

*ANALYSIS OF GREENWASTE COMPOST  
FROM DUBLIN CITY COUNCIL AND  
INTERPRETATION OF RESULTS*

**REPORT NO:** GW 62

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Table of Contents

**Introduction.....1**

**Applied Standards .....2**

**Results of Analysis .....3**

**Interpretation .....7**

## 1 Introduction

Dublin County Council composts greenwaste. It is composted in a windrow system.

Three samples from a composting trial were received. One pile was treated with a compost accelerator, one treated as a control, and the other sample was composted a normal, with regular turning.

The three samples were analysed blind for maturity and other parameters to assess the efficiency of the compost accelerator.

This report outlines the parameters under which the analysis was carried out, and provides detailed results of the laboratory tests.

The three samples were labelled A, B, C, these correspond to GW 62-1, GW 62-2, GW 62-3.

## 2 Applied Standards

The Environmental Protection Agency (EPA) has produced a document outlining the quality standards for the use of compost as a soil improver. German standards are also taken into consideration when interpreting the results recorded from these tests.

It is important to have a thorough knowledge of the raw material being composted before developing a programme of analysis.

The analysis carried out on the samples of compost from St Anne's Park was largely based on the EPA Standards for Compost Quality, with some additional analysis to increase the relevance for the specific situation.

### **3 Results of Analysis**

The samples were received from St Anne's Park on the 11th of June (GW 62, 1, 2 & 3) They were received in good condition. Analysis was carried out on this sample as requested by the client.

Comprehensive analysis was carried out to realise a full chemical, microbial and physical profile of the sample.

# Compost Testing and Analysis Service

Report ref: GW 62

**Sample reference:** GW 62 (received 11<sup>th</sup> June 03)**Sample matrix:** Composted greenwaste

## Maturity Tests

### Specific Oxygen Uptake Rate

Sample no.	SOUR Mg/L
GW 62 1	0.60
GW 62 2	0.32
GW 62 3	0.67

### Maturity Index Test

Sample no.	Maturity Index Test
GW 62 1	6 Curing phase
GW 62 2	7 Well matured.
GW 62 3	5 moving past active phase and ready for curing

### C: N Ratio

Sample no.	C:N Ratio
GW 62 1	36.4
GW 62 2	28
GW 62 3	45.4

### Self Heating Test

Sample no.	Maximum Temperature reached after 5 days
GW 62 1	24.4
GW 62 2	23
GW 62 3	28.7

### Germination Test

Sample no.	% Yield germinated compared to control (100% Greenwaste)
GW 62 1	80
GW 62 2	90
GW 62 3	60

## Plant Nutrient and Organic Matter Content

## Water Soluble Nutrients

Sample no.	PH	EC $\mu\text{S.cm}^{-1}$	NH <sub>4</sub> -N $\text{mg.L}^{-1}$	NO <sub>3</sub> -N $\text{mg.L}^{-1}$	PO <sub>4</sub> -P $\text{mg.L}^{-1}$	K $\text{mg.L}^{-1}$
GW 62 1	7.82	678	0	1	22	448
GW 62 2	8.52	1735	0	0	8	922
GW 62 3	7.41	782	0	0	20	431

## Total Plant Nutrients and Carbon Content (Dry Wt. Basis)

Sample no.	N %	C %	ASH %	NO <sub>3</sub> -N: NH <sub>4</sub> -N
GW 62 1	0.9	33.2	40.3	<1
GW 62 2	1.06	29.7	46.6	<1
GW 62 3	0.79	35.8	35.5	<1

## Heavy Metals (Dry Wt. Basis)

Sample no.	Cd $\text{mg.kg}^{-1}$	Cr $\text{mg.kg}^{-1}$	Cu $\text{mg.kg}^{-1}$	Hg $\text{mg.kg}^{-1}$	Ni $\text{mg.kg}^{-1}$	Pb $\text{mg.kg}^{-1}$	Zn $\text{mg.kg}^{-1}$
GW 62 1	0.859	13.2	32.2	0.084	13.6	46.1	106
GW 62 2	1.1	13.3	41.5	0.109	18.9	62.2	142
GW 62 3	1.01	11.8	33.4	0.109	20	59.1	185

## Physical Analysis

Sample no.	H <sub>2</sub> O %	MBD <sup>‡</sup> $\text{g.L}^{-1}$	DBD <sup>†</sup> $\text{g.L}^{-1}$
GW 62 1	73	510	143
GW 62 2	58	692	188
GW 62 3	74	357	124

## Particle Size Analysis (Dry Wt. Basis)

Sample no.	<1mm	1-2mm	2-5mm	5-10mm	10-20mm	>20mm
GW 62 1	26	22	27	13	10	3
GW 62 2	27	20	28	9	10	7
GW 62 3	30	16	27	10	14	2

## Contaminants (Dry Wt. Basis)

Sample no.	Foreign matter (plastic/ glass) %	Stones %
GW 62 1	0.1	8.8
GW 62 2	0.3	6.2
GW 62 3	0.1	6.9

## Microbiological Analysis

Sample no.	Faecal Coliforms (MPN/g)	Salmonella (sp/25g)
GW 62 1	<3	absent
GW 62 2	<3	absent
GW 62 3	<3	absent

**Note:**

**N/A NOT AVAILABLE**

Results given on a fresh weight basis except where indicated

Samples will be kept for three months

<sup>f</sup>Yield is expressed as % of control plants grown in 100% peat in relation to plants grown in 10%, 25%, 50% and 100% GW.

<sup>†</sup>DBD=Dry bulk density (after drying at 105°C for 12 hours)

<sup>‡</sup>MBD=Moist bulk density (sample as received)

CBW=Composted Biowaste

MP=Multipurpose Peat (fertilised peat)



## 4 Interpretation

The results of the analysis are interpreted on the basis of the EPA standards and German Standards. In some cases, where a particular standard is not applicable, a desirable range of values has been indicated, based on Bord Na Móna Ltd. research.

The maturity tests indicate that there are differences in maturity in the three samples. GW 62-2 (Labelled B) was seen to be the most mature. This sample reached a self heating temperature of 23°C and had a C:N ratio of 28. A C:N Ratio of about 25 is generally accepted as mature. The germination test also gave good results for this sample where yields of 90% for the 100% greenwaste sample and 80% for the 50% greenwaste sample were recorded. The other maturity tests carried out further confirm that this sample is mature. A SOUR of <0.35 is considered mature and a maturity test index of >7 is also considered mature.

Comparing GW 62-1 and GW 62-3 (labelled A and C respectively), there are differences in maturity. Both samples are not fully mature, but fall into the curing or ready for curing phases. Overall from the maturity tests, GW 62 1 is more mature than GW 62-3. This is reflected in the SOUR, C:N Ratio, self heating test and germination test (100% greenwaste sample). The temperature for the self heating test for sample GW 62-3 continued to rise after 5 days and it was monitored for another 10 days, where a maximum temperature of 37.7° C was reached. This is another indication of immature compost compared the GW 62-1.

The pH of all three samples is on the high side of acceptable levels. The Specific Conductivity (SC) of GW 62-1 and GW 62-3 are acceptable where the SC of GW 62-2 is on the high side. This relatively high SC could lead to problems with some seed germination. The low SC in samples GW 62-1 and GW 62-3 may indicate that the compost is not mature.

All heavy metal concentrations for the three samples fall below Class II range as set out by the EPA. Most of the heavy metals fall well below the Class I standard. The danger of heavy metal contamination from this product is negligible. Soluble nutrient levels are low, except for potassium which is high, but still within the acceptable range.

The moisture content of GW 62-1 and GW 62-3 are high, both samples being over 70% moisture

The levels of contaminants in the three samples are low, with most of the foreign matter being stones. There was plastic found in all three samples-possible from plastic bags. Particle size of compost refers to the size distribution of dominant particles. These samples have good particle size distribution, but are on the coarse side.

Microbial Analysis of the sample yielded no pathogenic organism. The danger of transmitting diseases through monitored pathogens is limited. It is important that proper compost storage practices are followed to prevent the re-introduction of pathogens to the sanitized product.

A growing trial is currently being undertaken. Here the samples are mixed with different percentages of peat and tomato seedlings grown in them. The results of this trial will follow in a subsequent report.

## Compost Testing and Analysis Service Interpretation of Results Sheet

Ref: IR-1

*Below are detailed maximum values or desirable ranges of values for mature biowaste compost. Results are on a fresh wt. basis except where indicated.*

### Plant Nutrient and Organic Matter Content

#### Exchangeable Nutrients

pH*	SC* μS.cm <sup>-1</sup>	NH <sub>4</sub> -N g.L <sup>-1</sup>	NO <sub>3</sub> -N mg.L <sup>-1</sup>	P mg.L <sup>-1</sup>	K mg.L <sup>-1</sup>
<b>6.9-8.3</b>	<b>2000-6000</b>	<b>500</b>	<b>24</b>	<b>50-120</b>	<b>620-2280</b>

\*Water soluble

#### Total Plant Nutrients and Carbon Content (Dry wt. Basis)

N %	P %	K %	ASH %	C:N	Mg %	Ca %
<b>0.8-1.9</b>	<b>0.4-1.1</b>	<b>0.6-1.7</b>	<b>24-51</b>	<b>≤25</b>	<b>0.18-0.78</b>	<b>1.57-5.07</b>

#### Heavy Metals (Dry Wt. Basis)

Class	Cd mg.kg <sup>-1</sup>	Cr mg.kg <sup>-1</sup>	Cu mg.kg <sup>-1</sup>	Pb mg.kg <sup>-1</sup>	Hg mg.kg <sup>-1</sup>	Ni mg.kg <sup>-1</sup>	Zn mg.kg <sup>-1</sup>
<b>I</b>	<b>0.7</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>0.5</b>	<b>50</b>	<b>200</b>
<b>II</b>	<b>1.5</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>1</b>	<b>75</b>	<b>400</b>

#### Physical Analysis

H <sub>2</sub> O %	DBD** g.L <sup>-1</sup>	MBD g.L <sup>-1</sup>
<b>55-76</b>	<b>120-369</b>	<b>500-820</b>

#### Contaminants (Dry Wt. Basis)

<b>Foreign Material (Metal, Glass, Plastic etc)</b>	<b>&lt;0.1% Free of foreign material</b>	<b>0.1-0.5 % Potentially free</b>	<b>&gt;0.5% Marked quantity (Noticeable)</b>	<b>&gt;2% Significant quantity (distinct)</b>
<b>Stones</b>	<b>&lt;5% Low</b>	<b>&gt;5% Significant</b>		

#### Microbiological Analysis

<b>Faecal Coliforms (MPN/g)</b>	<b>Salmonella (sp/25g)</b>
<b>&lt;1000</b>	<b>Absent in 25g</b>

\*\*Denotes Bord na Móna suggested standard