.100	1.4	* L	2.01	0.165	1.5	* L	3.90	0.305	3.6	0.800	0.100	0.6
Mn - DTPA	mg/kg	53	56.7	4.52	59.3	28.2	4.38	21.9		75.7	4.77	64.8		15.0	1.92	13.6	5.77	0.970	4
Fe - DTPA	mg/kg	56	49.4	6.35	50	23.8	3.00	16	* L	117	18.0	98		70.4	8.31	62	6.70	0.900	5
Cu - DTPA	mg/kg	56	0.493	0.058	0.5	0.300	0.030	0.2	* L	1.80	0.160	1.6		2.45	0.235	2.3	0.100	0.014	0
Zn - HCl	mg/kg	4	2.39	0.185		3.58	0.130			4.68	0.250			8.19	0.560		2.51	0.240	
Mn-H3PO4	mg/kg	9	71.0	5.98		35.7	1.37			82.0	6.24			68.6	14.0		25.0	0.440	
Cl - Ca(NO3)2 Extr.	mg/kg	18	5.67	0.789		2.66	0.315			4.80	0.568			4.80	0.719		12.6	2.70	
B - Hot Wat.	mg/kg	32	0.218	0.036	0	** L	0.895	0.135	0.2	** L	0.450	0.050	0	** L	0.920	0.170	0.1	** L	0.448
B-DTPA/Sorbitol	mg/kg	17	0.190	0.030		0.630	0.060			0.300	0.047			0.720	0.060		0.360	0.050	
Soil Organic Matter																			
Soil Kjeldahl N	%	19	0.150	0.010	0.112	* L	0.170	0.010	0.118	** L	0.200	0.010	0.168	* L	0.290	0.014	0.168	** L	0.060
Soil TN (combustion)	%	39	0.153	0.013		0.177	0.012			0.210	0.010			0.290	0.018		0.060	0.010	
Soil TOC (Combustion)	%	10	1.67	0.130	1.8	1.76	0.184	2		2.46	0.070	2.9	** H	3.67	0.178	4.1	0.418	0.022	0.5
Soil Total C (Combustion)	%	30	1.71	0.032	2.02	** H	1.90	0.084	2.42	** H	2.37	0.077	2.85	** H	3.87	0.110	7.47	** H	0.460
SOM - Walkley-Black	%	25	2.82	0.234	5	** H	3.25	0.150	3.9	** H	4.40	0.290	5.8	** H	6.01	0.420	8.3	** H	0.774
SOM - LOI (% Wt loss)	%	81	3.70	0.130		3.00	0.150			4.90	0.150			6.10	0.210		0.775	0.070	
Other																			
CaCO3 Content	%	10	0.792	0.166	0.8	0.700	0.120	0.7		0.600	0.130	0.4		2.80	0.187	4.6	** H	0.560	0.104
CEC - Cation Displacement	cmol/kg	18	11.0	1.77	14.1	12.7	2.70	16.1		11.6	1.98	18.6	* H	24.9	3.90	31.9	2.70	0.310	2.32
CEC - Estimation	cmol/kg	13	10.6	2.44		13.3	0.890			11.0	1.10			27.0	1.25		7.00	0.640	
Soil Density (Scoop)	g/cc	11	1.03	0.053		1.24	0.040			1.28	0.040			1.09	0.030		1.50	0.060	
Particle Size Analysis-Hydrometer																			
Sand 2000 - 50 um	%	35	16.3	3.50	10	82.5	2.30	83		63.9	3.10	58		40.2	5.20	33	92.0	2.00	92
Silt 50 - 2 um	%	35	58.0	4.00	72	* H	9.20	1.80	11	27.0	3.00	36	* H	41.6	3.60	53	* H	3.90	0.475
Clay 2 - 0 um	%	35	24.0	4.00	18	8.01	1.23	6		9.00	1.50	6		17.5	3.20	14	5.00	1.08	0
Particle Size Analysis- Pipette																			
Sand 2000 - 50 um	%	7	15.0	2.25		83.7	1.20			65.0	2.00			35.0	2.50		91.8	3.23	
Silt 50 - 2 um	%	7	62.0	2.00		7.48	1.16			26.0	4.00			47.5	2.62		2.00	0.400	
Clay 2 - 0 um	%	7	25.0	2.17		8.01	1.83			9.80	0.800			18.0	1.09		3.76	1.26	
Solvita CO2																			
Solvita CO2	ppm	9	213	79.0		134	21.0			82.0	15.0			139	44.9		17.5	3.50	

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