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Transitioning to the Loss on Ignition Method of Determining Organic Matter.

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INTRODUCTION

As of August 9, 2011 A&L Analytical Laboratories, Inc. will transition to the *Loss On Ignition* (LOI) method of determining soil organic matter for routine analyses. This change is imperative due to the mounting regulatory issues concerning the handling and disposal of Walkley-Black (WB) method reagents which can have potentially hazardous environmental and human health effects. Compared to WB, LOI typically produces slightly higher results on soils low in organic matter and is able to determine higher levels of organic matter in organic soils.

WB vs. LOI

LOI, otherwise known as organic matter by combustion, differs from the previously utilized modified WB method in that LOI is a gravimetric method (determines OM by a change of weight in the sample) versus the colorimetric (change in color) of the latter. While both methods are widely accepted, LOI will produce a different and higher OM percentage for the exact same soil sample (see Tables 1 and 2). There are several reasons for this. WB is only adequate for measuring low organic matter levels of mineral soil. Whereas LOI is capable of determining both the high OM levels typical in organic soils and the low OM levels in mineral soils. WB measures oxidized forms of carbon (i.e. carbon in organic matter that is in a highly decomposed state) versus LOI that will measure the loss of the sum of decomposed and undecomposed organic matter. LOI will therefore produce slightly higher results on low OM mineral soils and will be capable of more accurately determining the higher OM percentages in organic soils.

LOI results are also affected by other factors. Soils that contain high levels of carbonates and bicarbonates, such as calcareous soils, and soils with highly weathered clay mineralogy containing trapped moisture within the interlayer spaces will show slightly to highly exaggerated percentages of OM depending on the proportion of those minerals. These samples, in actuality, contain lower levels of OM, however during the process of heating the sample, bicarbonates and carbonates are lost as CO2 and moisture is lost as water, thus increasing the OM percentage.

Conclusion

LOI is a widely accepted method of measuring OM. Currently, the majority of agricultural laboratories participating in the Agricultural Laboratory Proficiency Program (ALP) and the North American Proficiency Testing Program (NAPT) perform LOI as their default method. Due to the environmental and human health concerns of the WB method more laboratories are transitioning to the LOI method. A&L Analytical Laboratories, Inc. will still be able to perform the WB method; however this will be performed solely on a per request basis, and will incur an additional charge for environmental waste handling.

Table 1. Agricultural Laboratory Proficiency Program 2011 Round #14				
Std. Ref. Soil	Species/Texture/Location	pH	LOI %	WB %
1101	Harrington, PEI, Canada Fine sandy loam	4.90	3.75	3.21
1102	Cass Cty, MI, USA Kalamazoo loam	6.27	0.87	0.73
1103	Lebanon Cty, TN, USA Bradyville silt loam	6.43	1.80	1.84
1104	Webster Cty, IA, USA Webster silty clay loam	7.43	4.13	2.56
1105	Merced Cty, CA, USA Atwater loamy sand	7.78	2.01	1.69

Table 2. North American Proficiency Testing Program 4th Quarter 2010				
Std. Ref. Soil	Species/Texture/Location	pH	LOI %	WB %
116	Fresno Cty, CA, USA Ciervo clay	8.1	1.7	0.8
117	Harris Cty, TX, USA Hockley fine sandy loam	6.24	2.40	2.44
118	Centre Cty, PA, USA Hagerstown silt loam	7.03	6.140	4.740
119	Wellsville, UT, USA Greenson loam	7.62	2.76	2.27
120	Kankakee Cty, IL, USA Ade loam	5.29	3.34	3.2