ANALYSIS REPORT FOR COMPOST 11/04/11

SOIL AND PLANT TISSUE TESTING LABORATORY
WEST EXPERIMENT STATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

Lab Number: C111024-105
Bag Number: 103808

SAMPLE INFORMATION

JEREMY MARIN
[redacted]

COMPOSTING METHOD: BIN-27
AGE: ~5 MONTHS
INTENDED USE: VEGETABLE GARDEN
COMPONENTS: COFFEE GROUNDS, SHREDDED NEWSPAPER

COMPOST ANALYSIS REPORT

SAMPLE ID: COMPOST

Moisture As Received: 70.9 %
Moist Bulk Density: 0.47 grams/cm3 (0.39 tons/yd3)
Coarse Fragments: 56.4

pH (v:v): 6.9
Soluble Salts (Elec. Cond.): 1.79 dS/M

Total Nitrogen: 3.48 % (7.9 lbs/yd3)
Nitrate-N: 5 mg/kg (0.00 lbs/yd3)
Ammonium-N: 5 mg/kg (0.00 lbs/yd3)

Organic Matter: 75.1 %
Estimated Organic Carbon: 40.6 %
Carbon/Nitrogen Ratio: 11.7

NUTRIENT RATING

NUTRIENT LEVELS:		PPM	LOW MEDIUM HIGH VERY HIGH
Phosphorus	(P)	503	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Potassium	(K)	6331	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Calcium	(Ca)	7345	xxxxxxxxxxx
Magnesium	(Mg)	1569	xxxxxxxxxxxxxxxxxx

EQUIVALENT BASE CATION PERCENTAGES
Ca =55.9 Mg =19.6 K =24.7

POTENTIAL ACIDITY
1.5 lbs CaCO3/yd3

EXTRACTABLE MICRONUTRIENTS

MICRONUTRIENT		mg/kg	COMPOST RANGE
Boron	(B)	2.9	(0.5-20)
Manganese	(Mn)	8.6	(5-200)
Zinc	(Zn)	4.3	(5-50)
Copper	(Cu)	1.9	(0.5-5)
Iron	(Fe)	2.8	(5-200)

EXTRACTABLE HEAVY METALS

METAL		mg/kg	COMPOST RANGE
Lead	(Pb)	2.2	(0-25)
Cadmium	(Cd)	0.1	(0-1.0)
Nickel	(Ni)	0.1	(0-2.5)
Chromium	(Cr)	0.1	(0-2.5)

Consult enclosed interpretation sheet. Questions may be directed to either Frank Mangan (Extension Specialist) at (508) 254-3331 or the UMass Soil Lab at (413)545-2311

[redacted]

Soil and Plant Tissue
Testing Laboratory
West Experiment Station
University of Massachusetts
Amherst, MA 01003-8010

413-545-2311
413-545-1931 fax
http://www.umass.edu/plsoils/soiltest

COMPOST
Interpretation of Test Results

The results of this test are meant to help evaluate a compost's quality as an agronomic or horticultural resource. Although several additional tests are possible to characterize compost, they can be expensive and the additional information obtained can sometimes be inferred by careful monitoring of the materials during the composting process.

pH - The pH of finished compost should be near neutral (7.0). Values below 6 and above 8 may indicate a problem with the starting materials, the composting process, or both.

Electrical Conductivity (Soluble Salts) - Electrical Conductivity (EC) is a measure of dissolved salts present in the compost after mixing one part dry compost with two parts water. Since dissolved salts conduct electricity they are expressed in terms of the electrical conductivity of the filtered mixture. Acceptable levels are determined on the basis of the intended use of the compost. EC values below 2.0 can be considered save for most all applications. Composts with values higher than 5.0 should only be used as soil amendments.

Coarse Fragments - The coarse fragments of a compost is that percentage of the compost (dry weight basis) that is larger than 2 mm. All chemical tests reported are performed on material less than 2 mm. The results of samples having more than 20 % coarse fragments should probably be adjusted. Coarse fragments may include wood chips, roots, gravel, glass, or plastic. They may be natural constituents of the starting materials, organic additives used as bulking agents (to maintain aeration during composting), or undesirable foreign matter.

Moisture Content - A compost's moisture content, as received, has limited significance. It is assumed that this moisture condition is typical for the material, as it exists in the pile when the compost is ready for use. Optimal moisture contents may be better defined if the total water holding capacity (WHC) of a compost is known. Materials containing moisture contents less than 40% of WHC may indicate that inadequate moisture was present in the pile to finish the composting process. At moisture contents greater than 80% of WHC insufficient oxygen may have been available to finish the process. The WHC of a compost will be a function of its percentages of coarse fragments and organic matter, and the degree of breakdown of the starting materials.

Bulk Density - The determination of bulk density allows a conversion of nutrient data to a volume basis (the form in which the compost is handled). The compost (as received) is transferred into a wide mouth volumetric cylinder. It is then shaken gently and tapped lightly to a level surface. It's volume and mass are obtained. It is then dried and weighed again. The mass per unit volume (g/cm3 or lbs/yd3) both moist and dry can then be determined.

Organic Matter and Estimated Organic Carbon - Organic matter (OM) is determined by loss on ignition at 450 degrees C. Organic carbon (OC) is estimated by multiplying the OM percentage by 0.54. This conversion factor was obtained from UMass Soil Lab data and agrees well with other values reported in the compost literature. The amount of OM in a compost sample will depend on the nature of the starting materials and the degree of decomposition. Most finished composts tested by this laboratory have 25-40 % OM (13-22% OC). There is no ideal organic matter content for finished compost. If all factors related to the biochemical breakdown of raw substrates are ideal, a final organic matter percentage near 30% by weight is common. The remaining 70% is mineral matter and ash.

Total Nitrogen - Compost can be a significant source of nitrogen (N). Measuring the total N content and the current levels of nitrate-N and ammonium-N of a compost is straightforward. Evaluating the "availability" of that N to a growing crop is more difficult.

Most composts contain about 1% total N on a dry weight basis (~7 lbs/cubic yard or ~20 lbs/dry ton (~10 lbs/moist ton). This means that an application of 50 dry tons/acre would add 1000 lbs N/acre! Only a small proportion of this N will be available to the crop the first year. If the compost is finished one can usually assume that about 10% of the total N will become available during the year of application. A total N level between 0.75% and 2.5% is normal. Values below this range often indicate a high mineral content in the compost (OM less than 20%). This may indicate that it has been diluted with soil or that the composting process has proceeded to an advanced stage and that some amount of soil material was included in the original compost recipe. Starting materials low in N may also be a contributing factor. Nitrogen contents above 2.5% are most often associated with high organic matter levels (>60%), and/or nitrogen rich starting components. Evaluating other test values and knowing the compost's history and appearance will usually reveal which of these conditions exist.

C:N Ratio - The C:N ratio is the relative proportion of organic carbon (OC) to total nitrogen in the compost. A "typical" compost recipe may start with a C:N ratio of about 30 (30 parts OC to 1 part nitrogen). As composting proceeds microbes in the mixture use the carbon substrates as their main energy source, oxidizing it and releasing carbon dioxide gas. Assuming that nitrogen is conserved (not lost as a gas or leached) in a moist, well-aerated pile, the C:N ratio decreases with time. Depending on the nature of the starting materials a final ratio of 15 to 20 should indicate a finished product. As stated for total nitrogen, an evaluation of other test values and a knowledge of the compost's history and appearance can help interpret C:N ratio values

Nitrate and Ammonium Levels - Nitrate-N and Ammonium-N are the common "mineralized" forms of nitrogen in compost. One feature of composts nearing completion is the production of nitrate-N. This may be an indication that nitrogen in excess of that required to further decompose carbon substrates may be present. Levels as high as 1000 mg/kg are not uncommon. This nitrogen is readily available to plants, but leaches easily if not used. Ammonium-N levels, in well-managed composting operations, are usually low (<100 mg/kg). High levels may indicate poor aeration, excessively wet conditions, nitrogen-rich starting materials, and/or an actively decomposing mixture. High ammonium-N levels at high pH can result in gaseous losses of nitrogen. The use of such composts in large quantities can severely damage sensitive plants.

Nutrient Rating - This is a measure of available plant nutrients. Values are expressed on a weight basis in mg/kg (PPM). The bar graph rating indicates the extent to which a soil test rating might be increased by this compost if applied at a rate of 50 tons/acre (~1 ton/1000 sq feet or about a 1 inch layer) and incorporated into the top 8 inches of soil.

Equivalent Base Cation Percentages - These values express the "equivalent" percentages of Calcium, Magnesium, and Potassium in the compost extract. When mixed into soil most of these cations will be retained on the soil's exchange complex. A well-balanced compost will generally have values near: Calcium-80%; Magnesium-15%; Potassium-5%.

Extractable Micronutrients - At the present time little information is available to interpret the significance of these values. Test levels falling within the ranges listed for compost can be considered save and beneficial. Boron levels higher than the range provided should be considered suspect and limits should be imposed on the compost's use.

Extractable Heavy Metals - The levels of heavy metals extracted by Morgan's Solution are reported as a guide to the environmentally sound use of compost. Most composts present no problem in this regard. The ranges provided indicate safe levels for these metals. Higher levels should arise some suspicion regarding the compost's raw ingredients. In such cases it may be advisable to have a Total Metal Analysis performed on the compost to determine heavy metal loading rates.

Issued by UMass Extension, Robert Helgesen, Dean, in furtherance of the Acts of May 8 and June 30, 1914; USDA and Massachusetts Counties cooperating. UMass Extension offers equal opportunity in programs and employment.