



2022 North American Proficiency Testing Program

Quarter 3 Soil Report - 10/24/2022

Laboratory ID

352129

Soil Analysis	Units	n	Soil 2022-111			Soil 2022-112			Soil 2022-113			Soil 2022-114			Soil 2022-115							
			Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result					
Saturated Paste																						
Moisture - sp	%	16	53.6	5.45	51	✓	24.3	3.31	19.4	✓	44.5	4.00	40.5	✓	47.5	0.950	44.1	L	65.8	7.73	59.9	✓
pH - sp	Unit	25	6.88	0.14	6.6	✓	6.86	0.14	6.6	✓	5.88	0.19	5.7	✓	7.32	0.15	7	✓	6.86	0.14	6.7	✓
ECe - sp	dS/m	26	0.74	0.075	0.84	✓	0.88	0.11	1.4	VH	0.75	0.15	0.96	✓	0.31	0.033	0.43	H	1.29	0.14	1.49	✓
HCO3 - sp	mmolc/L	12	5.46	0.59	5.67	✓	2.60	0.85	3.2	✓	1.14	0.33	0.93	✓	3.30	0.32	3.37	✓	4.48	0.52	4.48	✓
Ca - sp	mmolc/L	23	5.89	0.79	6.06	✓	4.57	1.08	6.47	✓	4.91	0.93	5.63	✓	2.20	0.47	2.84	✓	7.84	1.01	7.95	✓
Mg - sp	mmolc/L	22	1.36	0.11	1.37	✓	2.16	0.50	3.1	✓	2.02	0.33	2.13	✓	1.30	0.21	1.54	✓	2.09	0.15	2.1	✓
Na - sp	mmolc/L	19	1.16	0.12	1.36	✓	0.67	0.14	0.98	✓	0.26	0.035	0.3	✓	0.15	0.020	0.167	✓	0.13	0.020	0.115	✓
SAR - sp	value	15	0.61	0.040	0.7	✓	0.36	0.040	0.45	✓	0.13	0.020	0.15	✓	0.11	0.020	0.11	✓	0.060	0.020	0.05	✓
Cl - sp	mmolc/L	16	1.00	0.17	1.38	✓	0.42	0.080	0.63	H	1.07	0.12	1.56	VH	0.23	0.079	0.24	✓	3.93	0.47	5.1	✓
SO4 - sp	mmolc/L	14	1.08	0.18	1.33	✓	2.86	0.85	4.65	✓	0.70	0.16	0.86	✓	0.26	0.030	0.242	✓	1.71	0.43	1.66	✓
NO3 - sp	mmolc/L	6	0.25	0.23			2.85	1.22	4.43	✓	3.71	1.30	5.01	✓	0.18	0.14			1.44	1.15	1.44	✓
B - sp	mg/L	10	0.059	0.020	0.1	✓	0.26	0.060	0.33	✓	0.060	0.020	0.1	✓	0.055	0.020	0.1	✓	0.062	0.020	0.1	✓
pH & EC (1:1 or 1:2)																						
EC (1:1)	(dS/m)	33	0.37	0.050	0.56	H	0.28	0.023	0.4	VH	0.37	0.020	0.51	VH	0.19	0.030	0.17	✓	0.58	0.068	1.13	VH
EC (1:2)	(dS/m)	39	0.25	0.037	0.29	✓	0.20	0.033	0.2	✓	0.25	0.027	0.29	✓	0.11	0.020	0.1	✓	0.52	0.095	0.68	✓
pH (1:1) Water	Unit	76	6.98	0.14	6.5	L	7.03	0.14	6.7	✓	5.90	0.12	5.6	L	7.50	0.15	7	L	6.99	0.14	6.6	L
pH (1:2) Water	Unit	21	7.10	0.14	7.1	✓	7.16	0.14	7	✓	6.08	0.12	5.8	✓	7.60	0.15	7.3	✓	7.16	0.14	7	✓
pH (1:1) 0.01M CaCl2	Unit	19	6.62	0.13			6.58	0.13			5.56	0.11			7.00	0.14			6.69	0.13		
pH (1:2) 0.01M CaCl2	Unit	12	6.67	0.13			6.59	0.13			5.60	0.11			6.82	0.14			6.72	0.13		
Lime Req.																						
SMP Buffer pH	Unit	24	7.10	0.14	7.1	✓	7.31	0.15	7.4	✓	7.00	0.14	7.1	✓	7.28	0.15	7.3	✓	7.03	0.14	6.9	✓
Adams-Evans Buf pH	Unit	7	7.63	0.15			7.83	0.157			7.65	0.15			7.72	0.15			7.62	0.15		
Woodruff Buf. pH	Unit	14	6.94	0.14			7.00	0.140			6.77	0.14			7.04	0.141			6.95	0.14		
Mehlich Buffer pH	Unit	7	6.47	0.129			6.50	0.130			6.27	0.13			6.59	0.132			6.52	0.130		
Sikora Buffer pH	Unit	30	7.12	0.14			7.34	0.15			6.99	0.14			7.30	0.15			7.10	0.14		
Titrateable Acidity	cmol/kg																					
Inorganic Nitrogen (NO3-N & NH4-N)																						
NO3-N Cd. Rd.	mg/kg	54	12.0	0.35			17.2	1.35			38.1	1.75			2.95	0.35			34.9	3.71		
NO3-N ISE	mg/kg	7	12.5	3.43			18.2	2.95			43.3	5.59			7.00	3.00			44.6	14.2		
NO3-N CTA	mg/kg																					
NO3-N Ion Chr.	mg/kg																					
NO3-N Other	mg/kg	13	11.7	1.27	12.6	✓	17.4	1.30	16.1	✓	38.4	1.31	38.4	✓	3.00	1.37	3.08	✓	36.0	3.14	38.7	✓
NH4 - N (KCl Extr.)	mg/kg	43	6.15	0.60	10.2	VH	42.7	2.99	57.6	VH	10.0	0.62	15.3	VH	3.59	0.41	5.8	VH	175.0	20.7	650	VH
Phosphorus and Sulfur																						
PO4-P Bray P (1:10)	mg/kg	36	44.1	3.13			101.0	6.15			21.5	1.70			9.40	0.67			29.4	3.20		
PO4-P Bray P1 (1:7)	mg/kg	5	36.5	2.79			77.7	2.67			19.7	0.96			7.40	N/A			18.1	5.04		
PO4-P Olsen/Bicarb	mg/kg	47	27.0	1.84	26.8	✓	41.9	2.58	42.7	✓	12.2	1.20	15.6	H	7.00	1.40	9.3	✓	24.0	3.00	23.3	✓
PO4-P AB-DTPA	mg/kg	2	16.9	N/A			38.6	N/A			9.89	N/A			3.45	N/A			14.0	N/A		
PO4-P Modified Morgan	mg/kg	5	16.4	N/A			18.7	N/A			4.30	N/A			2.80	N/A			5.30	N/A		
PO4-P True Morgan	mg/kg	7	18.4	1.69			26.3	2.03			4.80	0.20			2.90	0.10			5.35	0.11		
PO4-P Mod. Kelowna	mg/kg	1	36.0	N/A			59.0	N/A			15.0	N/A			7.00	N/A			25.0	N/A		
PO4-P Stong Bray (1:10)	mg/kg	10	81.9	2.12			148.0	11.5			28.2	2.19			31.0	2.05			93.0	3.66		
PO4-P Water Soluble	mg/kg																					
SO4 - S (PO4 Extr.)	mg/kg	26	10.6	1.32			14.2	1.34			6.12	1.04			3.29	1.04			17.0	3.00		
Bases																						
K NH4OAc	mg/kg	63	153.0	7.08	177	H	247.0	17.5	243	✓	111.0	6.00	134	H	141.0	5.00	170	VH	198.0	21.6	240	✓
Ca NH4OAc	mg/kg	62	3150.0	265.0	3594	✓	863.0	64.4	767	✓	1690.0	73.0	1751	✓	2150.0	106.0	2137	✓	2480.0	275.0	3086	✓
Mg NH4OAc	mg/kg	62	246.0	7.24	253	✓	145.0	11.0	127	✓	244.0	11.5	253	✓	480.0	20.4	478	✓	179.0	19.5	209	✓

Na NH4OAc	mg/kg	49	45.0	3.16	49.3	✓	16.0	2.45	16.4	✓	12.3	2.34	15.8	✓	12.0	2.31	21.9	VH	8.80	2.00	18	VH
Bray Extractable K	mg/kg	6	110.0	5.90			228.0	10.1			85.5	3.47			105.0	8.41			139.0	7.97		
K - Bicarb.	mg/kg	4	129.0	N/A			218.0	N/A			101.0	N/A			113.0	N/A			196.0	N/A		
K - Modified Morgan	mg/kg	4	153.0	N/A			229.0	N/A			104.0	N/A			134.0	N/A			212.0	N/A		
K - True Morgan	mg/kg	4	103.0	4.50			180.0	N/A			83.5	4.80			85.0	N/A			171.0	N/A		
Ca Modified Morgan	mg/kg	3	4780.0	N/A			860.0	N/A			1730.0	N/A			2350.0	N/A			3860.0	N/A		
Aluminum KCL Extr.	mg/kg	4	0.70	N/A	1		0.90	N/A	1		0.65	N/A	1		0.65	N/A	1		1.01	N/A	1	

Mehlich-1 Multi Element

Scoop Soil Mass	g	5	5.00	N/A			5.00	N/A			5.00	N/A			5.00	N/A			5.00	N/A		
P	mg/kg	7	38.1	3.21			75.7	3.53			15.8	2.51			19.8	1.05			3.58	1.84		
K	mg/kg	7	92.8	5.88			211.0	4.22			72.6	1.70			93.3	3.12			139.0	2.78		
Ca	mg/kg	7	4060.0	170.0			969.0	23.4			1450.0	29.3			2070.0	41.5			3630.0	247.0		
Mg	mg/kg	7	276.0	22.8			155.0	3.10			215.0	4.30			505.0	15.6			195.0	8.61		
Mn	mg/kg	6	55.2	3.24			151.0	3.09			104.0	3.47			39.2	0.78			502.0	76.8		
Zn	mg/kg	7	4.94	0.37			32.8	1.89			2.00	0.30			1.99	0.26			1.44	0.065		

Mehlich-3 Multi-Element

Scoop Soil Mass	g	21	2.00	0.078			2.40	0.060			1.89	0.060			2.09	0.070			1.65	0.067		
Assumed Density	g/cm3	19	1.00	0.055			1.20	0.048			1.00	0.076			1.05	0.045			0.84	0.047		
Volume of Scoop	cm3	16	2.00	0.040			2.00	0.04			2.00	0.040			2.00	0.040			2.00	0.040		
Extractant Volume mL	mL	15	20.0	0.400			20.0	0.40			20.0	0.400			20.0	0.400			20.0	0.400		
P Colorimetric	mg/kg	11	53.6	1.25			113.0	3.00			22.0	1.13			12.7	1.30			41.0	2.20		
P ICP-AES	mg/kg	54	60.3	3.23			122.0	5.53			29.0	1.58			14.6	1.19			45.2	5.48		
K	mg/kg	51	155.0	8.55			269.0	24.3			113.0	6.03			153.0	7.90			182.0	10.4		
Ca	mg/kg	51	3930.0	174.0			1030.0	74.0			1800.0	112.0			2320.0	167.0			3260.0	303.0		
Mg	mg/kg	50	278.0	15.7			173.0	13.2			263.0	10.0			556.0	30.7			207.0	12.0		
Na	mg/kg	41	47.9	3.99			18.9	2.24			13.5	2.12			13.0	1.60			10.4	2.63		
S	mg/kg	42	17.0	1.15			21.3	1.34			10.6	0.70			6.94	0.78			27.0	1.55		
Al	mg/kg	34	608.0	37.4			343.0	15.1			504.0	18.7			683.0	31.1			800.0	49.5		
Zn	mg/kg	48	6.70	0.30			35.8	2.44			2.53	0.18			2.51	0.25			1.33	0.15		
Mn	mg/kg	46	115.0	8.49			162.0	7.94			158.0	8.66			78.9	4.06			355.0	26.5		
Fe	mg/kg	47	220.0	7.96			404.0	17.1			194.0	13.1			150.0	10.5			601.0	50.8		
Cu	mg/kg	48	2.81	0.19			9.75	0.55			1.50	0.17			2.84	0.18			0.32	0.085		
B	mg/kg	38	0.77	0.060			0.91	0.085			0.41	0.078			0.94	0.080			0.90	0.16		

Micronutrients

Zn - DTPA	mg/kg	55	3.63	0.21	3.47	✓	17.7	1.19	15.6	✓	1.58	0.085	1.54	✓	1.30	0.100	1.23	✓	0.84	0.060	0.824	✓
Mn - DTPA	mg/kg	46	30.0	3.66	28.2	✓	93.8	7.30	82	✓	105.0	7.40	112	✓	14.8	1.80	14.8	✓	191.0	18.8	210	✓
Fe - DTPA	mg/kg	47	60.5	5.12	63.5	✓	68.6	9.50	64.4	✓	52.1	3.78	57.6	✓	22.3	2.00	22.7	✓	312.0	23.1	320	✓
Cu - DTPA	mg/kg	48	1.50	0.10	1.48	✓	6.40	0.41	5.84	✓	0.98	0.080	0.985	✓	1.20	0.075	1.18	✓	1.18	0.12	1.14	✓
Zn - HCl	mg/kg																					
Mn-H3PO4	mg/kg	7	37.4	2.23			107.0	3.65			89.2	4.10			23.7	1.00			330.0	20.2		
Cl - Ca(NO3)2 Extr.	mg/kg	15	19.0	1.27			5.65	1.77			17.5	1.44			4.78	1.71			72.3	5.21		
B - Hot Wat.	mg/kg	18	0.37	0.070	0.13	L	0.52	0.12	0.189	L	0.26	0.059	0.1	L	0.37	0.14	0.121	✓	0.39	0.083	0.13	L
B - DTPA/Sorbitol	mg/kg	18	0.36	0.050			0.41	0.040			0.18	0.050			0.39	0.027			0.42	0.12		

N & C

Total N - Kjeldahl	%	9	0.17	0.020	0.165	✓	0.068	0.020	0.073	✓	0.13	0.020	0.112	✓	0.14	0.020	0.128	✓	0.40	0.020	0.39	✓
Total N - combustion	%	27	0.17	0.020			0.069	0.020			0.13	0.020			0.14	0.020			0.41	0.020		
TOC - combustion	%	12	1.98	0.040	1.91	✓	0.58	0.020	0.52	L	1.29	0.050	1.21	✓	1.31	0.030	1.16	VL	4.72	0.16	5.06	✓
Total C - combustion	%	26	2.03	0.068	2.16	✓	0.60	0.025	0.61	✓	1.28	0.033	1.31	✓	1.32	0.031	1.34	✓	4.65	0.14	5.57	VH
OM - Walkley-Black	%	18	3.40	0.20	3.53	✓	1.14	0.070	1.14	✓	2.12	0.16	2.17	✓	2.34	0.15	2.37	✓	7.56	0.65	8.05	✓
OM - LOI (% Wt loss)	%	61	3.75	0.13	3.66	✓	1.25	0.060	1.28	✓	2.59	0.13	2.85	✓	2.91	0.14	3.18	✓	8.70	0.28	9.27	✓

Miscellaneous

CaCO3 Content	%	10	1.30	0.24	2.2	H	0.47	0.13	0.8	H	0.61	0.13	0.9	✓	0.91	0.39	1.4	✓	1.75	0.39	2.3	✓
CEC - Cation Displacement	cmol/kg	10	19.1	3.26	24.5	✓	6.40	0.70	7.47	✓	14.7	1.71	17.1	✓	17.0	2.90	23.3	✓	19.4	3.60	24.4	✓
CEC - Estimation	cmol/kg	9	20.6	2.14			6.95	0.25			12.5	1.35			15.9	0.32			16.7	2.68		
Soil Density (Scoop)	g/cc	10	1.15	0.023			1.39	0.042			1.12	0.031			1.20	0.030			0.96	0.020		

Particle Size Analysis - Hydrometer

Sand 2000 - 50 um	%	30	18.0	2.20	9	VL	60.3	1.87	52	VL	16.0	3.02	8	L	31.9	2.69	22	L	43.6	2.48	36	L
Silt 50 - 2 um	%	30	60.0	4.69	71	✓	27.0	3.00	37	H	66.1	4.75	79	H	35.2	3.45	49	H	38.5	3.47	52	H
Clay 2 - 0 um	%	30	24.4	3.40	20	✓	13.4	2.45	11	✓	19.8	2.50	13	L	33.7	2.80	29	✓	17.6	3.00	12	✓

Particle Size Analysis - Pipette

Sand 2000 - 50 um	%	5	16.0	N/A			58.5	N/A			11.0	N/A			29.0	N/A			44.0	N/A
Silt 50 - 2 um	%	5	62.5	N/A			30.5	N/A			70.0	N/A			40.0	N/A			41.5	N/A
Clay 2 - 0 um	%	5	22.8	N/A			12.2	N/A			18.2	N/A			31.0	N/A			16.2	N/A

Soil Health

Autoclave-Citrate Extractable (ACE) protein	mg/g	2	5.95	N/A			4.31	N/A			5.39	N/A			4.27	N/A			16.5	N/A	
Microbial CO2 respiration (1 day incubation-STCM)	mg/g	5	0.12	N/A			0.030	N/A			0.065	N/A			0.060	N/A			0.23	N/A	
Microbial CO2 respiration (4 day incubation-STCM)	mg/g	1	0.15	N/A			0.090	N/A			0.090	N/A			0.12	N/A			0.30	N/A	
Microbial enzyme activity - As	mg PNP/kg soil h																				
Microbial enzyme activity - Beta Glucosidase (BG)	mg PNP/kg soil h	1	234.0	N/A			201.0	N/A			245.0	N/A			135.0	N/A			1310.0	N/A	
Microbial enzyme activity - NAG	mg PNP/kg soil h																				
Microbial enzyme activity - Pase	mg PNP/kg soil h																				
PMN 7 day anaerobic	mg/kg																				
Reactive carbon - permanganate oxidizable (POxC)	mg/kg	2	831.0	N/A			574.0	N/A			686.0	N/A			686.0	N/A			1300.0	N/A	