



2020 North American Proficiency Testing Program
Quarter 3 Soil Report - Monday, October 12, 2020

Laboratory ID
General

Soil	Soil 2020-111			Soil 2020-112			Soil 2020-113			Soil 2020-114			Soil 2020-115				
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	%	22	50.2	3.65		39.2	4.15		48.0	3.70		65.7	4.75		52.0	4.25	
pH - sp	Unit	30	7.08	0.105		6.90	0.080		5.89	0.100		6.98	0.090		7.58	0.130	
ECe - sp	dS/m	29	0.934	0.086		1.54	0.090		1.06	0.111		0.910	0.080		0.550	0.080	
HCO ₃ - sp	mmolc/L	16	5.34	1.00		2.05	0.485		1.60	0.350		3.50	0.302		5.02	1.18	
Ca - sp	mmolc/L	25	6.29	0.370		6.78	0.620		5.51	0.870		7.29	0.530		5.14	0.550	
Mg - sp	mmolc/L	25	2.53	0.176		4.50	0.300		2.80	0.300		1.15	0.110		1.49	0.140	
Na - sp	mmolc/L	25	0.700	0.060		0.650	0.067		0.300	0.052		0.210	0.039		0.291	0.049	
SAR - sp	value	22	0.330	0.030		0.270	0.030		0.130	0.030		0.100	0.010		0.165	0.035	
Cl - sp	mmolc/L	18	0.907	0.128		0.390	0.042		1.19	0.209		0.170	0.014		0.509	0.062	
SO ₄ - sp	mmolc/L	19	1.54	0.200		2.31	0.190		0.670	0.060		0.412	0.068		0.511	0.089	
NO ₃ - sp	mmolc/L	12	0.793	0.177		8.95	1.22		5.96	1.17		4.15	0.80		0.079	0.019	
B - sp	mg/L	15	0.210	0.030		0.118	0.022		0.070	0.009		0.100	0.020		0.070	0.010	
Soil pH & EC																	
Soil EC (1:1)	(dS/m)	38	0.473	0.058		0.537	0.130		0.500	0.042		0.370	0.032		0.390	0.060	
Soil EC (1:2)	(dS/m)	49	0.306	0.033		0.388	0.058		0.325	0.020		0.331	0.061		0.210	0.020	
pH (1:1) Water	Unit	87	7.23	0.070		7.00	0.040		5.94	0.060		7.04	0.060		7.96	0.042	
pH (1:2) Water	Unit	28	7.36	0.055		7.10	0.059		6.09	0.077		7.15	0.148		8.09	0.097	
pH (1:1) 0.01M CaCl ₂	Unit	24	6.89	0.045		6.69	0.030		5.64	0.035		6.72	0.035		7.51	0.035	
pH (1:2) 0.01M CaCl ₂	Unit	14	6.77	0.090		6.67	0.056		5.70	0.055		6.74	0.042		7.42	0.050	
Buffer pH, Lime Req.																	
SMP Buffer pH	Unit	27	7.20	0.040		7.13	0.050		6.90	0.080		7.12	0.050		7.42	0.030	
Adams-Evans Buf pH	Unit	9	7.66	0.030		7.78	0.030		7.67	0.070		7.76	0.110		7.76	0.020	
Woodruff Buf. pH	Unit	20	6.99	0.025		6.95	0.020		6.76	0.060		6.95	0.040		7.12	0.030	
Mehlich Buffer pH	Unit	7	6.52	0.030		6.53	0.030		6.28	0.015		6.55	0.040		6.70	0.020	
Sikora Buffer pH	Unit	31	7.20	0.030		7.26	0.040		6.94	0.040		7.20	0.040		7.46	0.030	
Titrateable Acidity	cmol/kg																
Inorganic Nitrogen (NO₃-N & NH₄-N)																	
NO ₃ -N Cd. Rd.	mg/kg	71	20.3	1.54		66.0	6.00		47.7	2.53		45.0	5.00		3.14	0.440	
NO ₃ -N ISE	mg/kg	6	22.0	1.47		63.4	3.96		46.7	2.14		42.1	6.00		3.86	0.762	
NO ₃ -N CTA	mg/kg	1	23.4	0.000		65.7	0.000		53.3	0.000		52.4	0.000		6.74	0.000	
NO ₃ -N Ion Chr.	mg/kg	1	22.9	0.000		66.7	0.000		52.3	0.000		51.0	0.000		3.62	0.000	
NO ₃ -N Other	mg/kg	12	21.0	1.68		69.8	8.84		49.4	5.36		45.2	7.70		3.34	0.61	
NH ₄ - N (KCl Extr.)	mg/kg	53	27.8	2.34		47.2	4.80		64.2	4.53		4.41	0.770		6.86	0.698	
Phosphorus and Sulfur																	
PO ₄ -P Bray P (1:10)	mg/kg	47	88.0	6.96		399	51.5		25.5	3.70		148	6.49		12.5	1.17	
PO ₄ -P Bray P1 (1:7)	mg/kg	4	67.4	5.15		274	32.0		20.1	3.60		98.4	17.0		10.1	0.950	
PO ₄ -P Olsen/Bicarb	mg/kg	58	62.0	4.57		76.4	10.2		25.0	2.40		68.8	8.26		7.15	1.15	
PO ₄ -P AB-DTPA	mg/kg	3	32.4	2.01		55.1	2.84		12.9	0.821		41.7	3.94		2.63	0.634	
PO ₄ -P Modified Morgan	mg/kg	5	32.4	1.40		44.3	3.50		2.03	1.55		40.6	2.90		4.65	2.95	
PO ₄ -P True Morgan	mg/kg	7	36.3	1.70		44.5	2.40		4.20	0.300		41.9	1.20		7.40	0.970	
PO ₄ -P Mod. Kewlona	mg/kg	2	65.3	11.8		241	60.2		11.1	3.00		117	24.8		6.90	1.72	
PO ₄ -P Stong Bray (1:10)	mg/kg	11	255	10.0		673	39.7		67.4	4.97		374	21.8		130	11.0	
PO ₄ -P Water Soluble	mg/kg																
SO ₄ - S (PO ₄ Extr.)	mg/kg	32	11.2	2.04		17.8	2.26		6.45	0.90		4.81	0.80		5.00	0.933	

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	77	860	58.2	196	12.2	128	6.43	367	51.0	338	17.6	
Ca Ammonium Acetate	mg/kg	73	3,440	217	1,420	116	1,390	89.0	3,940	487	5,180	476	
Mg Ammonium Acetate	mg/kg	73	536	28.8	240	20.3	308	16.9	148	18.1	492	25.3	
Na Ammonium Acetate	mg/kg	60	32.0	3.35	17.5	2.86	12.5	2.43	14.0	3.00	18.1	2.98	
Bray Extractable K	mg/kg	6	488	17.6	168	9.15	98.3	4.02	306	23.4	211	14.4	
K- Olsen/Bicarb.	mg/kg	3	683	4.00	177	11.0	115	1.00	370	1.00	239	5.00	
K Modified Morgan	mg/kg	3	840	24.0	160	11.5	122	0.000	414	6.00	304	2.50	
K True Morgan	mg/kg	5	519	10.0	167	16.0	99.0	15.2	306	5.00	173	1.00	
Ca Modified Morgan	mg/kg	2	3,500	175	1,450	152	1,500	103	5,040	1,120	5,720	1,600	
Aluminum KCL Extr.	mg/kg	4	0.614	0.350	0.641	0.619	0.305	0.105	0.702	0.385	0.184	0.134	

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	
P	mg/kg	9	167	25.6	294	21.6	14.8	1.10	120	18.1	29.5	3.41	
K	mg/kg	9	490	33.7	172	9.26	88.2	4.21	266	29.0	136	15.0	
Ca	mg/kg	9	3,210	159	2,180	286	1,100	61.4	5,030	280	5,210	452	
Mg	mg/kg	9	452	13.5	281	17.5	245	13.8	164	11.3	446	16.7	
Mn	mg/kg	8	114	6.27	144	10.2	393	31.9	53.7	12.4	26.3	4.82	
Zn	mg/kg	8	7.21	0.685	11.0	0.510	1.26	0.129	4.19	0.46	0.610	0.057	

Mehlich-3 Multi-Element (scoop)													
Scoop Soil Mass	g	25	1.84	0.121	2.43	0.080	1.99	0.100	1.54	0.080	2.08	0.080	
Assumed Density	g/cm3	20	0.935	0.068	1.22	0.045	1.00	0.050	0.785	0.052	1.04	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	17	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	20.0	0.000	
P Colorimetric	mg/kg	12	108	7.12	525	24.8	37.0	4.39	211	4.67	16.6	1.82	
P ICP-AES	mg/kg	55	112	5.29	534	33.6	38.0	4.20	215	10.8	18.6	1.71	
K	mg/kg	53	833	33.5	203	12.8	127	6.82	416	26.7	336	14.5	
Ca	mg/kg	52	3,550	187	1,970	114	1,390	78.1	4,970	319	5,920	294	
Mg	mg/kg	52	564	22.8	299	18.8	312	14.4	184	12.4	576	18.7	
Na	mg/kg	41	31.7	2.39	20.4	2.05	13.8	1.74	27.5	3.32	20.0	1.65	
S	mg/kg	49	17.4	1.30	32.5	1.80	11.5	1.08	11.2	1.02	10.4	1.40	
Al	mg/kg	33	681	28.8	1,110	59.0	634	28.8	1,020	58.3	479	24.7	
Zn	mg/kg	49	10.8	0.570	11.9	0.890	1.53	0.132	8.19	0.700	1.97	0.165	
Mn	mg/kg	48	158	9.74	136	5.16	394	26.9	131	13.1	137	8.35	
Fe	mg/kg	48	189	17.9	406	41.3	565	39.7	325	23.4	54.8	3.16	
Cu	mg/kg	48	4.60	0.225	3.65	0.305	0.970	0.170	1.16	0.085	3.16	0.170	
B	mg/kg	40	1.32	0.125	0.975	0.125	0.520	0.073	1.08	0.126	1.03	0.111	

Micronutrients													
Zn - DTPA	mg/kg	67	5.62	0.360	4.00	0.410	0.720	0.080	2.91	0.390	0.980	0.070	
Mn - DTPA	mg/kg	54	99.0	7.90	68.8	6.45	263	19.5	12.4	1.90	15.8	1.70	
Fe - DTPA	mg/kg	57	33.9	3.10	102	14.3	162	17.6	58.2	4.93	6.87	0.730	
Cu - DTPA	mg/kg	58	2.56	0.185	2.36	0.240	1.62	0.092	0.460	0.060	1.50	0.105	
Zn - HCl	mg/kg	4	11.1	0.195	12.6	0.700	1.68	0.225	8.55	0.270	2.02	0.145	
Mn-H3PO4	mg/kg	13	87.6	5.39	113	6.00	244	21.1	29.7	6.72	20.2	4.13	
Cl - Ca(NO3)2 Extr.	mg/kg	16	15.5	1.63	6.66	0.995	19.2	1.44	4.15	0.53	9.68	1.58	
B - Hot Wat.	mg/kg	30	0.930	0.218	0.505	0.072	0.200	0.027	0.510	0.121	0.405	0.051	
B-DTPA/Sorbitol	mg/kg	20	0.690	0.075	0.387	0.051	0.210	0.025	0.350	0.050	0.476	0.050	

Soil Organic Matter													
Soil Kjeldahl N	%	15	0.179	0.008	0.180	0.017	0.106	0.006	0.240	0.013	0.128	0.012	
Soil TN (combustion)	%	36	0.180	0.008	0.180	0.011	0.104	0.009	0.244	0.006	0.124	0.006	
Soil TOC (Combustion)	%	17	2.11	0.040	2.17	0.120	0.830	0.030	3.69	0.110	1.33	0.090	
Soil Total C (Combustion)	%	34	2.10	0.080	2.22	0.184	0.850	0.030	3.79	0.102	1.52	0.058	

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.

SOM - Walkley-Black	%	28	3.63	0.195	3.82	0.324	1.57	0.130	5.90	0.380	2.32	0.217
SOM - LOI (% Wt loss)	%	68	4.29	0.235	3.70	0.200	2.02	0.119	5.88	0.230	2.91	0.187
Other												
CaCO3 Content	%	15	0.750	0.127	0.495	0.100	0.509	0.063	1.15	0.095	2.37	0.209
CEC - Cation Displacement	cmol/kg	15	27.9	2.10	10.2	1.52	15.0	1.40	23.1	4.51	25.6	3.83
CEC - Estimation	cmol/kg	12	23.9	1.60	10.7	2.44	11.4	1.30	25.0	3.00	31.9	3.30
Soil Density (Scoop)	g/cc	12	1.04	0.031	1.36	0.050	1.12	0.055	0.878	0.025	1.18	0.035
Particle Size Analysis-Hydrometer												
Sand 2000 - 50 um	%	34	35.0	4.00	85.3	2.26	12.8	2.22	26.1	6.06	20.5	4.20
Silt 50 - 2 um	%	34	38.8	3.08	9.35	1.70	64.0	3.85	59.8	4.60	57.0	4.85
Clay 2 - 0 um	%	34	25.6	3.40	5.00	0.73	23.0	3.00	14.4	3.55	23.0	3.80
Particle Size Analysis- Pipette												
Sand 2000 - 50 um	%	4	36.5	3.00	87.6	1.00	15.0	1.10	27.4	5.40	22.5	0.900
Silt 50 - 2 um	%	4	39.2	2.50	8.50	0.750	64.5	0.600	59.4	2.00	57.4	2.00
Clay 2 - 0 um	%	4	23.8	1.50	4.70	0.800	20.5	0.500	13.2	2.25	19.8	2.50
Solvita CO2												
	ppm	6	136	34.2	83.0	15.0	89.9	15.0	116	40.0	108	22.7

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.