

Standard Test Method for Organic Matter Content of Putting Green and Sports Turf Root Zone Mixes

1. Scope

1.1 This test method covers the determination of the percent organic matter of a putting green root zone mixture using the loss on ignition or the Walkley-Black methods. These test methods are useful for quantifying the organic matter content of volume ratio mixed root zone mixes.

1.2 *This standard does not address the safety problems that may be associated with its use, nor the disposal of hazardous waste that may be generated. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 Methods of Soil Analysis, Part 2. Chemical and Microbiological Properties. Agronomy Monograph No. 9, Second Edition.

2.2 ASTM Standard D 2974-87 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

3. Summary of Methods

3.1 *Method A* — Organic matter content is determined by loss on ignition.

3.2 *Method B* — Organic matter content is determined by the Walkley-Black method; a dichromate oxidation procedure whereby the color intensity of the reaction product is determined colorimetrically.

4. Apparatus — Method A

4.1 *Oven*, capable of maintaining a constant temperature of 105°C.

4.2 *Muffle furnace*, capable of producing constant temperatures of 440°C.

4.3 *Evaporating dish or crucible*, made of high silica or porcelain of not less than 10 mL capacity.

4.4 *Desiccator*

4.5 *Aluminum foil*, heavy duty.

4.6 *Balance*, sensitive to 0.01 g.

5. Apparatus — Method B

5.1 *Soil Grinder*

5.2 *Balance*, sensitive to 0.01 g.

5.3 *Sulfuric acid*, concentrated (not less than 96%).

5.4 *Potassium dichromate*, 1N, made by dissolving 49.04 reagent-grade potassium dichromate in water, and diluting to a volume of 1L.

5.5 *Spectrophotometer or colorimeter*, set at or adjustable to 610 nm wavelength.

5.6 *Standard*, 10,000 mg/L as CO₂

5.7 *Pipets*, assorted, capable of measuring volumes of 0.1 to 10 mL.

5.8 *Glassware*, assorted, to include 250 mL erlenmeyer flasks and funnels (75 mm ID).

5.9 *Oven*, capable of maintaining a constant temperature of 105°C.

6. METHOD A: Procedure

6.1 Weigh a crucible or porcelain dish to the nearest 0.01 g and record the weight.

6.2 Place about 50 grams of oven-dried root zone mix into the crucible and weigh to the nearest 0.01 g.

6.3 Place the sample into a muffle furnace and gradually bring the temperature up to 440°C. Leave the sample in the furnace for at least 12 hours.

6.4 Remove the sample from the oven, cover with aluminum foil, and cool it in a desiccator. Remove the foil and determine and record the mass.

7. Calculation of percent organic matter, Method A.

7.1 Calculate percent organic matter as follows:

$$\text{Organic Matter \%} = \frac{(W_s - W_c) - (W_a - W_c)}{(W_s - W_c)}$$

where:

W_s = weight of crucible with oven dried sample (g)

W_c = weight of crucible (g)

W_a = weight of crucible with ashed sample (g)

8. METHOD B

8.1 Preparing a Standard Curve

8.1.1 Set up five 250 mL erlenmeyer flasks

8.1.2 Use a pipet to pipet the volumes of standard solution into the flasks, as listed below.

mL of 10,000 mg/L CO ₂	% organic matter
0	0
0.20	0.9
0.50	2.2
1.00	4.4
1.20	5.3

8.1.3 Pipet 10 mL of potassium dichromate into each flask.

8.1.4 In a well ventilated area, pipet or dispense 20 mL sulfuric acid into each flask.

8.1.5 Cover the flask and allow the reaction to progress for 10 minutes.

8.1.6 Add 100 mL of distilled or deionized water to each flask, swirl briskly.

8.1.7 Read the absorbance for each standard at 610 nm and plot a standard curve.

8.2 Procedures

8.2.1 Obtain a representative, oven dried root zone sample.

8.2.2 Grind a small quantity of sample until 100% passes a 140 sieve (0.1 mm).

8.2.3 Weigh out exactly 1 g of sample (to the nearest 0.01 g), and place in a 250 mL erlenmeyer flask.

8.2.4 Add 10 mL potassium dichromate.

8.2.5 Make up a blank sample by adding potassium dichromate into an empty flask.

8.2.6 Carefully add 20 mL sulfuric acid to both flasks. Be careful of the fumes and the heat generated by the reaction. Allow to sit for 10 minutes.

8.2.7 Add 100 mL of distilled or deionized water to the flasks.

8.2.8 Set up a funnel with No. 2 or similar filter paper. Pour enough of the solution through the funnel to collect about 10 mL.

8.2.9 Read the absorbance of the sample at 610 nm. Refer to the standard curve to obtain percent organic matter.