



2024 North American Proficiency Testing Program  
Quarter 4 Report - 1/19/2025

Laboratory ID

PAP certification requirements: All 20 soil and/or 12 plant samples have to have data submitted with an average score >60% for each method to be certified, as well as an overall of all methods >80%.

Overall PAP Score for this Year

**#DIV/0!**

Soil	Soil 2024-116			Soil 2024-117			Soil 2024-118			Soil 2024-119			Soil 2024-120			Current		
Analysis - Modus Code	Units	n	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	PAP Score
<b>Saturated Paste</b>																		
Moisture - sp	%	16	48.6	2.80		47.8	2.32		46.0	2.40		50.7	3.40		45.1	4.88		
pH - sp	Unit	23	7.56	0.15		6.03	0.12		6.37	0.13		6.89	0.14		6.82	0.14		
ECe - sp	dS/m	26	1.05	0.080		1.09	0.072		0.56	0.045		1.67	0.089		0.86	0.058		
HCO3 - sp	mmolc/L	10	5.16	0.46		1.64	0.73		3.70	0.88		6.06	0.81		4.51	0.61		
Ca - sp	mmolc/L	21	5.19	0.29		5.64	0.57		3.97	0.52		7.54	0.86		5.29	0.55		
Mg - sp	mmolc/L	18	4.95	0.35		2.24	0.32		1.86	0.17		4.96	0.75		1.78	0.25		
Na - sp	mmolc/L	18	1.13	0.060		0.20	0.026		0.27	0.028		0.24	0.021		0.44	0.048		
SAR - sp	value	15	0.49	0.020		0.10	0.020		0.15	0.024		0.10	0.020		0.24	0.020		
Cl - sp	mmolc/L	14	1.76	0.15		0.84	0.049		0.35	0.040		3.79	0.21		0.35	0.070		
SO4 - sp	mmolc/L	14	0.96	0.066		1.33	0.027		1.10	0.20		2.10	0.27		1.05	0.10		
NO3 - sp	mmolc/L	8	2.48	0.65		4.40	0.50		0.41	0.40		3.30	1.80		2.19	0.94		
B - sp	mg/L	11	0.080	0.035		0.13	0.035		0.16	0.035		0.45	0.032		0.16	0.055		
<b>pH &amp; EC (1:1 or 1:2)</b>																		
EC (1:1)	(dS/m)	35	0.45	0.030		0.47	0.040		0.29	0.037		0.60	0.071		0.42	0.024		
EC (1:2)	(dS/m)	39	0.33	0.020		0.32	0.020		0.19	0.022		0.49	0.065		0.26	0.026		
pH (1:1) Water	Unit	80	7.81	0.16		6.18	0.12		6.52	0.13		6.99	0.14		7.02	0.14		
pH (1:2) Water	Unit	15	8.00	0.16		6.30	0.13		6.65	0.13		7.10	0.14		7.16	0.14		
pH (1:1) 0.01M CaCl2	Unit	21	7.44	0.15		5.80	0.12		6.08	0.12		6.68	0.13		6.60	0.13		
pH (1:2) 0.01M CaCl2	Unit	11	7.52	0.15		5.80	0.12		6.11	0.12		6.69	0.13		6.61	0.13		
<b>Lime Req.</b>																		
SMP Buffer pH	Unit	18	7.43	0.15		6.64	0.13		6.90	0.14		7.14	0.14		7.18	0.14		
Adams-Evans Buf pH	Unit	6	7.81	0.16		7.44	0.15		7.58	0.15		7.75	0.16		7.64	0.15		
Woodruff Buf. pH	Unit	18	7.10	0.14		6.60	0.13		6.80	0.14		6.95	0.14		6.96	0.14		
Mehlich Buffer pH	Unit	7	6.74	N/A		6.20	0.12		6.27	0.13		6.58	0.13		6.50	0.13		
Sikora Buffer pH	Unit	34	7.50	0.15		6.77	0.14		7.00	0.14		7.29	0.15		7.23	0.15		
Titrateable Acidity	cmol/kg																	
<b>Inorganic Nitrogen (NO3-N &amp; NH4-N)</b>																		
NO3-N Cd. Rd.	mg/kg	61	23.3	1.16		37.3	1.89		9.30	0.52		37.5	2.75		23.8	0.92		
NO3-N ISE	mg/kg	4	31.0	N/A		41.0	N/A		12.0	N/A		46.5	N/A		27.2	N/A		
NO3-N CTA	mg/kg	1	20.2	N/A		34.5	N/A		8.08	N/A		36.6	N/A		20.5	N/A		
NO3-N Ion Chr.	mg/kg	1	26.8	N/A		44.9	N/A		11.5	N/A		43.4	N/A		27.7	N/A		
NO3-N Other	mg/kg	11	23.4	1.79		39.6	0.90		9.77	1.56		38.4	5.67		23.3	0.47		
NH4 - N (KCl Extr.)	mg/kg	38	25.1	0.98		144.0	6.42		19.7	0.80		110.0	8.25		27.5	0.99		
<b>Phosphorus and Sulfur</b>																		
PO4-P Bray P (1:10)	mg/kg	37	11.7	0.80		22.3	2.39		38.4	1.60		129.0	4.30		70.0	2.80		
PO4-P Bray P1 (1:7)	mg/kg	7	10.1	1.91		17.8	2.94		35.2	0.71		105.0	5.85		68.1	6.49		
PO4-P Olsen/Bicarb	mg/kg	46	9.00	0.94		24.0	1.61		23.8	1.75		51.0	5.51		38.2	2.49		
PO4-P AB-DTPA	mg/kg	1	8.44	N/A		16.6	N/A		19.7	N/A		44.6	N/A		23.5	N/A		
PO4-P Modified Morgan	mg/kg	5	7.50	N/A		2.79	N/A		10.5	N/A		19.4	N/A		21.3	N/A		
PO4-P True Morgan	mg/kg	5	7.99	1.51		3.50	1.25		11.5	N/A		20.5	1.48		23.2	5.18		
PO4-P Mod. Kelowna	mg/kg																	
PO4-P Stong Bray (1:10)	mg/kg	10	109.0	5.80		65.3	2.80		85.6	3.41		224.0	5.25		319.0	11.5		
PO4-P Water Soluble	mg/kg	4	1.82	N/A		1.74	N/A		4.61	N/A		5.20	N/A		8.32	N/A		
SO4 - S (PO4 Extr.)	mg/kg	25	8.06	1.18		11.0	1.15		7.97	1.07		16.7	2.15		7.64	0.87		
<b>Bases</b>																		

K NH4OAc	mg/kg	67	182.0	7.81	240.0	9.02	265.0	11.0	257.0	18.8	691.0	20.3
Ca NH4OAc	mg/kg	60	3700.0	478.0	2340.0	112.0	2550.0	116.0	1300.0	68.0	2510.0	108.0
Mg NH4OAc	mg/kg	56	671.0	28.0	348.0	12.0	413.0	15.9	280.0	20.0	342.0	12.4
Na NH4OAc	mg/kg	46	35.0	2.05	10.0	1.37	16.2	1.37	10.2	1.55	19.0	1.00
Bray Extractable K	mg/kg	5	128.0	N/A	157.0	N/A	192.0	N/A	198.0	N/A	496.0	N/A
K- Bicarb.	mg/kg	3	136.0	N/A	174.0	N/A	211.0	N/A	247.0	N/A	487.0	N/A
K - Modified Morgan	mg/kg	4	170.0	N/A	226.0	N/A	245.0	N/A	247.0	N/A	638.0	N/A
K - True Morgan	mg/kg	4	124.0	N/A	157.0	N/A	175.0	N/A	200.0	N/A	383.0	N/A
Ca Modified Morgan	mg/kg	3	9120.0	N/A	2110.0	N/A	2280.0	N/A	1320.0	N/A	2220.0	N/A
Aluminum KCL Extr.	mg/kg	3	1.12	N/A	0.90	N/A	0.40	N/A	0.84	N/A	1.64	N/A

#### Mehlich-1 Multi Element

##### Scoop Soil Mass

P	mg/kg	9	4.00	0.27	7.35	0.66	60.8	3.82	80.0	3.47	250.0	9.00
K	mg/kg	9	80.1	6.97	145.0	4.45	154.0	12.4	206.0	5.64	394.0	35.3
Ca	mg/kg	9	4550.0	293.0	2110.0	70.7	2360.0	133.0	1730.0	97.2	2390.0	154.0
Mg	mg/kg	9	601.0	43.8	296.0	9.43	368.0	24.4	313.0	21.9	299.0	17.4
Mn	mg/kg	8	61.0	3.76	375.0	31.4	212.0	13.8	408.0	16.1	109.0	6.50
Zn	mg/kg	8	0.26	0.080	2.00	N/A	3.10	0.22	4.83	0.25	2.21	0.20

#### Mehlich-3 Multi-Element

##### Scoop Soil Mass

##### Assumed Density

##### Volume of Scoop

##### Extractant Volume mL

P Colorimetric	mg/kg	9	20.0	1.80	30.0	4.00	39.7	1.00	147.0	8.51	88.4	3.50
P ICP-AES	mg/kg	54	23.4	1.40	35.0	3.31	51.1	2.40	172.0	8.00	99.3	5.09
K	mg/kg	58	186.0	9.00	245.0	15.1	266.0	13.9	261.0	13.6	728.0	32.0
Ca	mg/kg	52	5170.0	315.0	2610.0	128.0	2890.0	129.0	1580.0	73.1	2700.0	105.0
Mg	mg/kg	53	783.0	27.6	374.0	13.3	463.0	18.7	322.0	14.0	386.0	10.0
Na	mg/kg	45	39.1	2.07	11.8	1.41	17.1	1.62	11.0	1.45	20.0	1.83
S	mg/kg	43	17.0	0.80	19.0	1.16	15.0	1.00	30.0	1.50	13.6	0.92
Al	mg/kg	33	283.0	24.5	665.0	21.0	415.0	19.5	806.0	30.5	615.0	21.8
Zn	mg/kg	49	2.43	0.14	1.98	0.13	4.47	0.18	4.70	0.20	3.50	0.11
Mn	mg/kg	48	121.0	6.09	382.0	27.3	330.0	25.8	351.0	28.8	239.0	14.7
Fe	mg/kg	48	305.0	11.3	534.0	55.9	200.0	13.3	334.0	23.6	141.0	7.50
Cu	mg/kg	47	4.54	0.29	1.14	0.45	2.10	0.10	2.72	0.13	3.17	0.15
B	mg/kg	37	0.70	0.090	0.80	0.13	1.13	0.077	1.70	0.11	1.16	0.074

#### Micronutrients

Zn - DTPA	mg/kg	59	1.10	0.060	1.27	0.070	2.75	0.13	2.23	0.16	1.60	0.050
Mn - DTPA	mg/kg	51	43.2	2.84	304.0	23.6	209.0	16.4	176.0	17.7	86.4	4.89
Fe - DTPA	mg/kg	54	86.4	7.11	188.0	14.5	64.1	6.06	104.0	11.6	30.7	2.20
Cu - DTPA	mg/kg	54	3.57	0.16	3.20	0.17	1.34	0.080	2.17	0.21	1.80	0.100
Zn - HCl	mg/kg											
Mn-H3PO4	mg/kg	9	52.1	5.88	285.0	22.3	173.0	8.58	384.0	15.5	82.4	2.33
Cl - Ca(NO3)2 Extr.	mg/kg	10	25.9	4.19	12.2	0.97	4.85	0.70	66.0	2.85	5.96	1.27
B - Hot Wat.	mg/kg	19	0.31	0.085	0.51	0.21	0.74	0.18	1.27	0.40	0.80	0.30
B - DTPA/Sorbitol	mg/kg	19	0.38	0.064	0.40	0.10	0.50	0.050	0.96	0.080	0.65	0.040

#### N & C

Total N - Kjeldahl	%	6	0.11	0.020	0.20	0.020	0.20	0.020	0.20	N/A	0.15	N/A
Total N - combustion	%	41	0.11	0.020	0.20	0.020	0.20	0.020	0.19	0.020	0.15	0.020
TOC - combustion	%	25	1.00	0.040	2.21	0.068	2.22	0.070	1.92	0.061	1.34	0.029
Total C - combustion	%	37	1.34	0.041	2.28	0.052	2.24	0.047	2.04	0.055	1.35	0.027
OM - Walkley-Black	%	21	1.85	0.12	3.85	0.14	3.85	0.21	3.35	0.23	2.46	0.13
OM - LOI ( % Wt loss)	%	64	2.29	0.095	4.45	0.20	3.90	0.13	4.03	0.12	2.72	0.14

#### Miscellaneous

<b>CaCO3 Content</b>	%	8	<b>2.97</b>	0.21	<b>0.43</b>	0.22	<b>0.40</b>	0.27	<b>0.72</b>	0.10	<b>0.45</b>	0.28
<b>CEC - Cation Displacement</b>	cmol/kg	4	<b>15.0</b>	N/A	<b>20.8</b>	N/A	<b>19.5</b>	N/A	<b>10.7</b>	N/A	<b>18.1</b>	N/A
<b>CEC - Estimation</b>	cmol/kg	13	<b>25.0</b>	3.20	<b>18.2</b>	1.40	<b>18.2</b>	1.10	<b>10.2</b>	1.30	<b>18.0</b>	0.80
<b>Soil Density (Scoop)</b>	g/cc											
<b>Particle Size Analysis - Hydrometer</b>												
<b>Sand 2000 - 50 um</b>	%	29	<b>44.9</b>	3.42	<b>13.1</b>	2.26	<b>61.0</b>	2.30	<b>22.7</b>	2.49	<b>24.3</b>	5.69
<b>Silt 50 - 2 um</b>	%	28	<b>41.0</b>	3.86	<b>62.1</b>	1.90	<b>21.3</b>	3.00	<b>56.6</b>	4.12	<b>59.5</b>	5.50
<b>Clay 2 - 0 um</b>	%	29	<b>15.8</b>	2.60	<b>26.3</b>	3.50	<b>19.4</b>	2.30	<b>20.8</b>	3.00	<b>20.1</b>	2.80
<b>Particle Size Analysis - Pipette</b>												
<b>Sand 2000 - 50 um</b>	%	3	<b>48.0</b>	N/A	<b>3.00</b>	N/A	<b>62.0</b>	N/A	<b>18.6</b>	N/A	<b>21.0</b>	N/A
<b>Silt 50 - 2 um</b>	%	3	<b>36.4</b>	N/A	<b>68.2</b>	N/A	<b>20.0</b>	N/A	<b>60.1</b>	N/A	<b>58.7</b>	N/A
<b>Clay 2 - 0 um</b>	%	3	<b>16.0</b>	N/A	<b>28.0</b>	N/A	<b>19.0</b>	N/A	<b>18.8</b>	N/A	<b>19.5</b>	N/A
<b>Soil Health</b>												
<b>Autoclave-Citrate Extractable (ACE) protein</b>	mg/g	4	<b>2.47</b>	N/A	<b>6.58</b>	N/A	<b>6.47</b>	N/A	<b>5.76</b>	N/A	<b>3.42</b>	N/A
<b>Microbial CO2 respiration (1 day incubation-ST)</b>	mg/g	7	<b>0.068</b>	0.041	<b>0.090</b>	0.031	<b>0.16</b>	0.034	<b>0.13</b>	0.068	<b>0.090</b>	0.069
<b>Microbial CO2 respiration (4 day incubation-ST)</b>	mg/g	1	<b>0.041</b>	N/A	<b>0.049</b>	N/A	<b>0.050</b>	N/A	<b>0.079</b>	N/A	<b>0.047</b>	N/A
<b>Microbial enzyme activity - As</b>	mg PNP/kg soil h											
<b>Microbial enzyme activity - Beta Glucosidase (E)</b>	mg PNP/kg soil h											
<b>Microbial enzyme activity - NAG</b>	mg PNP/kg soil h											
<b>Microbial enzyme activity - Pase</b>	mg PNP/kg soil h											
<b>PMN 7 day anaerobic</b>	mg/kg	2	<b>19.0</b>	N/A	<b>36.0</b>	N/A	<b>68.0</b>	N/A	<b>44.5</b>	N/A	<b>41.5</b>	N/A
<b>Reactive carbon - permanganate oxidizable (PC)</b>	mg/kg	6	<b>395.0</b>	N/A	<b>626.0</b>	110.0	<b>687.0</b>	116.0	<b>704.0</b>	124.0	<b>450.0</b>	N/A



Water	Water 2024-310			Water 2024-311			Water 2024-312				
Analysis - Modus Code	Units	n	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result
<b>pH &amp; EC</b>											
pH		28	8.41	0.17		8.20	0.16		8.27	0.17	
EC	dS/m	27	0.69	0.020		0.53	0.020		0.39	0.020	
<b>Cations</b>											
Ca	mmol/L	26	1.58	0.074		2.51	0.10		2.37	0.14	
Mg	mmol/L	27	3.96	0.22		2.13	0.12		1.60	0.087	
Na	mmol/L	27	1.80	0.090		0.97	0.039		0.27	0.020	
K	mmol/L	25	0.11	0.020		0.092	0.020		0.024	0.020	
NH4-N	mmol/L	6	0.004	0.020		0.005	N/A		0.006	0.020	
Sum Cations	mmol/L	11	7.57	0.20		5.63	0.21		4.21	0.20	
SAR	---	12	1.07	0.025		0.64	0.020		0.20	0.020	
Adj-SAR	---	4	1.78	N/A		1.34	N/A		0.30	N/A	
<b>Anions</b>											
HCO3	mmol/L	21	4.23	0.36		4.28	0.28		3.50	0.29	
CO3	mmol/L	9	0.39	0.17		0.20	0.060		0.20	0.086	
Cl	mmol/L	19	1.34	0.10		0.86	0.060		0.28	0.034	
NO3	mmol/L	15	0.010	0.020		0.020	0.020		0.012	0.020	
SO4	mmol/L	18	1.48	0.092		0.40	0.028		0.14	0.020	
Sum Anions	mmol/L	10	6.96	0.23		5.47	0.12		4.12	0.33	
Cation-Anion Difference	---	4	0.38	N/A		0.19	N/A		0.35	N/A	
<b>Miscellaneous</b>											
Boron	mg/L	12	0.076	0.020		0.038	0.020		0.012	0.020	
PO4-P Phosphorus - Spec	mg/L	5	0.011	N/A		0.044	N/A		0.070	N/A	
Phosphorus - ICP (Total)	mg/L	6	0.010	N/A		0.075	0.025		0.030	0.020	
TKN	mg/L	1	0.19	N/A		0.23	N/A		0.040	N/A	
Nitrogen Combustion (Total)	mg/L	1	0.19	N/A		0.51	N/A		0.23	N/A	
Total Organic Carbon	mg/L	2	2.53	N/A		2.04	N/A		0.62	N/A	

Environmental	Soil 2024-116			Soil 2024-117			Soil 2024-118			Soil 2024-119			Soil 2024-120				
Soil Analyses - Modus Code	Units	n	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result	Median	MAD	Lab Result
<b>Metals</b>																	
Ag	mg/kg																
Al	mg/kg	5	12500.0	1020.0		10500.0	1020.0		4700.0	736.0		13300.0	N/A		12500.0	N/A	
As	mg/kg	7	8.27	0.83		7.67	0.69		4.00	0.29		6.99	0.60		3.55	0.41	
Ba	mg/kg	3	107.0	N/A		162.0	N/A		98.6	N/A		70.7	N/A		125.0	N/A	
Be	mg/kg																
Bi	mg/kg																
B	mg/kg	4	10.4	N/A		8.46	N/A		10.8	N/A		9.80	N/A		9.70	N/A	
Ca	mg/kg	6	14600.0	N/A		3560.0	N/A		4280.0	N/A		3930.0	194.0		4840.0	N/A	
Cd	mg/kg	5	0.57	N/A		0.61	N/A		0.77	N/A		0.52	N/A		0.78	N/A	
Co	mg/kg	7	9.74	0.91		8.91	0.99		5.22	0.65		12.2	1.23		5.68	0.89	
Cr	mg/kg	7	18.6	3.87		16.5	3.10		10.5	1.26		23.7	3.37		17.7	3.00	
Cu	mg/kg	5	20.6	N/A		16.5	N/A		9.14	N/A		13.5	N/A		14.3	N/A	
Fe	mg/kg	6	25600.0	2670.0		19500.0	886.0		9550.0	639.0		21200.0	1050.0		15300.0	896.0	
K	mg/kg	6	2330.0	241.0		1350.0	153.0		1250.0	N/A		922.0	99.7		3840.0	N/A	
Li	mg/kg																
Mg	mg/kg	5	8730.0	N/A		1940.0	154.0		1960.0	165.0		2890.0	N/A		4220.0	N/A	
Mn	mg/kg	5	434.0	N/A		1000.0	N/A		940.0	N/A		856.0	N/A		550.0	N/A	
Mo	mg/kg	4	0.28	N/A		0.63	N/A		0.52	N/A		0.71	N/A		0.48	N/A	
Na	mg/kg	5	240.0	52.1		64.6	13.3		88.0	N/A		79.4	N/A		166.0	39.9	
Ni	mg/kg	6	16.5	1.80		14.2	1.60		16.5	0.89		17.9	1.21		14.0	1.33	
P	mg/kg	5	841.0	57.0		530.0	25.4		469.0	36.8		928.0	N/A		865.0	51.8	
Pb	mg/kg	6	10.9	1.12		19.8	2.82		7.56	0.93		21.3	2.20		11.7	1.45	
S	mg/kg	5	185.0	5.24		221.0	14.5		232.0	11.8		304.0	N/A		197.0	N/A	
Sb	mg/kg																
Se	mg/kg	4	0.75	N/A		1.21	N/A		0.97	N/A		1.14	N/A		0.78	N/A	
Sn	mg/kg																
Sr	mg/kg	1	49.1	N/A		13.7	N/A		20.6	N/A		5.52	N/A		29.1	N/A	
V	mg/kg	2	43.5	N/A		26.6	N/A		21.7	N/A		32.8	N/A		20.1	N/A	
Zn	mg/kg	5	61.6	N/A		51.7	N/A		48.3	N/A		47.5	N/A		62.6	3.22	
Hg (US-EPA 7470 or 7471)	mg/kg	1	0.016	N/A		0.026	N/A		0.034	N/A		0.025	N/A		0.013	N/A	

n = Number of labs submitting results

MAD = Median Average Deviation

N/A = Not applicable as there are too few labs submitting data for this test to run statistics

H = High - Outside 2.5\* +/- MAD VH = Very High - Outside 4\* +/- MAD

L = Low - Outside 2.5\* +/- MAD VL = Very Low - Outside 4\* +/- MAD

✓ = Passing