



2021 North American Proficiency Testing Program
Quarter 3 Soil Report - Monday, October 18, 2021

Laboratory ID
General

Soil	Soil 2021-111				Soil 2021-112			Soil 2021-113			Soil 2021-114			Soil 2021-115			
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	63.6	3.40		47.3	2.31		43.0	2.65		38.7	1.55		42.2	2.75	
pH - sp	Unit	31	6.30	0.080		6.10	0.099		4.70	0.120		7.77	0.132		7.24	0.100	
ECe - sp	dS/m	28	1.46	0.140		0.840	0.195		0.550	0.070		0.866	0.113		1.48	0.220	
HCO ₃ - sp	mmol/L	15	2.00	0.400		1.97	0.312		0.401	0.070		3.96	0.980		6.18	1.16	
Ca - sp	mmol/L	24	8.58	1.18		5.36	0.874		2.48	0.495		5.59	1.01		6.18	0.977	
Mg - sp	mmol/L	24	2.61	0.305		2.39	0.585		0.706	0.122		1.48	0.220		4.50	0.550	
Na - sp	mmol/L	24	0.256	0.056		0.275	0.055		0.216	0.041		0.201	0.034		2.12	0.331	
SAR - sp	value	19	0.120	0.030		0.130	0.027		0.190	0.030		0.110	0.008		0.970	0.070	
Cl - sp	mmol/L	17	0.250	0.030		0.260	0.060		0.200	0.031		0.250	0.060		5.32	0.970	
SO ₄ - sp	mmol/L	20	0.445	0.069		1.10	0.075		0.380	0.085		0.465	0.065		1.45	0.302	
NO ₃ - sp	mmol/L	13	9.84	1.37		4.32	0.88		3.06	0.590		3.54	0.71		0.509	0.125	
B - sp	mg/L	18	0.132	0.025		0.195	0.020		0.060	0.006		0.140	0.015		0.148	0.013	
Soil pH & EC																	
Soil EC (1:1)	(dS/m)	40	0.555	0.050		0.475	0.049		0.230	0.034		0.425	0.041		0.640	0.082	
Soil EC (1:2)	(dS/m)	38	0.435	0.058		0.302	0.026		0.160	0.010		0.250	0.028		0.425	0.043	
pH (1:1) Water	Unit	86	6.37	0.050		6.14	0.050		4.73	0.065		8.04	0.080		7.48	0.050	
pH (1:2) Water	Unit	23	6.43	0.070		6.27	0.060		4.81	0.070		8.18	0.120		7.59	0.060	
pH (1:1) 0.01M CaCl ₂	Unit	24	6.10	0.045		5.83	0.030		4.28	0.040		7.63	0.050		7.11	0.070	
pH (1:2) 0.01M CaCl ₂	Unit	12	6.09	0.031		5.85	0.035		4.26	0.039		7.62	0.088		7.10	0.092	
Buffer pH, Lime Req.																	
SMP Buffer pH	Unit	27	6.86	0.060		6.90	0.030		6.33	0.110		7.50	0.030		7.35	0.040	
Adams-Evans Buf pH	Unit	8	7.60	0.055		7.56	0.050		7.34	0.075		7.70	0.040		7.76	0.045	
Woodruff Buf. pH	Unit	21	6.76	0.040		6.77	0.030		6.20	0.060		7.18	0.060		7.08	0.030	
Mehlich Buffer pH	Unit	8	6.29	0.020		6.20	0.035		5.86	0.055		6.81	0.030		6.66	0.060	
Sikora Buffer pH	Unit	33	6.90	0.070		6.94	0.040		6.30	0.060		7.50	0.030		7.36	0.045	
Titrateable Acidity	cmol/kg																
Inorganic Nitrogen (NO₃-N & NH₄-N)																	
NO ₃ -N Cd. Rd.	mg/kg	65	90.2	10.8		47.0	2.18		25.0	1.40		25.8	1.10		17.2	0.980	
NO ₃ -N ISE	mg/kg	5	99.3	3.03		49.6	1.31		25.9	0.360		26.2	2.15		18.8	2.83	
NO ₃ -N CTA	mg/kg	1	102	0.000		56.3	0.000		32.3	0.000		35.4	0.000		26.6	0.000	
NO ₃ -N Ion Chr.	mg/kg																
NO ₃ -N Other _____	mg/kg	13	88.4	11.2		47.8	4.22		25.3	1.60		25.6	0.970		16.8	1.37	
NH ₄ - N (KCl Extr.)	mg/kg	52	24.8	3.15		8.51	0.650		8.01	0.860		5.36	0.620		130	10.0	
Phosphorus and Sulfur																	
PO ₄ -P Bray P (1:10)	mg/kg	45	97.0	8.00		36.5	2.94		76.8	4.80		44.0	3.30		67.5	5.40	
PO ₄ -P Bray P1 (1:7)	mg/kg	7	83.5	13.6		34.0	1.60		64.8	3.63		33.4	2.98		54.3	6.05	
PO ₄ -P Olsen/Bicarb	mg/kg	57	55.2	5.20		24.2	2.05		44.3	3.03		15.8	1.49		47.0	2.67	
PO ₄ -P AB-DTPA	mg/kg	2	27.0	3.33		15.1	0.474		16.6	2.96		8.19	0.101		28.1	1.46	
PO ₄ -P Modified Morgan	mg/kg	3	17.5	0.000		11.7	1.40		5.20	0.400		55.4	4.20		22.1	0.700	
PO ₄ -P True Morgan	mg/kg	9	16.9	2.20		13.6	0.750		6.00	1.02		43.5	3.50		24.9	1.78	
PO ₄ -P Mod. Kewlona	mg/kg	2	83.2	3.15		27.2	2.75		64.2	6.15		27.0	4.05		48.2	5.80	
PO ₄ -P Stong Bray (1:10)	mg/kg	11	162	8.00		87.1	3.80		97.0	6.40		669	114		123	3.75	
PO ₄ -P Water Soluble	mg/kg																
SO ₄ - S (PO ₄ Extr.)	mg/kg	29	5.00	1.00		9.00	1.00		8.76	0.97		3.59	0.40		12.0	1.87	

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	72	410	49.5	256	11.5	306	12.9	856	40.5	530	21.0
Ca Ammonium Acetate	mg/kg	70	2,660	311	2,530	102	742	47.4	4,910	504	1,920	103
Mg Ammonium Acetate	mg/kg	70	240	26.5	410	17.5	91.6	5.26	383	19.6	538	19.8
Na Ammonium Acetate	mg/kg	58	13.0	2.50	15.5	2.50	10.9	2.22	12.2	1.57	58.4	3.80
Bray Extractable K	mg/kg	6	258	12.1	184	10.0	232	8.88	532	30.9	381	27.9
K- Olsen/Bicarb.	mg/kg	5	381	2.00	213	3.00	292	2.67	552	13.0	457	2.55
K Modified Morgan	mg/kg	3	430	10.0	232	26.0	290	21.0	809	8.00	511	11.0
K True Morgan	mg/kg	6	312	14.2	167	1.75	242	11.8	414	20.0	370	12.1
Ca Modified Morgan	mg/kg	3	3,120	50.0	2,610	106	790	17.0	11,400	834	2,050	120
Aluminum KCL Extr.	mg/kg	4	0.800	0.372	0.600	0.469	72.1	6.07	1.20	0.837	0.720	0.249

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	8	67.0	7.27	72.0	3.69	39.5	1.22	279	43.9	70.0	3.75
K	mg/kg	8	258	9.68	153	8.17	229	5.49	295	21.6	383	24.3
Ca	mg/kg	8	2,800	98.9	2,590	90.5	674	22.0	5,950	698	1,860	48.7
Mg	mg/kg	8	218	8.88	373	8.84	84.1	2.33	338	19.1	485	19.0
Mn	mg/kg	6	210	3.95	133	3.27	135	1.63	4.56	0.082	194	4.30
Zn	mg/kg	6	6.36	0.045	3.20	0.115	1.72	0.126	0.077	0.028	4.24	0.139

Mehlich-3 Multi-Element (scoop)												
Scoop Soil Mass	g	25	1.55	0.090	2.02	0.060	2.02	0.070	2.06	0.065	2.10	0.060
Assumed Density	g/cm ³	19	0.772	0.028	1.01	0.030	1.02	0.040	1.02	0.036	1.06	0.035
Volume of Scoop	cm ³	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	19	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	112	8.40	40.6	2.76	80.5	4.49	70.6	3.57	80.5	5.45
P ICP-AES	mg/kg	57	121	6.65	50.3	2.70	86.3	3.70	74.8	5.81	85.4	3.97
K	mg/kg	56	371	27.0	256	13.0	312	15.6	894	51.7	542	22.5
Ca	mg/kg	55	2,730	118	2,840	77.0	779	59.0	6,360	313	2,100	76.0
Mg	mg/kg	54	241	14.3	445	14.5	99.0	4.99	511	25.3	596	25.3
Na	mg/kg	47	13.7	1.48	17.0	2.14	11.9	2.38	15.0	3.00	61.0	3.70
S	mg/kg	47	8.81	0.710	15.9	0.915	15.5	1.16	10.2	0.980	18.9	1.05
Al	mg/kg	38	776	31.5	402	19.1	942	45.5	531	29.5	345	23.6
Zn	mg/kg	53	7.63	0.490	4.32	0.190	2.28	0.125	2.05	0.148	5.40	0.260
Mn	mg/kg	51	221	12.0	279	18.6	193	13.2	300	32.0	213	13.4
Fe	mg/kg	51	338	25.2	141	10.1	204	13.6	33.0	3.33	308	16.0
Cu	mg/kg	49	1.55	0.138	1.71	0.110	0.920	0.110	3.00	0.200	4.75	0.350
B	mg/kg	44	0.970	0.130	1.13	0.115	0.300	0.055	2.29	0.190	1.18	0.150

Micronutrients												
Zn - DTPA	mg/kg	63	4.48	0.620	2.60	0.180	1.52	0.099	0.655	0.075	2.83	0.200
Mn - DTPA	mg/kg	53	164	22.2	118	9.50	132	10.2	9.17	2.20	175	13.3
Fe - DTPA	mg/kg	56	101	16.8	46.4	5.04	70.5	9.51	3.80	0.500	79.3	10.7
Cu - DTPA	mg/kg	56	0.900	0.114	0.930	0.088	0.878	0.080	0.960	0.091	3.90	0.340
Zn - HCl	mg/kg	3	8.24	0.660	4.42	0.120	2.01	0.010	1.80	0.300	5.75	0.350
Mn-H3PO4	mg/kg	11	190	13.3	102	5.65	110	5.00	3.56	0.50	157	10.0
Cl - Ca(NO3)2 Extr.	mg/kg	15	4.10	0.58	4.03	0.50	2.31	0.36	3.10	0.57	81.1	11.9
B - Hot Wat.	mg/kg	26	0.740	0.115	0.775	0.185	0.243	0.048	1.00	0.127	0.760	0.185
B-DTPA/Sorbitol	mg/kg	21	0.430	0.080	0.460	0.050	0.170	0.021	1.24	0.115	0.604	0.104

Soil Organic Matter												
Soil Kjeldahl N	%	16	0.229	0.009	0.196	0.010	0.108	0.006	0.120	0.010	0.186	0.008
Soil TN (combustion)	%	36	0.242	0.008	0.205	0.010	0.110	0.004	0.120	0.010	0.190	0.010
Soil TOC (Combustion)	%	15	4.29	0.167	2.30	0.191	1.14	0.040	1.29	0.086	2.03	0.160
Soil Total C (Combustion)	%	29	4.17	0.131	2.29	0.094	1.13	0.030	1.62	0.065	2.04	0.090

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SOM - Walkley-Black	%	24	6.85	0.300	3.70	0.188	1.98	0.100	2.13	0.166	3.50	0.244
SOM - LOI (% Wt loss)	%	69	7.04	0.280	3.86	0.140	2.60	0.100	2.57	0.200	3.60	0.150
Other												
CaCO3 Content	%	11	0.685	0.114	0.515	0.073	0.500	0.200	4.08	0.810	0.600	0.108
CEC - Cation Displacement	cmol/kg	15	24.2	4.00	20.1	2.10	11.6	1.30	24.0	2.70	17.3	2.30
CEC - Estimation	cmol/kg	11	17.7	1.70	18.2	1.15	9.70	0.96	30.8	3.08	15.9	1.10
Soil Density (Scoop)	g/cc	12	0.918	0.040	1.17	0.025	1.18	0.045	1.21	0.035	1.21	0.025
Particle Size Analysis-Hydrometer												
Sand 2000 - 50 um	%	33	23.1	3.90	59.5	2.50	21.3	2.30	27.6	3.40	44.2	2.30
Silt 50 - 2 um	%	33	56.8	3.20	19.3	2.72	60.0	2.65	44.0	4.00	32.4	2.60
Clay 2 - 0 um	%	33	18.0	3.80	19.0	2.10	18.8	1.75	28.0	4.30	22.5	2.90
Particle Size Analysis- Pipette												
Sand 2000 - 50 um	%	4	17.0	2.40	59.2	0.720	16.0	2.67	24.1	2.00	44.2	1.63
Silt 50 - 2 um	%	4	60.5	3.80	20.0	0.500	63.0	4.95	47.5	3.45	34.0	2.00
Clay 2 - 0 um	%	4	22.0	1.04	21.9	1.00	21.5	1.50	29.5	4.55	23.5	1.70
Solvita CO2												
	ppm	5	123	41.5	131	19.6	66.0	1.50	55.0	10.1	168	11.6

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