2021 North American Proficiency Testing Program
Quarter 4 Soil Report - Thursday, February 3, 2022

Laboratory ID
General

Soil			Soil 2021-116			Soil 2021-117			Soil 2021-118			Soil 2021-119			Soil 2021-120		
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	%	16	**48.9**	*2.12*		**45.4**	*2.50*		**49.4**	*2.00*		**34.5**	*3.94*		**24.6**	*2.16*	
pH - sp	Unit	24	**6.05**	*0.068*		**6.10**	*0.080*		**7.10**	*0.075*		**7.52**	*0.135*		**7.03**	*0.090*	
ECe - sp	dS/m	24	**1.04**	*0.084*		**0.855**	*0.140*		**0.955**	*0.095*		**1.26**	*0.185*		**1.37**	*0.190*	
HCO3 - sp	mmolc/L	11	**1.62**	*0.260*		**2.00**	*0.260*		**6.00**	*1.40*		**4.90**	*0.54*		**2.40**	*0.245*	
Ca - sp	mmolc/L	20	**5.04**	*0.688*		**5.55**	*1.10*		**6.40**	*0.774*		**8.87**	*1.70*		**7.44**	*1.25*	
Mg - sp	mmolc/L	20	**2.06**	*0.392*		**2.68**	*0.545*		**2.70**	*0.474*		**3.15**	*0.588*		**0.649**	*0.102*	
Na - sp	mmolc/L	20	**0.160**	*0.015*		**0.270**	*0.040*		**0.740**	*0.130*		**1.28**	*0.207*		**0.605**	*0.063*	
SAR - sp	value	18	**0.090**	*0.009*		**0.115**	*0.015*		**0.315**	*0.040*		**0.500**	*0.044*		**0.288**	*0.054*	
Cl - sp	mmolc/L	15	**0.800**	*0.090*		**0.230**	*0.030*		**1.00**	*0.200*		**3.16**	*0.440*		**0.880**	*0.110*	
SO4 - sp	mmolc/L	15	**0.940**	*0.170*		**1.20**	*0.140*		**1.60**	*0.390*		**2.87**	*0.530*		**0.960**	*0.240*	
NO_3 - sp	mmolc/L	12	**5.59**	*1.31*		**5.26**	*1.24*		**1.48**	*0.30*		**1.07**	*0.254*		**7.64**	*1.60*	
B - sp	mg/L	12	**0.145**	*0.018*		**0.200**	*0.039*		**0.181**	*0.014*		**0.215**	*0.049*		**0.039**	*0.005*	
Soil pH & EC																	
Soil EC (1:1)	(dS/m)	41	**0.499**	*0.039*		**0.471**	*0.051*		**0.487**	*0.047*		**0.443**	*0.073*		**0.300**	*0.029*	
Soil EC (1:2)	(dS/m)	36	**0.326**	*0.039*		**0.310**	*0.030*		**0.320**	*0.030*		**0.341**	*0.046*		**0.240**	*0.039*	
pH (1:1) Water	Unit	90	**6.14**	*0.050*		**6.16**	*0.050*		**7.22**	*0.065*		**7.72**	*0.075*		**7.20**	*0.050*	
pH (1:2) Water	Unit	23	**6.26**	*0.060*		**6.22**	*0.075*		**7.26**	*0.060*		**7.83**	*0.120*		**7.31**	*0.067*	
pH (1:1) 0.01M CaCl2	Unit	24	**5.78**	*0.040*		**5.84**	*0.040*		**6.86**	*0.035*		**7.40**	*0.040*		**6.79**	*0.050*	
pH (1:2) 0.01M CaCl2	Unit	12	**5.78**	*0.075*		**5.80**	*0.046*		**6.80**	*0.085*		**7.29**	*0.110*		**6.80**	*0.080*	
Buffer pH, Lime Req.																	
SMP Buffer pH	Unit	24	**6.70**	*0.090*		**6.92**	*0.042*		**7.24**	*0.040*		**7.45**	*0.050*		**7.40**	*0.040*	
Adams-Evans Buf pH	Unit	9	**7.43**	*0.070*		**7.61**	*0.090*		**7.66**	*0.040*		**7.82**	*0.025*		**7.90**	*0.040*	
Woodruff Buf. pH	Unit	23	**6.60**	*0.040*		**6.76**	*0.040*		**7.01**	*0.030*		**7.15**	*0.045*		**7.03**	*0.050*	
Mehlich Buffer pH	Unit	9	**6.19**	*0.050*		**6.20**	*0.035*		**6.54**	*0.050*		**6.76**	*0.040*		**6.61**	*0.030*	
Sikora Buffer pH	Unit	31	**6.69**	*0.040*		**6.92**	*0.045*		**7.20**	*0.030*		**7.51**	*0.020*		**7.46**	*0.060*	
Titratable Acidity	cmol/kg																
Inorganic Nitrogen (NO3-N & NH4-N)																	
NO3-N Cd. Rd.	mg/kg	60	**42.4**	*1.84*		**46.0**	*1.91*		**19.4**	*1.30*		**15.4**	*1.30*		**32.5**	*3.01*	
NO3-N ISE	mg/kg	6	**41.8**	*12.6*		**43.5**	*10.9*		**19.1**	*8.38*		**14.6**	*5.02*		**29.3**	*9.86*	
NO3-N CTA	mg/kg	1	**93.0**	*0.000*		**99.0**	*0.000*		**50.0**	*0.000*		**40.0**	*0.000*		**81.0**	*0.000*	
NO3-N Ion Chr.	mg/kg	1	**48.0**	*0.000*		**52.0**	*0.000*		**24.0**	*0.000*		**17.0**	*0.000*		**35.0**	*0.000*	
NO3-N Other _____	mg/kg	12	**42.6**	*2.54*		**46.2**	*2.70*		**19.7**	*2.58*		**15.7**	*1.40*		**33.7**	*4.07*	
NH4 - N (KCl Extr.)	mg/kg	47	**135**	*9.47*		**8.75**	*1.45*		**27.8**	*2.93*		**8.91**	*1.40*		**16.0**	*1.61*	
Phosphorus and Sulfur																	
PO4-P Bray P (1:10)	mg/kg	44	**16.2**	*2.07*		**37.2**	*2.49*		**83.4**	*5.65*		**39.0**	*2.80*		**60.6**	*4.73*	
PO4-P Bray P1 (1:7)	mg/kg	5	**16.5**	*6.84*		**33.6**	*0.860*		**69.6**	*6.95*		**31.4**	*2.30*		**51.5**	*5.80*	
PO4-P Olsen/Bicarb	mg/kg	51	**25.0**	*1.50*		**24.0**	*1.00*		**57.8**	*4.14*		**16.6**	*1.35*		**14.2**	*1.70*	
PO4-P AB-DTPA	mg/kg	1	**13.5**	*0.000*		**14.8**	*0.000*		**27.2**	*0.000*		**10.3**	*0.000*		**10.0**	*0.000*	
PO4-P Modified Morgan	mg/kg	3	**2.00**	*1.50*		**9.50**	*2.80*		**29.0**	*1.50*		**20.0**	*12.3*		**3.00**	*2.91*	
PO4-P True Morgan	mg/kg	7	**4.01**	*0.564*		**14.0**	*0.900*		**35.0**	*2.44*		**32.0**	*2.60*		**6.60**	*0.400*	
PO4-P Mod. Kewlona	mg/kg	1	**9.20**	*0.000*		**24.4**	*0.000*		**76.9**	*0.000*		**23.4**	*0.000*		**32.9**	*0.000*	
PO4-P Stong Bray (1:10)	mg/kg	12	**62.0**	*5.14*		**85.6**	*4.78*		**254**	*12.0*		**128**	*5.60*		**76.8**	*7.06*	
PO4-P Water Soluble	mg/kg	1	**0.400**	*0.000*		**7.70**	*0.000*		**8.10**	*0.000*		**1.80**	*0.000*		**0.400**	*0.000*	
SO4 - S (PO4 Extr.)	mg/kg	26	**8.22**	*1.70*		**9.00**	*0.850*		**11.7**	*1.70*		**21.6**	*1.90*		**6.34**	*1.31*	

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Bases												
K Ammonium Acetate	mg/kg	66	**246**	*10.0*	**257**	*11.8*	**840**	*51.8*	**323**	*26.6*	**173**	*18.8*
Ca Ammonium Acetate	mg/kg	61	**2,350**	*118*	**2,540**	*124*	**3,300**	*162*	**3,730**	*422*	**618**	*73.3*
Mg Ammonium Acetate	mg/kg	61	**349**	*16.0*	**408**	*17.3*	**521**	*29.0*	**290**	*24.8*	**26.8**	*5.50*
Na Ammonium Acetate	mg/kg	51	**11.2**	*2.69*	**15.0**	*2.09*	**30.8**	*3.56*	**31.1**	*2.69*	**11.8**	*2.50*
Bray Extractable K	mg/kg	5	**171**	*11.6*	**195**	*12.1*	**492**	*27.0*	**257**	*15.1*	**172**	*7.30*
K- Olsen/Bicarb.	mg/kg	4	**188**	*5.00*	**214**	*8.50*	**663**	*20.5*	**252**	*10.0*	**156**	*0.500*
K Modified Morgan	mg/kg	2	**248**	*11.0*	**254**	*8.50*	**848**	*42.0*	**292**	*6.50*	**150**	*15.5*
K True Morgan	mg/kg	5	**150**	*7.00*	**160**	*9.00*	**498**	*17.5*	**198**	*9.22*	**140**	*8.00*
Ca Modified Morgan	mg/kg	2	**2,510**	*76.0*	**2,610**	*30.0*	**3,580**	*291*	**5,890**	*1,300*	**545**	*115*
Aluminum KCL Extr.	mg/kg	2	**0.740**	*0.440*	**1.00**	*0.100*	**0.550**	*0.454*	**1.00**	*0.600*	**0.600**	*0.400*
Mehlich-1 Multi Element (scoop)												
Scoop Soil Mass	g	6	**5.00**	*0.000*	**5.00**	*0.000*	**5.00**	*0.000*	**5.00**	*0.000*	**5.00**	*0.000*
P	mg/kg	11	**5.74**	*1.12*	**66.5**	*4.50*	**158**	*29.5*	**43.4**	*9.84*	**32.2**	*2.75*
K	mg/kg	11	**157**	*13.7*	**153**	*13.5*	**491**	*40.8*	**200**	*20.2*	**157**	*10.1*
Ca	mg/kg	11	**2,250**	*156*	**2,580**	*186*	**3,310**	*256*	**5,130**	*1,020*	**675**	*29.2*
Mg	mg/kg	11	**306**	*12.1*	**369**	*16.5*	**472**	*25.5*	**331**	*31.0*	**25.1**	*2.88*
Mn	mg/kg	7	**374**	*18.9*	**130**	*7.75*	**117**	*7.64*	**21.5**	*1.77*	**8.48**	*0.480*
Zn	mg/kg	7	**2.25**	*0.050*	**3.03**	*0.224*	**6.96**	*0.600*	**1.72**	*0.810*	**1.34**	*0.060*
Mehlich-3 Mult-Element (scoop)												
Scoop Soil Mass	g	28	**2.00**	*0.080*	**2.04**	*0.056*	**1.83**	*0.090*	**2.39**	*0.077*	**2.51**	*0.059*
Assumed Density	g/cm3	22	**1.02**	*0.068*	**1.03**	*0.051*	**0.950**	*0.082*	**1.19**	*0.036*	**1.24**	*0.052*
Volume of Scoop	cm3	28	**2.00**	*0.000*	**2.00**	*0.000*	**2.00**	*0.000*	**2.00**	*0.000*	**2.00**	*0.000*
Extractrant Volume mL	mL	21	**20.0**	*0.000*	**20.0**	*0.000*	**20.0**	*0.000*	**20.0**	*0.000*	**20.0**	*0.000*
P Colorimetric	mg/kg	11	**25.5**	*3.50*	**41.0**	*3.10*	**105**	*2.00*	**52.3**	*1.30*	**64.0**	*4.00*
P ICP-AES	mg/kg	61	**28.0**	*4.59*	**49.8**	*3.79*	**110**	*6.20*	**59.4**	*4.10*	**74.7**	*4.79*
K	mg/kg	58	**244**	*13.9*	**253**	*13.6*	**804**	*50.0*	**341**	*21.6*	**186**	*15.6*
Ca	mg/kg	58	**2,590**	*125*	**2,810**	*131*	**3,450**	*188*	**4,890**	*394*	**695**	*62.8*
Mg	mg/kg	58	**370**	*18.9*	**444**	*18.1*	**549**	*25.2*	**371**	*21.3*	**36.4**	*4.89*
Na	mg/kg	48	**12.3**	*2.22*	**16.4**	*2.08*	**31.0**	*2.89*	**36.3**	*3.10*	**14.0**	*2.10*
S	mg/kg	51	**14.3**	*0.670*	**15.6**	*0.850*	**17.4**	*1.01*	**39.0**	*2.56*	**12.5**	*0.730*
Al	mg/kg	38	**684**	*46.7*	**387**	*23.1*	**666**	*43.0*	**376**	*51.0*	**724**	*51.1*
Zn	mg/kg	54	**2.01**	*0.190*	**4.26**	*0.260*	**10.7**	*0.700*	**6.25**	*0.450*	**2.12**	*0.175*
Mn	mg/kg	53	**335**	*17.0*	**277**	*18.4*	**160**	*9.96*	**64.1**	*5.23*	**9.84**	*1.15*
Fe	mg/kg	53	**560**	*74.3*	**135**	*11.6*	**181**	*12.7*	**111**	*8.20*	**140**	*8.77*
Cu	mg/kg	51	**0.661**	*0.106*	**1.66**	*0.120*	**4.50**	*0.280*	**2.41**	*0.150*	**0.700**	*0.100*
B	mg/kg	45	**0.950**	*0.169*	**1.10**	*0.120*	**1.30**	*0.140*	**2.49**	*0.250*	**0.270**	*0.034*
Micronutrients												
Zn - DTPA	mg/kg	57	**1.20**	*0.120*	**2.54**	*0.188*	**5.34**	*0.440*	**2.64**	*0.260*	**0.580**	*0.080*
Mn - DTPA	mg/kg	48	**252**	*23.0*	**119**	*10.1*	**104**	*7.60*	**13.4**	*1.76*	**3.90**	*0.580*
Fe - DTPA	mg/kg	51	**227**	*31.5*	**43.7**	*4.26*	**29.2**	*3.40*	**26.0**	*3.69*	**23.1**	*4.54*
Cu - DTPA	mg/kg	52	**2.96**	*0.245*	**0.950**	*0.071*	**2.53**	*0.240*	**1.01**	*0.140*	**0.270**	*0.050*
Zn - HCl	mg/kg	1	**3.56**	*0.000*	**4.34**	*0.000*	**11.1**	*0.000*	**7.59**	*0.000*	**1.25**	*0.000*
Mn-H3PO4	mg/kg	8	**264**	*26.7*	**104**	*6.86*	**97.5**	*9.14*	**18.8**	*4.25*	**6.95**	*0.865*
Cl - Ca(NO3)2 Extr.	mg/kg	15	**11.3**	*1.13*	**3.80**	*0.700*	**15.0**	*2.45*	**40.2**	*2.80*	**8.10**	*1.22*
B - Hot Wat.	mg/kg	24	**0.592**	*0.108*	**0.781**	*0.165*	**0.916**	*0.170*	**0.975**	*0.149*	**0.100**	*0.017*
B-DTPA/Sorbitol	mg/kg	20	**0.500**	*0.050*	**0.470**	*0.028*	**0.665**	*0.052*	**1.12**	*0.138*	**0.102**	*0.013*
Soil Organic Matter												
Soil Kjeldahl N	%	10	**0.192**	*0.011*	**0.191**	*0.006*	**0.178**	*0.009*	**0.148**	*0.010*	**0.050**	*0.010*
Soil TN (combustion)	%	37	**0.195**	*0.009*	**0.202**	*0.012*	**0.176**	*0.006*	**0.150**	*0.010*	**0.048**	*0.008*
Soil TOC (Combustion)	%	14	**2.34**	*0.103*	**2.24**	*0.145*	**2.12**	*0.085*	**1.59**	*0.076*	**0.455**	*0.040*
Soil Total C (Combustion)	%	32	**2.32**	*0.116*	**2.27**	*0.093*	**2.08**	*0.090*	**1.87**	*0.088*	**0.472**	*0.031*

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SOM - Walkley-Black	%	21	**3.90**	*0.250*		**3.79**	*0.210*		**3.64**	*0.264*		**2.60**	*0.230*		**1.00**	*0.200*
SOM - LOI (% Wt loss)	%	69	**4.40**	*0.200*		**3.83**	*0.170*		**4.28**	*0.280*		**2.65**	*0.140*		**1.00**	*0.050*
Other																
CaCO3 Content	%	8	**0.765**	*0.130*		**0.400**	*0.024*		**0.840**	*0.135*		**2.92**	*0.350*		**0.480**	*0.054*
CEC - Cation Displacement	cmol/kg	9	**20.5**	*2.03*		**18.3**	*2.60*		**26.9**	*4.50*		**11.2**	*0.885*		**3.11**	*0.375*
CEC - Estimation	cmol/kg	15	**17.8**	*2.10*		**19.0**	*1.44*		**24.0**	*1.10*		**25.0**	*2.20*		**4.30**	*0.300*
Soil Density (Scoop)	g/cc	13	**1.17**	*0.020*		**1.20**	*0.010*		**1.08**	*0.030*		**1.42**	*0.030*		**1.46**	*0.020*
Particle Size Analysis-Hydrometer																
Sand 2000 - 50 um	%	31	**12.8**	*2.49*		**58.0**	*3.00*		**35.0**	*3.60*		**66.0**	*3.70*		**76.0**	*1.80*
Silt 50 - 2 um	%	31	**60.0**	*5.20*		**21.0**	*2.00*		**39.6**	*3.60*		**22.2**	*2.60*		**14.0**	*2.40*
Clay 2 - 0 um	%	31	**26.0**	*2.04*		**19.4**	*2.60*		**26.0**	*4.00*		**12.0**	*2.00*		**9.00**	*1.38*
Particle Size Analysis- Pipette																
Sand 2000 - 50 um	%	4	**7.00**	*1.78*		**59.7**	*1.00*		**31.3**	*0.700*		**69.0**	*1.95*		**80.0**	*1.05*
Silt 50 - 2 um	%	4	**61.8**	*2.00*		**22.2**	*1.50*		**40.8**	*3.60*		**22.0**	*2.45*		**14.5**	*1.10*
Clay 2 - 0 um	%	4	**29.2**	*1.30*		**19.6**	*1.50*		**27.0**	*3.00*		**11.4**	*1.50*		**5.94**	*1.36*
Solvita CO2	ppm	6	**73.0**	*27.1*		**91.5**	*32.4*		**126**	*37.2*		**94.8**	*29.0*		**24.0**	*5.62*

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