GUIDELINES FOR INTERPRETING YOUR COMPOST ANALYSIS REPORT

Introduction

The following notes are intended to provide some guidelines for understanding and interpreting compost results.

The Basic Compost profile has been set up to provide useful information on the water content and the organic and mineral composition of your composts. This composition is pre-determined by the nature of the raw materials which are used to make up the compost, and by the manner in which these materials are treated during the composting process.

The definition of what makes a good compost will depend on the intended use of the compost. For example, most composts are used as soil amendments or mulches and are applied to improve the physical structure and condition of the soil. Composts are generally not directly comparable with mineral fertilisers and should not be expected to produce the same responses as the phosphate-based types typically used in New Zealand. For these reasons, and given the variable composition of compost raw materials, the definition of standard quality criteria for composts and graphical presentation of 'typical' compost results is not practical.

Note: Raw manures are not accepted by Hill Laboratories.

Results

- **Dry Matter %**

The percentage dry matter allows conversion of mineral levels reported on a “dry basis” to an “as received” basis.

Results (as received basis) = Results (dry matter basis) x (%Dry Matter /100)

- **Organic Matter**

When compost is added to soil, this organic matter provides a source of energy for soil organisms. The stable residue remaining in the soil after decomposition of organic matter by soil organisms is humus – an essential component of high fertility soils with good physical structure and water holding capacity.

The laboratory has two methods for reporting organic matter – either calculated from total carbon or measured as Loss on Ignition.

- The organic matter (*OM*) content of a compost can be measured as total carbon (*TC*) and calculated to report organic matter using the equation: *OM = tC x 1.72*

  [Note: The relationship between carbon & organic matter varies according to organic matter type and soil type if soil is present in the product. Commonly used conversion factors range from 1.65 to 2.2 (Ref 5)]
- The Loss on Ignition (*LOI*) method gives a closer measure of organic matter than the above calculated value (see note). The sample is combusted at 550°C for 2 hours and the resultant ash (inorganic matter) is weighed. The loss on ignition is therefore the organic component of the sample that has been combusted.

- **Minerals**

Minerals (elements) are reported as the total content measured in the compost on a “dry basis”, and levels typically reported range from 0.05% (500 mg/kg) to 2% (20,000 mg/kg). Where composts include inorganic components such as phosphate rock, ash or lime, levels of some elements may be higher than for composts made from organic materials such as plant wastes or manures. Results are reported as both mg/kg and % in the analysis report. To convert results from % to kg/T:

kg/T (dry weight basis) = % (Dry weight basis) x 10

While the total level does not indicate how plant-available these elements are, continued decomposition of the compost in the soil will eventually “release” most of them. The time this takes depends on many variables. A water-extractable test can estimate immediate plant-available nutrients and may be requested separately.

Table 1.**Typical concentrations of nutrients in some common waste materials (from “Practical Soil Management”, Dr. Ian Cornforth)**

Material		**Dry Matter (%)**	**Nitrogen (%)**	**Phosphorous (%)**	**Potassium (%)**
Sheep Manure		60	2.0	0.5	2.3
Cow Manure		30	0.7	0.2	0.5
Pig Manure		30	1.0	0.3	0.7
Horse Manure		50	0.7	0.15	0.4
Poultry	Cage Manure	40	1.4	1.4	0.7
	Broiler litter	75	2.5	1.5	1.3
Dairy	Shed effluent	1	0.02	0.004	0.03
	Oxidation pond slurry	5	0.08	0.014	0.07
Pig	Effluent	2	0.13	0.06	0.05
	Screened solids	25	0.6	0.3	0.1
Dairy Factory whey		1	0.14	0.05	0.15
Meat Works effluent		1	0.012	0.0013	0.01
Municipal sewage	Effluent	1	0.002	0.0007	0.001
	De-watered sludge	33	0.53	0.33	0.03

C:N Ratio

The C:N ratio is used to predict the effect that the compost is likely to have on plant available nitrogen in the soil, and as an indicator of the rate of decomposition. A C:N ratio of about 30 is considered nitrogen neutral - lower ratios will release nitrogen and act as nitrogen fertilisers and higher ratios will immobilise nitrogen as microbial breakdown of the carbon component occurs. In the long term, the nitrogen content will become ‘available’ as carbon decomposition occurs.

- **Typical C:N Ratio**

Poultry manure	7	(indicative of a fast rate of decomposition)
Bio-solids	8	
Poultry litter	10	
Cow manure	12	
Green Waste	20	
Corn Stalks	33	
Dead Leaves	60	
Straw	100	
Bark	500	
Sawdust	550	(indicative of a low rate of decomposition)

High C:N materials such as bark, sawdust or post peelings are often used as mulch due to their slow rate of decomposition when spread on to the soil surface. However, when such high C:N materials are cultivated or mixed into the soil, plant available nitrogen may be reduced in the short term.

Low C:N materials tend to have a fast rate of decomposition when applied to the soil and act as nitrogen fertilizers.

- **Heavy Metals**

The heavy metals profile reports trace metal levels that may be undesirable in organic growing systems, and also for general agricultural and horticultural production. Most composts will contain some heavy metals, but the levels are determined by what materials the compost is made from. For example, composts containing sawdust from tanalised timber may contain high levels of Arsenic, Copper and Chromium.

Maximum suggested levels:

Metal	Biosolids limits – Grade A (mg/kg Dry Weight)	Bio-Gro NZ Organic Standard for Compost (mg/kg Dry Weight)
Cadmium (Cd)	1	1
Chromium (Cr)	600	150
Arsenic (As)	20	20
Lead (Pb)	300	250
Nickel (Ni)	60	60
Mercury (Hg)	1	1
Zinc (Zn)	300	300
Copper (Cu)	100	60

These 'maximum' levels are guidelines for the application of contaminated biosolids in the New Zealand environment (see reference #4 below). Where heavy metals levels exceed these guidelines in composts used as soil amendments, the effect of this metal contamination on the soil profile and on crop quality should be assessed. For composts which are required to be certified for 'organic production', each certifying body specifies permissible heavy metal levels. For example, the Bio-Gro Organic Production Standards for heavy metals specifies lower maximum levels for some of the heavy metals.

References

1. Growing Media for Ornamental Plants & Turf. Handreck, K & Black , N. NSW University Press, 1989. P93-102
2. Practical Soil Management. Cornforth, I. Lincoln University Press, 1998. P170.
3. Bio-Gro NZ Organic Standards. Annex Two-Residue Levels. 2001 v1.
4. Guidelines for the Safe Application of Biosolids to Land in New Zealand. NZWWA Aug., 2003. MOE.
5. New Zealand Standard: Composts, Soil Conditioners and Mulches. NZS 4454:2005

Contact Details

For further information please contact our Agriculture client service managers.