



2009 North American Proficiency Testing Program
2nd Quarter Report - August 20, 2009

Laboratory ID

| Soil Analysis | Units | n | Soil 2009-106 | | | Soil 2009-107 | | | Soil 2009-108 | | | Soil 2009-109 | | | Soil 2009-110 | | |
|----------------------------------|---------|----|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|
| | | | 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 | % | 25 | 27.0 | 2.58 | | 46.7 | 3.05 | | 60.1 | 5.33 | | 39.7 | 1.59 | | 53.0 | 6.00 | |
| pH - sp | Unit | 32 | 5.19 | 0.112 | | 7.39 | 0.11 | | 6.18 | 0.080 | | 7.12 | 0.120 | | 7.50 | 0.100 | |
| ECe - sp | dS/m | 33 | 1.57 | 0.140 | | 0.890 | 0.070 | | 0.310 | 0.060 | | 0.380 | 0.030 | | 1.08 | 0.120 | |
| HCO3 - sp | mmolc/L | 10 | 0.690 | 0.310 | | 4.25 | 1.20 | | 1.94 | 0.750 | | 2.43 | 0.922 | | 2.79 | 0.785 | |
| Ca - sp | mmolc/L | 26 | 8.25 | 0.755 | | 3.71 | 0.350 | | 1.76 | 0.390 | | 1.63 | 0.210 | | 8.01 | 0.610 | |
| Mg - sp | mmolc/L | 26 | 4.41 | 0.375 | | 1.36 | 0.140 | | 0.826 | 0.194 | | 1.01 | 0.115 | | 2.57 | 0.220 | |
| Na - sp | mmolc/L | 26 | 0.497 | 0.153 | | 0.305 | 0.135 | | 0.270 | 0.100 | | 0.675 | 0.125 | | 0.391 | 0.121 | |
| SAR - sp | value | 24 | 0.200 | 0.050 | | 0.190 | 0.085 | | 0.215 | 0.070 | | 0.590 | 0.090 | | 0.175 | 0.045 | |
| Cl - sp | mmolc/L | 17 | 3.08 | 0.390 | | 0.390 | 0.050 | | 0.300 | 0.036 | | 0.635 | 0.155 | | 0.390 | 0.060 | |
| SO4 - sp | mmolc/L | 17 | 0.710 | 0.060 | | 1.43 | 0.160 | | 0.360 | 0.037 | | 0.392 | 0.041 | | 0.430 | 0.085 | |
| NO ₃ - sp | mmolc/L | 12 | 10.9 | 0.37 | | 0.050 | 0.031 | | 0.030 | 0.030 | | 0.120 | 0.120 | | 6.66 | 1.005 | |
| B - sp | mg/L | 10 | 0.095 | 0.030 | | 0.074 | 0.019 | | 0.065 | 0.015 | | 0.158 | 0.020 | | 0.073 | 0.025 | |
| Soil pH & EC | | | | | | | | | | | | | | | | | |
| Soil EC (1:1) | (dS/m) | 26 | 0.370 | 0.070 | | 0.340 | 0.060 | | 0.120 | 0.030 | | 0.150 | 0.029 | | 0.720 | 0.093 | |
| Soil EC (1:2) | (dS/m) | 45 | 0.287 | 0.032 | | 0.260 | 0.050 | | 0.083 | 0.013 | | 0.092 | 0.012 | | 0.407 | 0.067 | |
| pH (1:1) Water | Unit | 75 | 5.34 | 0.060 | | 7.60 | 0.080 | | 6.35 | 0.050 | | 7.36 | 0.090 | | 7.75 | 0.110 | |
| pH (1:2) Water | Unit | 23 | 5.40 | 0.090 | | 7.70 | 0.060 | | 6.40 | 0.100 | | 7.46 | 0.060 | | 7.86 | 0.130 | |
| pH (1:1) 0.01M CaCl ₂ | Unit | 23 | 5.01 | 0.040 | | 7.17 | 0.030 | | 5.70 | 0.050 | | 6.75 | 0.050 | | 7.50 | 0.100 | |
| pH (1:2) 0.01M CaCl ₂ | Unit | 11 | 5.00 | 0.040 | | 7.09 | 0.073 | | 5.66 | 0.060 | | 6.61 | 0.060 | | 7.46 | 0.136 | |
| Buffer pH, Lime Req. | | | | | | | | | | | | | | | | | |
| SMP Buffer pH | Unit | 47 | 6.65 | 0.060 | | 7.24 | 0.040 | | 6.60 | 0.100 | | 7.35 | 0.050 | | 7.47 | 0.030 | |
| Adams-Evans Buf pH | Unit | 9 | 7.54 | 0.080 | | 7.75 | 0.045 | | 7.43 | 0.030 | | 7.82 | 0.040 | | 7.64 | 0.045 | |
| Woodruff Buf. pH | Unit | 26 | 6.51 | 0.070 | | 7.04 | 0.040 | | 6.52 | 0.080 | | 6.98 | 0.040 | | 7.12 | 0.050 | |
| Mehlich Buffer pH | Unit | 8 | 6.17 | 0.095 | | 6.77 | 0.060 | | 6.09 | 0.060 | | 6.53 | 0.020 | | 6.83 | 0.070 | |
| Sikora Buffer pH | | 16 | 6.68 | 0.080 | | 7.30 | 0.050 | | 6.63 | 0.070 | | 7.32 | 0.060 | | 7.40 | 0.020 | |
| Titrateable Acidity | cmol/kg | 1 | | | | | | | | | | | | | | | |

1 - Values flagged exceed Warning Limits " * " 2.5x MAD (Median Absolute Deviation) and Control Limits " * * " 4 x MAD. "<" and "ND" values not recorded.

2 - Limits not compared to lab data for methods with < 7 labs reporting



2009 North American Proficiency Testing Program 2nd Quarter Report - August 20, 2009

Laboratory ID

| Soil Analysis | Units | n | Soil 2009-106 | | | Soil 2009-107 | | | Soil 2009-108 | | | Soil 2009-109 | | | Soil 2009-110 | | |
|---|-------|----|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|
| | | | 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} |
| Inorganic Nitrogen (NO3-N & NH4-N) | | | | | | | | | | | | | | | | | |
| NO3-N Cd. Rd. | mg/kg | 53 | 46.5 | 2.80 | | 19.2 | 1.35 | | 1.60 | 0.400 | | 4.40 | 0.600 | | 62.8 | 3.80 | |
| NO3-N ISE | mg/kg | 15 | 45.0 | 6.10 | | 17.9 | 4.21 | | 2.40 | 0.640 | | 5.00 | 0.900 | | 64.5 | 7.40 | |
| NO3-N CTA | mg/kg | 4 | 45.0 | 2.00 | | 19.5 | 1.40 | | 4.10 | 0.650 | | 4.65 | 0.750 | | 61.2 | 5.15 | |
| NO3-N Ion Chr. | mg/kg | 0 | | | | | | | | | | | | | | | |
| NO3-N Other _____ | mg/kg | 11 | 47.1 | 2.31 | | 20.0 | 1.00 | | 2.33 | 0.804 | | 4.71 | 0.300 | | 64.9 | 4.61 | |
| NH4 - N (KCl Extr.) | mg/kg | 44 | 12.0 | 0.91 | | 150 | 14.4 | | 7.30 | 0.500 | | 2.17 | 0.490 | | 2.62 | 0.51 | |
| Phosphorus and Sulfur | | | | | | | | | | | | | | | | | |
| PO4-P Bray P (1:10) | mg/kg | 47 | 158 | 15.0 | | 271 | 26.0 | | 70.0 | 5.00 | | 34.0 | 3.08 | | 2.67 | 1.67 | |
| PO4-P Bray P1 (1:7) | mg/kg | 6 | 132 | 16.0 | | 187 | 10.4 | | 56.0 | 3.49 | | 28.0 | 1.12 | | 3.00 | 1.41 | |
| PO4-P Olsen/Bicarb | mg/kg | 49 | 48.4 | 4.58 | | 133 | 18.0 | | 40.7 | 3.73 | | 14.5 | 1.47 | | 8.00 | 1.00 | |
| PO4-P AB-DTPA | mg/kg | 1 | 53.9 | 0.00 | | 149 | 0.00 | | 36.9 | 0.00 | | 7.86 | 0.00 | | 3.13 | 0.00 | |
| PO4-P Modified Morgan | mg/kg | 3 | 7.60 | 0.700 | | 98.2 | 15.3 | | 8.70 | 1.70 | | 16.3 | 1.70 | | 7.90 | 3.70 | |
| PO4-P True Morgan | mg/kg | 5 | 8.40 | 0.270 | | 117 | 9.1 | | 12.2 | 0.80 | | 16.4 | 1.10 | | 10.0 | 0.40 | |
| PO4-P Mod. Kewlona | mg/kg | 3 | 96.1 | 6.40 | | 252 | 17.0 | | 58.3 | 3.00 | | 24.6 | 1.14 | | 14.3 | 3.20 | |
| PO4-P Stong Bray (1:10) | mg/kg | 8 | 210 | 17.5 | | 778 | 179 | | 114 | 7.8 | | 223 | 41.2 | | 103 | 27.5 | |
| PO4-P Water Soluble | mg/kg | 5 | 5.18 | 1.62 | | 29.3 | 6.90 | | 10.9 | 3.9 | | 7.88 | 2.02 | | 4.52 | 0.52 | |
| SO4 - S (PO4 Extr.) | mg/kg | 35 | 8.50 | 2.55 | | 11.9 | 2.80 | | 4.00 | 1.10 | | 3.90 | 1.20 | | 6.00 | 2.00 | |
| Bases | | | | | | | | | | | | | | | | | |
| K Ammonium Acetate | mg/kg | 73 | 115 | 10.0 | | 537 | 40.0 | | 377 | 49.2 | | 607 | 40.0 | | 616 | 36.5 | |
| Ca Ammonium Acetate | mg/kg | 69 | 608 | 78.5 | | 2036 | 194 | | 2284 | 272 | | 1347 | 84.5 | | 5833 | 781 | |
| Mg Ammonium Acetate | mg/kg | 69 | 99.0 | 9.90 | | 236 | 19.5 | | 298 | 42.6 | | 321 | 17.9 | | 619 | 37.8 | |
| Na Ammonium Acetate | mg/kg | 52 | 15.2 | 7.94 | | 13.1 | 6.15 | | 14.9 | 5.66 | | 25.0 | 5.30 | | 23.5 | 7.45 | |
| Bray Extractable K | mg/kg | 4 | 125 | 6.1 | | 424 | 26.8 | | 285 | 46.1 | | 578 | 41.8 | | 352 | 28.5 | |
| K- Olsen/Bicarb. | mg/kg | 6 | 116 | 20.0 | | 485 | 21.5 | | 390 | 15.6 | | 510 | 38.0 | | 341 | 55.0 | |
| K Modified Morgan | mg/kg | 3 | 103 | 2.2 | | 580 | 78.8 | | 459 | 116 | | 577 | 24.2 | | 559 | 39.0 | |
| K True Morgan | mg/kg | 5 | 84.6 | 15.6 | | 481 | 8.0 | | 341 | 27.0 | | 470 | 21.0 | | 222 | 12.0 | |
| Ca Modified Morgan | mg/kg | 4 | 507 | 39.3 | | 2803 | 101 | | 2303 | 316 | | 1231 | 42.2 | | 21358 | 8684 | |
| Aluminum KCL Extr. | mg/kg | 3 | 2.00 | 1.17 | | 1.46 | 0.457 | | 2.00 | 0.000 | | 1.00 | 0.000 | | 1.00 | 0.000 | |

1 - Values flagged exceed Warning Limits " * " 2.5x MAD (Median Absolute Deviation) and Control Limits " * * " 4 x MAD. "<" and "ND" values not recorded.

2 - Limits not compared to lab data for methods with < 7 labs reporting



2009 North American Proficiency Testing Program 2nd Quarter Report - August 20, 2009

Laboratory ID

| Soil Analysis | Units | n | Soil 2009-106 | | | Soil 2009-107 | | | Soil 2009-108 | | | Soil 2009-109 | | | Soil 2009-110 | | |
|--|-------------------|----|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|
| | | | 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} |
| Mehlich-1 Multi Element (scoop) | | | | | | | | | | | | | | | | | |
| Scoop Soil Mass | g | 7 | 5.00 | 0.00 | | 5.00 | 0.00 | | 5.00 | 0.00 | | 5.00 | 0.00 | | 5.00 | 0.00 | |
| P | mg/kg | 7 | 66.2 | 6.90 | | 343 | 42.9 | | 34.2 | 2.16 | | 203 | 19.8 | | 10.7 | 1.57 | |
| K | mg/kg | 7 | 93.2 | 5.46 | | 424 | 39.7 | | 279 | 41.4 | | 446 | 48.2 | | 139 | 12.1 | |
| Ca | mg/kg | 7 | 670 | 52.3 | | 3591 | 272 | | 2707 | 443 | | 1642 | 139 | | 5004 | 506 | |
| Mg | mg/kg | 7 | 103 | 5.8 | | 315 | 16.4 | | 354 | 47.5 | | 344 | 24.2 | | 415 | 18.9 | |
| Mn | mg/kg | 6 | 78.6 | 5.80 | | 327 | 22.9 | | 69.9 | 9.89 | | 22.8 | 2.46 | | 1.32 | 0.194 | |
| Zn | mg/kg | 6 | 4.86 | 0.593 | | 18.9 | 2.12 | | 6.29 | 0.430 | | 4.15 | 0.365 | | 0.105 | 0.071 | |
| Mehlich-3 Multi-Element (scoop) | | | | | | | | | | | | | | | | | |
| Scoop Soil Mass | g | 26 | 2.42 | 0.150 | | 2.00 | 0.151 | | 1.68 | 0.227 | | 2.18 | 0.170 | | 2.07 | 0.110 | |
| Assumed Density | g/cm ³ | 12 | 1.18 | 0.004 | | 1.18 | 0.015 | | 1.18 | 0.090 | | 1.18 | 0.070 | | 1.18 | 0.048 | |
| Volume of Scoop | cm ³ | 27 | 2.00 | 0.300 | | 2.00 | 0.300 | | 2.00 | 0.300 | | 2.00 | 0.300 | | 2.00 | 0.300 | |
| Extractant Volume mL | mL | 31 | 20.0 | 0.00 | | 20.0 | 0.00 | | 20.0 | 0.00 | | 20.0 | 0.00 | | 20.0 | 0.00 | |
| P Colorimetric | mg/kg | 18 | 172 | 14.0 | | 462 | 61.5 | | 75.4 | 3.22 | | 54.3 | 4.45 | | 29.7 | 1.60 | |
| P ICP-AES | mg/kg | 42 | 192 | 14.8 | | 489 | 20.1 | | 84.0 | 7.70 | | 58.5 | 4.50 | | 30.4 | 2.65 | |
| K | mg/kg | 46 | 124 | 13.5 | | 563 | 31.5 | | 389 | 36.7 | | 639 | 37.2 | | 644 | 49.5 | |
| Ca | mg/kg | 44 | 704 | 74.0 | | 2986 | 167 | | 2462 | 247 | | 1489 | 131 | | 9345 | 888 | |
| Mg | mg/kg | 44 | 112 | 12.4 | | 308 | 16.0 | | 323 | 31.5 | | 380 | 23.0 | | 754 | 41.0 | |
| Na | mg/kg | 34 | 16.3 | 6.75 | | 18.6 | 9.22 | | 15.7 | 7.30 | | 27.5 | 8.60 | | 25.7 | 7.93 | |
| S | mg/kg | 35 | 20.1 | 5.42 | | 24.9 | 3.70 | | 8.20 | 2.20 | | 7.64 | 1.84 | | 17.4 | 3.58 | |
| Al | mg/kg | 25 | 1017 | 78.1 | | 962 | 58.0 | | 845 | 58.3 | | 477 | 19.0 | | 235 | 42.0 | |
| Zn | mg/kg | 39 | 6.29 | 0.420 | | 25.4 | 1.26 | | 7.93 | 0.785 | | 5.15 | 0.350 | | 2.36 | 0.234 | |
| Mn | mg/kg | 39 | 125 | 12.7 | | 504 | 34.0 | | 90.0 | 13.2 | | 47.0 | 4.10 | | 155 | 24.0 | |
| Fe | mg/kg | 36 | 305 | 51.4 | | 153 | 17.8 | | 289 | 33.6 | | 127 | 12.1 | | 55.4 | 6.85 | |
| Cu | mg/kg | 40 | 3.92 | 0.351 | | 10.7 | 0.59 | | 1.81 | 0.215 | | 2.50 | 0.292 | | 3.50 | 0.315 | |
| B | mg/kg | 32 | 0.400 | 0.200 | | 1.35 | 0.210 | | 0.600 | 0.208 | | 0.728 | 0.148 | | 1.54 | 0.195 | |

1 - Values flagged exceed Warning Limits " * " 2.5x MAD (Median Absolute Deviation) and Control Limits " ** " 4 x MAD. "<" and "ND" values not recorded.

2 - Limits not compared to lab data for methods with < 7 labs reporting



2009 North American Proficiency Testing Program 2nd Quarter Report - August 20, 2009

Laboratory ID

| Soil Analysis | Units | n | Soil 2009-106 | | | Soil 2009-107 | | | Soil 2009-108 | | | Soil 2009-109 | | | Soil 2009-110 | | |
|-------------------------------|---------|----|---------------|--------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|---------------|-------|--------------------|
| | | | 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} |
| Micronutrients | | | | | | | | | | | | | | | | | |
| Zn - DTPA | mg/kg | 66 | 3.49 | 0.330 | | 8.93 | 0.779 | | 5.53 | 0.860 | | 2.44 | 0.162 | | 1.03 | 0.082 | |
| Mn - DTPA | mg/kg | 50 | 60.4 | 6.43 | | 159 | 15.9 | | 45.1 | 6.43 | | 5.47 | 0.815 | | 9.19 | 1.55 | |
| Fe - DTPA | mg/kg | 53 | 50.5 | 8.68 | | 38.0 | 4.45 | | 99.0 | 16.2 | | 15.6 | 2.08 | | 9.28 | 1.17 | |
| Cu - DTPA | mg/kg | 52 | 1.85 | 0.168 | | 6.21 | 0.690 | | 1.32 | 0.148 | | 1.16 | 0.109 | | 1.50 | 0.130 | |
| | | | | | | | | | | | | | | | | | |
| Zn - HCl | mg/kg | 5 | 4.73 | 0.400 | | 28.2 | 2.06 | | 8.02 | 1.22 | | 5.92 | 0.580 | | 0.120 | 0.060 | |
| Mn-H3PO4 | mg/kg | 10 | 66.8 | 2.67 | | 299 | 16.6 | | 46.2 | 6.58 | | 10.8 | 1.01 | | 2.07 | 0.650 | |
| | | | | | | | | | | | | | | | | | |
| Cl - Ca(NO3)2 Extr. | mg/kg | 17 | 33.5 | 4.50 | | 4.70 | 1.22 | | 4.00 | 0.800 | | 5.78 | 1.01 | | 6.00 | 1.15 | |
| B - Hot Wat. | mg/kg | 36 | 0.240 | 0.045 | | 0.750 | 0.230 | | 0.560 | 0.130 | | 0.570 | 0.120 | | 0.610 | 0.260 | |
| B-DTPA/Sorbitol | mg/kg | 11 | 0.200 | 0.090 | | 0.510 | 0.120 | | 0.269 | 0.073 | | 0.348 | 0.072 | | 0.860 | 0.070 | |
| Soil Organic Matter | | | | | | | | | | | | | | | | | |
| Soil Kjeldahl N | % | 14 | 0.099 | 0.005 | | 0.221 | 0.015 | | 0.231 | 0.017 | | 0.071 | 0.004 | | 0.166 | 0.007 | |
| Soil TN (combustion) | % | 35 | 0.107 | 0.006 | | 0.240 | 0.010 | | 0.254 | 0.014 | | 0.079 | 0.007 | | 0.182 | 0.012 | |
| Soil TOC (Combustion) | % | 12 | 1.18 | 0.058 | | 2.32 | 0.105 | | 4.02 | 0.160 | | 0.705 | 0.040 | | 1.80 | 0.615 | |
| Soil Total C (Combustion) | % | 24 | 1.21 | 0.061 | | 2.43 | 0.097 | | 4.07 | 0.208 | | 0.714 | 0.025 | | 2.93 | 0.117 | |
| SOM - Walkley-Black | % | 30 | 2.22 | 0.185 | | 3.65 | 0.275 | | 6.28 | 0.680 | | 1.34 | 0.090 | | 2.62 | 0.200 | |
| SOM - LOI (% Wt loss) | % | 63 | 2.24 | 0.0870 | | 4.94 | 0.240 | | 7.13 | 0.285 | | 1.73 | 0.130 | | 3.50 | 0.260 | |
| | | | | | | | | | | | | | | | | | |
| CaCO3 Content | % | 13 | 0.170 | 0.160 | | 0.987 | 0.437 | | 0.380 | 0.310 | | 0.410 | 0.260 | | 11.1 | 1.25 | |
| | | | | | | | | | | | | | | | | | |
| CEC - Cation Displacement | cmol/kg | 18 | 7.22 | 0.815 | | 15.7 | 1.45 | | 23.9 | 1.87 | | 11.8 | 1.05 | | 27.2 | 3.34 | |
| CEC - Estimation | cmol/kg | 12 | 8.60 | 1.44 | | 14.6 | 1.56 | | 16.9 | 2.59 | | 11.8 | 1.06 | | 40.3 | 5.14 | |
| | | | | | | | | | | | | | | | | | |
| Soil Density (Scoop) | g/cc | 11 | 1.36 | 0.051 | | 1.08 | 0.033 | | 0.859 | 0.037 | | 1.21 | 0.068 | | 1.17 | 0.039 | |
| Particle Size Analysis | | | | | | | | | | | | | | | | | |
| Sand 2000 - 50 um | % | 39 | 67.0 | 2.68 | | 21.0 | 4.00 | | 22.0 | 5.00 | | 56.5 | 4.25 | | 10.0 | 5.00 | |
| Silt 50 - 2 um | % | 39 | 24.8 | 2.70 | | 53.9 | 4.10 | | 61.0 | 7.00 | | 36.8 | 4.75 | | 41.1 | 6.92 | |
| Clay 2 - 0 um | % | 38 | 8.5 | 1.90 | | 22.5 | 4.10 | | 17.3 | 3.55 | | 6.1 | 1.56 | | 48.0 | 6.00 | |

1 - Values flagged exceed Warning Limits " * " 2.5x MAD (Median Absolute Deviation) and Control Limits " ** " 4 x MAD. "<" and "ND" values not recorded.

2 - Limits not compared to lab data for methods with < 7 labs reporting