

## Field Method to Estimate Soil Organic Matter Level

**Purpose:** To determine if the organic matter levels in soil are high, medium or low. Organic matter is important in the soil to improve soil structure, nutrient holding capacity, water holding capacity, and infiltration. Frequent tillage and removal of crop material lowers soil organic matter levels. Fertility amendments such as animal manure, compost, and green manure cover crops increase the organic matter level.

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### **Tools:**

- 0.5 g scoop from the LaMotte soil testing kit
- Test tubes and caps from the LaMotte (or other) soil testing kit
- Filter papers, funnel, and jar
- Small glass vials or tubes
- Set of standard organic matter extraction solutions.
- Extracting solution. For this you will need a scale accurate to 0.1 gram, three 1 liter glass containers with screw on caps, graduated cylinder accurate to 1 ml, dry (granules or crystals) of sodium hydroxide and EDTA disodium salt. These can be obtained from your local chemistry dept. or supply center.

To mix the extraction solution, weigh out and mix 10 g of sodium hydroxide (NaOH 0.25 M) with one liter of water. Please either wear plastic gloves and eye protection, or use extreme caution when mixing these solutions. Sodium hydroxide is a strong base which could cause minor burns on skin. Let stand until mixture is cool, and the crystals have dissolved. This will take a few hours. In a second one liter bottle mix 18.6 grams of EDTA disodium salt (Na<sub>2</sub>EDTA 0.05 M) with one liter of water. Mix well, and allow several hours to dissolve. In the third 1 liter bottle, mix 500 ml of the sodium hydroxide solution with 500 ml of the EDTA solution. This is the extraction solution to used in the following procedure.

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### **Procedure:**

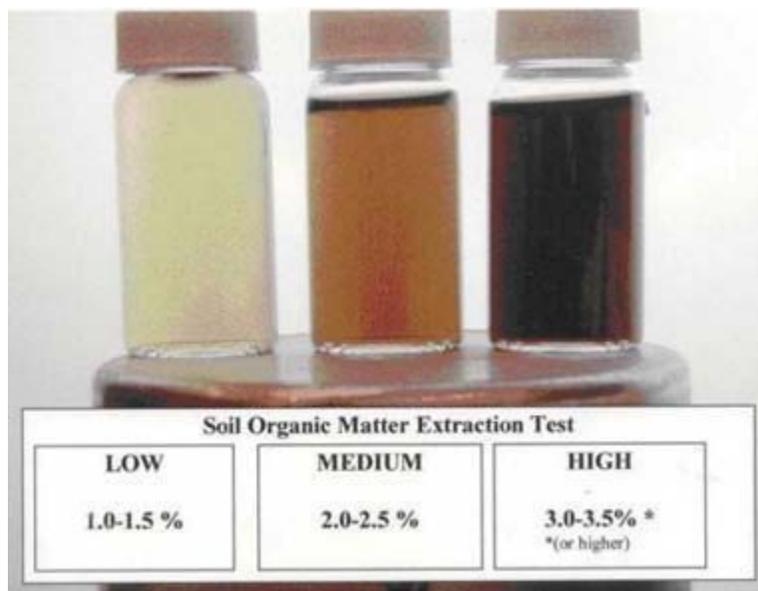
(Reference: R.A. Bowman, USDA-ARS, Akron, CO, Conservation Tillage Fact Sheet #5-97)

This method is more qualitative than quantitative, and should mainly be used to establish which fields may be in the "adequate" range, and which may need some serious soil building efforts. The texture of the soil (sandy, clay, etc) may affect the results of this test also, and lead to either an under- or overestimation of organic matter content. If one would like to document soil building over time, repeated (annual or every 2 years) soil samples should be analyzed by a commercial soil test lab.

1. Use the 0.5 g scoop from the Lamotte kit and put 1 level scoop of soil into the plastic containers with lids.
2. Use the test tubes from the Lamotte kit, and measure 20 ml of organic matter extracting solution into the plastic container with the soil. Each mark on the tube is 1 ml. Please either wear plastic gloves and eye protection, or use extreme

- caution when measuring this solution. The solution contains sodium hydroxide, a strong base, which could cause minor burns on skin.
3. Cap the container, and shake for about 30 seconds. Hold over a sink in case the cap leaks or comes off. Shake vigorously, but use caution.
  4. Fold two filter papers to fit into a funnel. Put one filter paper inside of the other one. A very clean solution is needed for this test, and we have found from experience that using only one filter paper leaves too much soil in suspension.
  5. Pour the liquid/soil suspension into the funnel with the two filter papers. Put a jar or other container under the funnel to catch the liquid. Because the soil is dispersed, it will take 30 to 60 minutes for the liquid to come through. Continue to be careful about touching the solution, and the sodium hydroxide is still capable of burning the skin, even after the soil has been extracted.
  6. After 10 ml of liquid or so is through the filter papers (it doesn't have to all have gone through), pour the liquid into one of the small glass vials. It will either be clear, or some shade of brown, but should not have soil floating in it. The color is due to organic matter that has been extracted by the strong ETDA/Sodium Hydroxide solution.
  7. Hold the vial of liquid up to a light or bright window, and compare the color to the photograph in [figure 1](#) on page 37. Rate your organic matter as low, medium, or high.

**Figure 1. Soil Organic Matter Comparison**



**Interpretation** - The soil organic matter test is only an approximation, but can still be used to give a rating.

Notes on interpretation: Ideally, for each soil type, a set of standard solutions for soils with known organic matter content would be developed. A useful range would be 1, 2, 3, 4, and 5% organic matter, and those sample vials used for comparison for field tests. This is not practical for most farms, and so a generalized guide is being used. Also, we have found that at the upper end of the organic matter scale, this test does not distinguish between soil that is 3% organic matter, and compost amended samples that are 5%, 10%, or even higher. Also, an occasional sample will not follow the pattern, so once an initial assessment is conducted, we recommend further testing using commercial labs.

<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
The soil organic matter is apparently "high" according to the chart.	The soil organic matter content appears to be "medium high."	The soil organic matter is "medium."	The soil organic matter is "low."