



ANALYSIS REPORT - COMPOSTED MATERIAL

Customer Information

PR Number *PR119*
Composting Site *Winterpick*
Grade (particle size range) *0 - 25*
Grade Type *Principal*
Certification Code *OEL-WBP-1025xx1*
Date Sampled *03/11/2020*
Batch Age When Sampled *8 Weeks*
Producer's Sample Code *01-37-20*

Laboratory Information

Date Received *04/11/2020*
Report No *1054*
Sample Number *P-OLU001/309/20*
Reported By *Steve Johnson*
Report Date *03/12/2020*

SUMMARY ~ PAS 100 "PASS" OR "FAIL"

Parameter	Result	PAS 100 Upper Limit	Unit	Pass or Fail	Method Reference
E. coli	<100	1000	cfu/g	Pass	BS ISO 16649-2
Salmonella spp	Absent	Absent	in 25g	Pass	BS EN ISO 6579, Schedule 2, Part II.
Cadmium as Cd	0.2	1.5	mg/kg	Pass	BS EN 13650
Chromium as Cr	8.8	100	mg/kg	Pass	BS EN 13650
Copper as Cu	22	200	mg/kg	Pass	BS EN 13650
Lead as Pb	48	200	mg/kg	Pass	BS EN 13650
Mercury as Hg	0.2	1	mg/kg	Pass	BS ISO 16772
Nickel as Ni	7.5	50	mg/kg	Pass	BS EN 13650
Zinc as Zn	108	400	mg/kg	Pass	BS EN 13650
CO ₂ (stability)	5.2	16	mg CO ₂ / g organic matter / day	Pass	ORG0020
Weed Plants	0	0	number/l compost as received	Pass	OFW004-006
Glass, metal, plastic & other	0.00	0.25	% of 'air-dry' sample > 2 mm	Pass	AfOR MT PC&S' 05/12/2012
Plastic	0.00	0.12	% of 'air-dry' sample > 2 mm	Pass	AfOR MT PC&S' 05/12/2012
Sharps	0.00	R	% of 'air-dry' sample > 2 mm	R	AfOR MT PC&S' 05/12/2012
Stones in "mulch"	0.86	10	% of 'air-dry' sample > 4 mm	Pass	AfOR MT PC&S' 05/12/2012
Stones in other than "mulch"	0.86	8	% of 'air-dry' sample > 4 mm	Pass	AfOR MT PC&S' 05/12/2012

R Refer to composter's quality policy for upper limit allocated to the compost grade and intended market / end use, and evaluate sharps result against that limit.

Plant Response Tests	Result	PAS 100 Minimum	Unit	Pass or Fail	Method Reference
Tomato plants germinated	103.7	80	no. of plants, tests as % of controls	Pass	OFW004-006
Tomato plant top growth	87.6	80	average g / plant, tests as % of controls	Pass	OFW004-006
Tomato plant abnormalities	None	Absent	abnormal tomato plants in test trays	Pass	OFW004-006
Validity of the Plant Response Test		Result	Validity criterion	Outcome	
Germination of tomato seeds sown in control trays		27	≥ 27 tomato seeds germinated in control trays by 14 days after sowing	Valid	

OVERALL ASSESSMENT

Pass - if all of the results above are 'Pass' and all of the conditions of the Plant Response Test are 'Valid'

Fail - if any of the results are 'Fail' and any of the conditions of the Plant Response Test are 'Invalid'

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TOTAL NUTRIENTS ¹

Parameter	As Received (fresh)		In dry matter		Method Reference	Plant Significance
	Result	Unit	Result	Unit		
Nitrogen as N	1658	mg/l	12080	mg/kg	Dumas, BS EN 13654-2 ²	Primary Nutrients
Nitrogen as N	0.52	% m/m	1.21	% m/m	Dumas, BS EN 13654-2 ²	Primary Nutrients
Phosphorus as P	218	mg/l	1589	mg/kg	BS EN 13650	Primary Nutrients
Phosphorus as P	0.07	% m/m	0.16	% m/m*	BS EN 13650	Primary Nutrients
Potassium as K	931	mg/l	6786	mg/kg	BS EN 13650	Primary Nutrients
Potassium as K	0.29	% m/m	0.68	% m/m*	BS EN 13650	Primary Nutrients
Calcium as Ca	2568	mg/l	18710	mg/kg	BS EN 13650	Secondary Nutrients
Calcium as Ca	0.81	% m/m	1.87	% m/m	BS EN 13650	Secondary Nutrients
Magnesium as Mg	273	mg/l	1992	mg/kg	BS EN 13650	Secondary Nutrients
Magnesium as Mg	0.09	% m/m	0.20	% m/m	BS EN 13650	Secondary Nutrients
Sulphur as S	186	mg/l	1353	mg/kg	BS EN 13650	Secondary Nutrients
Sulphur as S	0.06	% m/m	0.14	% m/m*	BS EN 13650	Secondary Nutrients
Boron as B	3.29	mg/l	24	mg/kg	BS EN 13650	Trace Nutrients
Iron as Fe	920	mg/l	6704	mg/kg	BS EN 13650	Trace Nutrients
Manganese as Mn	36.0	mg/l	262	mg/kg	BS EN 13650	Trace Nutrients
Molybdenum as Mo	0.18	mg/l	1.3	mg/kg	BS EN 13650	Trace Nutrients
Sodium as Na	74.5	mg/l	543	mg/kg	BS EN 13650	See Footnote 3

¹ This method uses a hydrochloric- and nitric-acid extractant ("aqua regia") and approximates "total" rather than "bioavailable" concentrations of the above elements.

² Unsuitable for materials containing free ammonia because this may be lost when samples are flushed with oxygen during the procedure, e.g. if compost sample contains > 500 mg/l ammonium.

³ Together with chloride, influences nutrient uptake by plants and can inhibit this at high concentrations.

* The QP Manager (the 'web tool') requires the test result associated with this unit.

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POTENTIALLY TOXIC ELEMENTS ¹

Parameter	As Received (fresh)		In dry matter		PAS100 Upper Limit	Pass or Fail	Method Reference
	Result	Unit	Result	Unit			
Cadmium as Cd	0.03	mg/l	0.2	mg/kg*	1.5	Pass	BS EN 13650
Chromium as Cr	1.21	mg/l	8.8	mg/kg*	100	Pass	BS EN 13650
Copper as Cu ¹	3.02	mg/l	22	mg/kg*	200	Pass	BS EN 13650
Lead as Pb	6.59	mg/l	48	mg/kg*	200	Pass	BS EN 13650
Mercury as Hg	0.03	mg/l	0.2	mg/kg*	1	Pass	BS ISO 16772
Molybdenum as Mo	0.18	mg/l	1.3	mg/kg	N/A	N/A	BS EN 13650
Nickel as Ni	1.03	mg/l	7.5	mg/kg*	50	Pass	BS EN 13650
Zinc as Zn ¹	14.8	mg/l	108	mg/kg*	400	Pass	BS EN 13650

¹ Zinc and copper are required by plants but, similarly as with other PTEs, can be toxic to some plant species at high concentrations. Such effects are influenced by other factors, so may not necessarily occur if corresponding PTE upper limits are exceeded. Check plant response test results for any toxic effects.

* The QP Manager (the 'web tool') requires the test result associated with this unit.

PHYSICO-CHEMICAL PROPERTIES

Parameter	As Received (fresh)		In dry matter		Method Reference
	Result	Unit	Result	Unit	
Bulk Density ¹	317	g/l*	137	mg/l	BS EN 13040
Dry Matter	43.3	% m/m	N/A		BS EN 13040
Moisture	180	g/l	N/A		BS EN 13040
Moisture	56.7	% m/m*	N/A		BS EN 13040
Organic Matter (Loss On Ignition)	86.8	% m/m	69.5	% m/m*	BS EN 13039
Organic Carbon (LOI ÷ 1.72)	50.5	% m/m	40.4	% m/m*	Calculated
pH	5.39	N/A*	N/A		BS EN 13037
Electrical Conductivity	1068	µS/cm@25°C	N/A		BS EN 13038
Electrical Conductivity	107	mS/m @ 25 oC	N/A		BS EN 13038

¹ Bulk density in dry matter is termed 'Dry Weight Density' and expressed in (g/l). DWD = fresh bulk density (g/l) - volumetric moisture content (g/l)

² The Fertilisers (Sampling and Analysis) Regulations 1996' Schedule 2, Part II Section 6 - 'Determination of the neutralising value of liming materials.' Method adaptation: the stage of passing the sample through a 1 mm sieve is omitted and results are expressed as % by weight of CaO on the undried sample, as received.

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PATHOGENS

Parameter	As Received (fresh)			Pass or Fail	Method Reference
	Result	PAS100 Upper Limit	Unit		
E. coli at 44°C	<100	1000	cfu/g	Pass	BS ISO 16649-2
Salmonella spp at 37°C	Absent	Absent	in 25g	Pass	BS EN ISO 6579, Schedule 2, Part II.

STABILITY / MATURITY

Parameter	As Received (fresh)			Pass or Fail	Method Reference
	Result	PAS100 Upper Limit	Unit		
Carbon Dioxide (evolution rate)	5.2	16	mg CO ₂ / g organic matter / day	Pass	ORG0020
Proportion of particles < 20 mm	98	N/A	% g/g	N/A	ORG0020

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PLANT RESPONSE ~ PART 1 ~ GERMINATION OF TOMATO PLANTS AND WEEDS

OFW004-006: Method for testing plant response to composted material and contamination by weed seeds and propagules.

Parameter	Peat	Compost	Unit
Quantity 'Selected before sieving'	3000	755	g
Quantity 'Sieved, particles <10 mm'	3000	755	g
Percentage of particles <10 mm	100	100.00	% m/m as received
Electrical conductivity of sieved material	91	1068	$\mu\text{S cm}^{-1}$
Laboratory compacted bulk density of sieved material	330	317	g/l

Parameter	Peat Control For 3 trays	Peat + compost test For 3 trays	Unit
Quantity of sieved peat (volume)	5.0	3.75	litres
Quantity of sieved compost (volume)	0.0	1.25	litres
Substrates ratio (vol peat:vol compost)	1.00 :0	3.00 :1	peat:compost
Quantity of sieved peat (mass)	1650.0	1237.5	g
Quantity of sieved compost (mass)	0.0	396.3	g
Quantity of dolomite limestone	20.0	15.0	g
Quantity of fertiliser	5.0	5.0	g

Parameter	Peat Control			Peat + compost test			Overall	Unit
	Tray 1	Tray 2	Tray 3	Tray 1	Tray 2	Tray 3		
Total weed plants per tray	0	0	0	0	0	0		per litre compost as received
Mean weed plants per litre compost as received							0	
PAS 100 upper limit							0.0	
Pass or Fail							Pass	

1 If negative value, weed(s) present in control only, or if in test mix are attributable to its peat content

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OFW004-006: Method for testing plant response to composted material and contamination by weed seeds and propagules.

Parameter	Peat Control			Peat + compost test			Overall	Unit
	Tray 1	Tray 2	Tray 3	Tray 1	Tray 2	Tray 3		
Sown tomato seeds	10	10	10	10	10	10		
Germinated tomato plants								
10 days after sowing	8	8	10	7	9	9		
14 days after sowing	9	8	10	8	9	10		
28 days after sowing	9	8	10	9	9	10		
Total germinated tomato plants in all test trays as % of total germinated tomato plants in all control trays, by 10 days after sowing							96.2	
Total germinated tomato plants in all test trays as % of total germinated tomato plants in all control trays, by 14 days after sowing							100.0	tests as % of controls
Total germinated tomato plants in all test trays as % of total germinated tomato plants in all control trays, by 28 days after sowing							103.7	
PAS 100 minimum performance required %							80	
Pass or Fail							Pass	number germinated
Number of tomato seeds sown in control trays that germinated by 14 days after sowing							27	
Assessment of test validity	Invalid if <27 tomato seeds sown in control trays germinated by 14 days after sowing						Valid	

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PLANT RESPONSE ~ PART 2 ~ GROWTH OF GERMINATED OF TOMATO PLANTS

OFW004-006: Method for testing plant response to composted material and contamination by weed seeds and propagules.

Tomato plant top growth 28 days after sowing	Peat Control			Peat + compost test			Overall	Unit
	Tray 1	Tray 2	Tray 3	Tray 1	Tray 2	Tray 3		
Total number of true leaves per tray	N/D	N/D	N/D	N/D	N/D	N/D		number of tomato plants
Mean number of true leaves per plant in tray	N/D	N/D	N/D	N/D	N/D	N/D		
Total plant mass ¹ per tray	47.00	38.20	42.87	20.23	16.02	27.38		g top growth fresh mass
Mean mass per plant ¹ in tray	5.2	4.8	4.3	2.2	1.8	2.7		
Mean mass per plant¹ for all test trays as % of mean mass per plant¹ for all control trays, by 28 days after sowing							87.6	tests as % of controls
PAS 100 minimum performance required							80	
Pass or Fail							Pass	g top growth fresh mass
Mean mass per plant ¹ grown in all 3 control trays							4.743	
Assessment of test validity	Valid if ≥ 2.00 g per plant ¹ in control trays						Valid	

¹ Tomato plant top growth

N/D = Not Determined

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PLANT RESPONSE ~ PART 3 ~ ABNORMAL TOMATO PLANTS

OFW004-006: Method for testing plant response to composted material and contamination by weed seeds and propagules.

Abnormal tomato plants	Peat Control			Peat + compost test			Overall
	Tray 1	Tray 2	Tray 3	Tray 1	Tray 2	Tray 3	
Not evident							
Abnormalities in plants grown in test sample trays that are not present in plants grown in control trays							None
Pass or Fail							Pass
Assessment of test validity	Abnormalities in plants grown in control trays						None
	Valid if abnormalities absent in plants grown in control trays						Valid

Observations	
Additional factors	None

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PHYSICAL CONTAMINANTS

Sieve Apertures ¹	Glass	Metal	Plastic	Other ²	Description	Total ³	Of which Sharps ⁴	Stones ⁵	Method Reference: AfOR MT PC&S ¹ 05/12/2012
mm	g	g	g	g		g	g	g	
31.5	0	0	0	0		0	0	0	
16.0	0	0	0	0		0	0	0	
8.0	0	0	0	0		0	0	0	
4.0	0	0	0	0		0	0	1.22	
2.0	0	0	0	0		0	0	ND	
1.0	ND	ND	ND	ND	N/A	0	ND	ND	
Pan	ND	ND	ND	ND	N/A	0	ND	ND	
% of total sample > 2 mm	0.00	0.00	0.00	0.00		0.00	0.00	N/A	
% of total sample > 4 mm	NA	NA	NA	NA		NA	NA	0.86	
PAS 100 upper limit for "mulch"			0.12			0.25	R	10.0	
Pass or Fail			Pass			Pass	R	Pass	
PAS 100 upper limit for other than "mulch"			0.12			0.25	R	8	
Pass or Fail			Pass			Pass	R	Pass	

Contaminants Key - Other²

A = Paper/Card B = Fibre C = String/Twine D = Rubber E = Matting

¹ 10 or 12.5 omitted

² Any different physical contaminant type; use key to identify or name in 'Description'

³ 'Total' is for glass, metal, plastic and 'other'. N.B.: excludes stones

⁴ Sharps > 2 mm, of any inorganic physical contaminant type (excludes woody fragments)

⁵ Stones and other consolidated mineral contaminants

R Refer to composter's quality policy for upper limit allocated to the compost grade and intended market / end use, and evaluate sharps result against that limit.

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PARTICLE SIZE DISTRIBUTION (air-dry sample)

Sieve Apertures ¹ mm	Sample	of which compost	Cumulative		Method Reference: Afor MT PC&S ¹ 05/12/2012
	Retained g	Retained g	Retained %	Passing %	
31.5	23.5	23.5	16.5	83.5	
16.0	2.5	2.5	18.3	81.7	
8.0	11.4	11.4	26.3	73.7	
4.0	23.5	22.28	41.9	58.1	
2.0	27.8	27.8	61.4	38.6	
1.0	23.9	23.9	78.2	21.8	
Pan	31.0	31	100.0	0.0	
Total	143.6	142.38			

¹ 10 or 12.5 omitted

Note: Moisture at 40°C = 1.7 % m/m

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