



2022 North American Proficiency Testing Program
Quarter 2 Soil Report - 7/12/2023

Laboratory ID
General

Soil	Soil 2023-106			Soil 2023-107			Soil 2023-108			Soil 2023-109			Soil 2023-110				
Analysis	Units	n	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result
Saturated Paste																	
Moisture - sp	%	14	64.0	4.80		49.4	2.16		55.9	2.65		45.2	2.50		52.4	2.29	
pH - sp	Unit	20	7.63	0.15		5.91	0.12		6.86	0.14		6.83	0.14		6.68	0.13	
ECe - sp	dS/m	24	0.58	0.070		0.39	0.040		1.24	0.13		0.67	0.078		0.70	0.093	
HCO3 - sp	mmolc/L	10	3.14	0.93		2.28	0.88		2.19	0.60		3.95	1.90		4.00	2.00	
Ca - sp	mmolc/L	18	4.34	0.33		2.97	0.45		6.32	0.65		4.54	0.55		3.94	0.43	
Mg - sp	mmolc/L	18	1.33	0.12		0.75	0.100		3.84	0.51		1.97	0.27		2.60	0.37	
Na - sp	mmolc/L	15	0.28	0.053		0.42	0.060		0.24	0.040		0.10	0.030		0.21	0.045	
SAR - sp	value	12	0.18	0.020		0.30	0.020		0.11	0.020		0.055	0.023		0.11	0.020	
Cl - sp	mmolc/L	10	0.42	0.17		0.39	0.11		0.48	0.11		0.21	0.071		0.36	0.10	
SO4 - sp	mmolc/L	10	1.30	0.34		0.89	0.13		1.26	0.22		0.80	0.10		1.10	0.19	
NO3 - sp	mmolc/L	9	0.070	0.067		0.030	0.026		7.70	0.99		0.81	0.81		0.45	0.44	
B - sp	mg/L	10	0.050	0.020		0.066	0.020		0.090	0.020		0.15	0.020		0.085	0.020	
pH & EC (1:1 or 1:2)																	
EC (1:1)	(dS/m)	30	0.47	0.040		0.19	0.020		0.62	0.058		0.29	0.037		0.32	0.020	
EC (1:2)	(dS/m)	34	0.30	0.031		0.14	0.020		0.43	0.038		0.21	0.020		0.22	0.020	
pH (1:1) Water	Unit	74	7.85	0.16		5.94	0.12		7.02	0.14		6.86	0.14		6.80	0.14	
pH (1:2) Water	Unit	17	7.96	0.16		6.04	0.12		7.07	0.14		6.95	0.14		6.88	0.14	
pH (1:1) 0.01M CaCl2	Unit	19	7.48	0.15		5.42	0.11		6.78	0.14		6.49	0.13		6.42	0.13	
pH (1:2) 0.01M CaCl2	Unit	6	7.37	0.15		5.37	0.11		6.69	0.13		6.41	0.13		6.35	0.13	
Lime Req.																	
SMP Buffer pH	Unit	24	7.37	0.15		6.20	0.12		7.05	0.14		7.23	0.15		6.90	0.14	
Adams-Evans Buf pH	Unit	8	7.72	0.15		7.23	0.15		7.61	0.15		7.80	0.16		7.60	0.15	
Woodruff Buf. pH	Unit	15	7.18	0.14		6.28	0.13		6.98	0.14		6.99	0.14		6.83	0.14	
Mehlich Buffer pH	Unit	9	6.88	0.14		5.90	0.12		6.54	0.13		6.52	0.13		6.48	0.13	
Sikora Buffer pH	Unit	25	7.40	0.15		6.28	0.13		7.10	0.14		7.31	0.15		7.00	0.14	
Titrateable Acidity	cmol/kg																
Inorganic Nitrogen (NO3-N & NH4-N)																	
NO3-N Cd. Rd.	mg/kg	59	20.9	1.04		5.76	0.46		62.0	3.05		25.5	1.13		7.40	0.58	
NO3-N ISE	mg/kg	5	21.2	N/A		6.30	N/A		48.8	N/A		23.9	N/A		7.73	N/A	
NO3-N CTA	mg/kg																
NO3-N Ion Chr.	mg/kg																
NO3-N Other	mg/kg	10	20.3	1.40		5.49	1.31		60.7	6.45		25.9	2.73		7.07	2.07	
NH4 - N (KCl Extr.)	mg/kg	37	7.93	1.21		20.6	1.58		133.0	4.69		6.25	0.55		69.6	3.34	
Phosphorus and Sulfur																	
PO4-P Bray P (1:10)	mg/kg	34	9.00	0.66		132.0	11.5		36.6	1.50		23.2	2.05		69.0	2.17	
PO4-P Bray P1 (1:7)	mg/kg	7	4.92	1.04		82.0	20.6		24.6	3.04		19.8	1.06		47.7	4.27	
PO4-P Olsen/Bicarb	mg/kg	47	24.7	2.64		61.3	4.60		48.0	2.72		12.7	1.40		53.9	5.54	
PO4-P AB-DTPA	mg/kg	1	9.12	N/A		40.8	N/A		29.6	N/A		11.9	N/A		35.3	N/A	
PO4-P Modified Morgan	mg/kg	4	3.64	N/A		5.70	N/A		7.60	N/A		11.2	N/A		11.8	N/A	
PO4-P True Morgan	mg/kg	7	4.40	0.80		7.25	0.28		9.50	N/A		15.4	1.51		14.6	1.10	
PO4-P Mod. Kelowna	mg/kg																
PO4-P Stong Bray (1:10)	mg/kg	9	32.0	2.94		213.0	12.1		97.5	11.0		63.0	5.20		170.0	9.67	
PO4-P Water Soluble	mg/kg	1	3.64	N/A		0.27	N/A		2.06	N/A		3.18	N/A		0.22	N/A	
SO4 - S (PO4 Extr.)	mg/kg	23	12.6	1.60		10.3	1.67		10.2	1.93		6.41	1.31		10.1	2.38	
Bases																	
K NH4OAc	mg/kg	63	160.0	10.4		283.0	18.7		212.0	9.50		233.0	9.30		262.0	12.3	
Ca NH4OAc	mg/kg	58	5070.0	411.0		2340.0	138.0		2910.0	132.0		1930.0	92.2		1800.0	97.9	
Mg NH4OAc	mg/kg	58	528.0	36.0		208.0	13.6		700.0	28.3		278.0	11.7		452.0	25.9	

Na NH4OAc	mg/kg	47	19.0	3.00	24.0	3.08	12.0	2.78	8.10	1.90	12.0	2.32
Bray Extractable K	mg/kg	4	103.0	N/A	183.0	N/A	150.0	N/A	205.0	N/A	189.0	N/A
K - Bicarb.	mg/kg	3	125.0	N/A	250.0	N/A	164.0	N/A	207.0	N/A	218.0	N/A
K - Modified Morgan	mg/kg	3	157.0	N/A	290.0	N/A	204.0	N/A	222.0	N/A	270.0	N/A
K - True Morgan	mg/kg	5	89.4	N/A	193.0	N/A	135.0	N/A	180.0	N/A	182.0	N/A
Ca Modified Morgan	mg/kg	2	6150.0	N/A	2540.0	N/A	3030.0	N/A	1750.0	N/A	1120.0	N/A
Aluminum KCL Extr.	mg/kg	5	0.40	N/A	0.90	N/A	1.00	N/A	0.92	N/A	0.82	N/A

Mehlich-1 Multi Element

Scoop Soil Mass	g	5	5.00	0.10	5.00	0.10	5.00	0.10	5.00	N/A	5.00	0.10
P	mg/kg	10	1.86	0.12	46.7	8.19	8.14	0.34	60.0	2.44	31.9	5.94
K	mg/kg	9	70.2	6.29	174.0	6.90	131.0	7.78	173.0	5.60	176.0	3.57
Ca	mg/kg	9	4550.0	617.0	2330.0	130.0	2720.0	294.0	2110.0	130.0	1840.0	51.7
Mg	mg/kg	7	593.0	73.8	193.0	8.40	645.0	49.7	273.0	5.46	417.0	8.34
Mn	mg/kg	7	31.3	6.26	58.0	3.85	275.0	14.1	70.1	1.56	417.0	N/A
Zn	mg/kg	6	1.71	0.51	4.12	0.18	3.31	0.31	2.64	0.060	16.3	1.29

Mehlich-3 Multi-Element

Scoop Soil Mass	g	24	1.83	0.070	1.80	0.10	1.96	0.085	2.13	0.065	1.88	0.12
Assumed Density	g/cm ³	19	0.91	0.046	0.90	0.068	1.00	0.068	1.10	0.050	0.96	0.060
Volume of Scoop	cm ³	18	2.00	0.040	2.00	0.040	2.00	0.040	2.00	0.040	2.00	0.040
Extractant Volume mL	mL	15	20.0	0.40	20.0	0.40	20.0	0.40	20.0	0.40	20.0	0.40
P Colorimetric	mg/kg	11	20.0	3.00	109.0	6.80	52.8	8.20	27.0	4.30	101.0	6.45
P ICP-AES	mg/kg	47	20.0	2.68	118.0	7.40	58.2	7.07	38.0	1.80	114.0	7.13
K	mg/kg	47	161.0	7.15	272.0	17.1	210.0	9.40	243.0	12.3	260.0	15.5
Ca	mg/kg	46	6120.0	275.0	2550.0	126.0	3250.0	65.1	2280.0	85.5	2020.0	76.7
Mg	mg/kg	45	609.0	32.7	225.0	10.3	761.0	19.9	331.0	11.0	491.0	21.7
Na	mg/kg	37	21.2	2.80	25.7	3.43	13.4	2.10	9.90	1.70	13.7	1.16
S	mg/kg	39	22.8	1.37	18.1	0.88	18.1	0.89	13.4	0.98	18.3	0.91
Al	mg/kg	33	656.0	35.0	1360.0	80.5	661.0	35.8	263.0	13.0	799.0	37.2
Zn	mg/kg	44	4.26	0.28	4.57	0.14	2.52	0.19	3.49	0.19	12.7	0.50
Mn	mg/kg	41	59.5	5.92	59.3	3.07	202.0	13.0	180.0	10.9	444.0	17.4
Fe	mg/kg	42	395.0	37.0	197.0	16.8	486.0	62.7	87.8	6.05	482.0	58.3
Cu	mg/kg	41	6.42	0.24	1.76	0.060	0.60	0.18	0.80	0.064	1.06	0.37
B	mg/kg	34	0.98	0.070	0.52	0.048	1.37	0.15	1.62	0.12	0.86	0.11

Micronutrients

Zn - DTPA	mg/kg	54	1.44	0.10	3.19	0.23	1.80	0.11	1.71	0.11	7.40	0.40
Mn - DTPA	mg/kg	41	11.1	1.44	40.3	3.43	106.0	6.78	44.8	3.73	342.0	14.1
Fe - DTPA	mg/kg	43	51.5	7.19	80.8	5.91	217.0	20.1	21.4	1.99	177.0	15.8
Cu - DTPA	mg/kg	46	3.50	0.20	1.34	0.090	3.28	0.27	0.30	0.026	2.41	0.13
Zn - HCl	mg/kg	2	2.00	N/A	3.95	N/A	2.65	N/A	2.60	N/A	10.4	N/A
Mn-H3PO4	mg/kg	8	19.1	3.26	47.0	2.20	174.0	8.80	58.2	1.16	373.0	15.1
Cl - Ca(NO3)2 Extr.	mg/kg	12	4.70	0.80	4.00	1.00	6.35	1.60	3.50	1.60	5.65	1.59
B - Hot Wat.	mg/kg	20	0.39	0.12	0.38	0.12	0.67	0.15	0.87	0.24	0.44	0.16
B - DTPA/Sorbitol	mg/kg	19	0.46	0.040	0.27	0.040	0.67	0.083	0.64	0.051	0.43	0.11

N & C

Total N - Kjeldahl	%	8	0.19	0.021	0.23	0.035	0.22	0.020	0.17	0.020	0.22	0.020
Total N - combustion	%	36	0.19	0.020	0.24	0.020	0.23	0.020	0.18	0.020	0.23	0.020
TOC - combustion	%	13	1.74	0.055	2.92	0.085	2.43	0.070	1.76	0.10	2.29	0.098
Total C - combustion	%	30	1.94	0.039	2.96	0.059	2.46	0.083	1.83	0.062	2.30	0.070
OM - Walkley-Black	%	19	2.86	0.23	4.97	0.36	4.11	0.31	3.12	0.18	3.82	0.26
OM - LOI (% Wt loss)	%	56	3.99	0.19	6.40	0.28	4.66	0.15	3.02	0.090	4.46	0.11

Miscellaneous

CaCO3 Content	%	7	2.18	0.42	0.46	0.16	0.96	0.25	0.63	0.070	0.46	0.13
CEC - Cation Displacement	cmol/kg	7	25.4	5.13	23.1	4.51	24.3	2.60	14.2	0.60	18.2	2.99
CEC - Estimation	cmol/kg	10	29.8	0.60	18.1	3.05	21.3	0.50	13.0	0.85	14.0	0.28
Soil Density (Scoop)	g/cc	11	1.08	0.025	1.05	0.043	1.16	0.030	1.25	0.025	1.10	0.022

Particle Size Analysis - Hydrometer

Sand 2000 - 50 um	%	26	11.0	4.30	28.2	3.15	11.0	3.20	84.9	2.37	19.2	3.24
Silt 50 - 2 um	%	27	40.0	4.50	43.8	4.45	60.0	3.73	7.20	2.20	58.0	5.50
Clay 2 - 0 um	%	26	49.0	4.94	26.9	4.15	28.0	3.00	8.94	1.90	21.0	2.72

Particle Size Analysis - Pipette

Sand 2000 - 50 um	%	4	7.48	3.47	27.0	3.20	8.50	5.25	83.6	N/A	15.2	5.74
Silt 50 - 2 um	%	6	42.5	N/A	47.3	N/A	62.0	N/A	9.21	2.45	63.9	N/A
Clay 2 - 0 um	%	6	51.0	N/A	26.8	N/A	27.8	5.50	7.68	3.25	21.5	6.50

Soil Health

Autoclave-Citrate Extractable (ACE) protein	mg/g	3	3.70	N/A	5.62	N/A	7.80	N/A	6.80	N/A	9.80	N/A
Microbial CO2 respiration (1 day incubation-STCM)	mg/g	5	0.12	0.050	0.16	N/A	0.12	N/A	0.20	N/A	0.24	N/A
Microbial CO2 respiration (4 day incubation-STCM)	mg/g	2	0.073	N/A	0.13	N/A	0.071	N/A	0.12	N/A	0.14	N/A
Microbial enzyme activity - As	mg PNP/kg soil h											
Microbial enzyme activity - Beta Glucosidase (BG)	mg PNP/kg soil h	1	27.1	N/A	22.3	N/A	53.1	N/A	86.7	N/A	57.1	N/A
Microbial enzyme activity - NAG	mg PNP/kg soil h	1	9.26	N/A	5.87	N/A	6.36	N/A	25.3	N/A	14.0	N/A
Microbial enzyme activity - Pase	mg PNP/kg soil h											
PMN 7 day anaerobic	mg/kg	1	60.0	N/A	80.0	N/A	35.0	N/A	75.0	N/A	65.0	N/A
Reactive carbon - permanganate oxidizable (POxC)	mg/kg	5	541.0	N/A	741.0	N/A	867.0	N/A	730.0	N/A	850.0	N/A