

Test Report No.: 244534985a 001

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Client: Dai A Industry Joint Stock Company**Contact Information:** Luong Son Industrial Zone, Highway 6, Hoa Son Commune, Luong Son District
purchasing@daiaplastic.com**Identification/Model No(s):** BIODEGRADABLE COMPOUND**Sample Receiving Date:** 2023-08-03**Sample Obtaining Method:** Sending by customer**Condition at Delivery:** Test item complete and undamaged**Testing Period:** 2023-08-03 to 2024-05-30**Place of Testing:** Chemical laboratory Shanghai& Kunshan, Toys laboratory Shanghai**Test Specification:**

With reference to ASTM D6400-23 / EN 13432: 2000 / EN 14995:2006 / ISO 18606:2013,

Testing according to customer's specification for the following parameters:

Heavy Metals and Other Toxic Substances

Qualitative Identification by Fourier Transform Infrared Spectroscopy

Thickness Check

Aerobic Biodegradation Test

Quantitative Aerobic Disintegration Test

Plant Test

Test Result:

Pass

Please refer to page 5

Please refer to page 6

Pass

Pass

Pass

Other Information:

Country of Origin: Vietnam

Procedure No: 3393449

For and on behalf of
TÜV Rheinland (Shanghai) Co., Ltd.

2024-05-31 Lucy Lu/Assistant Technical Manager

Date

Name/Position

Sample information is provided by customer. Test result is drawn according to the kind and extent of tests performed. This test report relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products. "Decision Rule" document announced in our website (<https://www.tuv.com/landingpage/en/qm-gcn/>) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.

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Picture and Detailed Description of the Test Sample**M001****M002****Material List:**

Material No.	Material	Color	Location	Remark
M001	Plastic	White	Film	-
M002	Plastic	White	Granule	-

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1 Heavy Metals and Other Toxic Substances**Test Method:** For Fluorine (F) content, according to EN 15408: 2011.

For other contents, according to ISO 17294-2: 2016.

Test Result:

			Test No.	T001
			Material No.	M002
Test Parameter	Unit	Reporting Limit	Test Result	
Zn	mg/kg	5	<RL	
Cu	mg/kg	5	<RL	
Ni	mg/kg	5	<RL	
Cd	mg/kg	0.25	<RL	
Pb	mg/kg	5	<RL	
Hg	mg/kg	0.20	<RL	
Cr	mg/kg	5	<RL	
Mo	mg/kg	0.25	<RL	
Se	mg/kg	0.25	<RL	
As	mg/kg	0.25	<RL	
F	mg/kg	50	<RL	
Co	mg/kg	3	<RL	

Abbreviation: mg/kg = Milligram per kilogram

<RL = Less than reporting limit

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Remark:

1. The requirement is following ASTM D6400-23 / EN 13432: 2000 / EN 14995:2006 / ISO 18606:2013.
2. The concentrations of regulated metals and other toxic substances in the plastic product or material refer to below Table 1 for examples.

Table 1 — Examples of maximum concentrations of regulated metals and other toxic substances

Values given in mg/kg of dry material

Element	US ^a	Canada ^b		EN13432 ^c / AS4736 ^d / AS5810 ^d	NF T51-800 ^e	China ^f	Japan ^g
		CCME	Ontario				
Zn	1400	350	250	150	150	150	180
Cu	750	200	50	50	50	50	60
Ni	210	31	31	25	25	25	30
Cd	17	1.5	1.5	0.5	0.5	0.5	0.5
Pb	150	75	75	50	50	50	10
Hg	8.5	0.4	0.4	0.5	0.5	0.5	0.2
Cr	—	105	105	50	50	50	50
Mo	—	2.5	2.5	1	1	1	—
Se	50	1	1	0.75	0.75	0.75	—
As	20.5	6.5	6.5	5	5	5	5
F	—	—	—	100	100	100	—
Co	—	17	17	—	38	38	—

^a The maximum metal concentrations given here for the US are 50 % of those prescribed by 40 CFR 503.13, Table 3 (as per ASTM D6400 and ASTM D6868 requirements).

^b The maximum metal concentrations for Canada are 50 % of those prescribed in Table 1 for Compost Category A in Guidelines for Compost Quality published by the Canadian Council of Ministers of the Environment (CCME), and Category AA of the Ontario Compost Quality Standards, published by Ontario Ministry of the Environment (as per ASTM D6400 requirements).

^c The maximum metal concentrations for the EC are 50 % of those prescribed in ecological criteria for the award of the Community eco-label to soil improvers (EC OJ L 219, 7.8.1998, p. 39).

^d The maximum metal concentrations given here for Australia refers to EN 13432, Table A.1.

^e The maximum metal concentrations given here for France refers to EN 13432, Table A.1. except for Co, and the maximum concentration for Co is prescribed in BNQ 9011-911-I/2007.

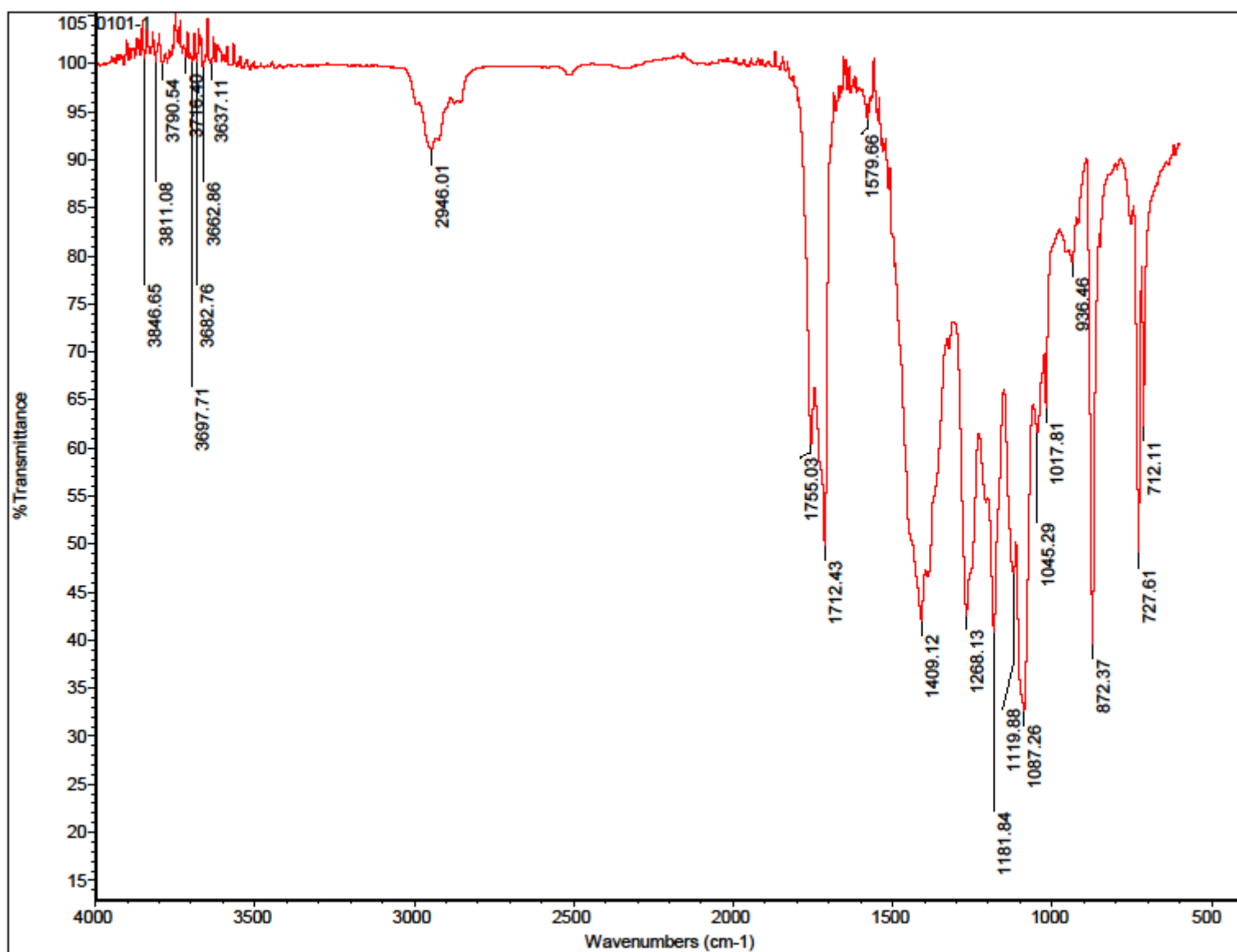
^f The maximum metal and other toxic substances concentrations given here for People's Republic of China refers to GB/T 41010-2021 Degradability and identification requirements of biodegradable plastics and products, Table 1.

^g The maximum metal concentrations for Japan are 10 % of those prescribed in the Fertilizer Control Law (Ministry of Agriculture, Forestry and Fisheries) and Guidelines for Quality of Composts (Central Union of Agricultural Co-operatives).

3. BPI's new standard for fluorinated chemicals went into effect on January 1, 2020. Products may no longer be claimed as BPI Certified, whether on the product itself, or on a product's packaging or marketing materials, unless it meets all conditions of the rule, including no intentionally added fluorinated chemicals (as demonstrated in Safety Data Sheets) and a test report showing less than 100 ppm total fluorine.

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2 Qualitative Identification by Fourier Transform Infrared Spectroscopy**Test Method:** Determination by Fourier Transform Infrared Spectroscopy ATR mode according to GB/T 6040-2019.**Test Result:****Picture of IR Spectrometry for M001**

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3 Thickness Check

Test Method: EN 71-1: 2014+A1: 2018: CLAUSE 8.25.1 refers to ISO 4593-1993 where applicable, measured by thickness meter.

Test Result:

		Test No.:	T001
		Material No.:	M001
Trial	Unit	Test Result	
1	mm	0.103	
2	mm	0.111	
3	mm	0.120	
4	mm	0.121	
5	mm	0.103	
6	mm	0.099	
7	mm	0.105	
8	mm	0.098	
9	mm	0.093	
10	mm	0.100	
Average	mm	0.105	
SD	mm	0.0093	

Abbreviation: mm = Millimeter

$$SD = \text{Standard deviation, } S = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Remark:

Equipment Uncertainty: U = 0.001mm (k = 2)

Foot Size (Diameter): up 6.25mm, down 6.26mm; Foot force: 0.76N

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4 Biodegradation**4.1 General Test Information**Test Method : ISO 14855-1: 2012/ASTM D5338-15(2021)Reference Material : Microcrystalline celluloseTest Vessels : The vessel used for biodegradation test is a high pressure conical flask, volume: 3000 ml. It was provided by Pyrex Co. Ltd.CO₂-determination : Determination of the amount of carbon dioxide evolved by weighing the carbon dioxide absorbing system. The amount of carbon dioxide is calculated via the difference in the weight of the carbon dioxide absorbing trap in the beginning and in the end of the test.Thermostat Controlled Oven : The biodegradation test is proceeded in a temperature controlled oven for maintaining the temperature needed.**4.2 Summary of Test Results**

	Test Material	Reference Material
45 days biodegradation rate (%)	35.35	73.56
Overall biodegradation rate (%)	91.30	99.86
Final relative biodegradation rate (test material/ reference material) (%)	91.43	
Test duration (days)	175	175
Observation	No abnormal findings	No abnormal findings

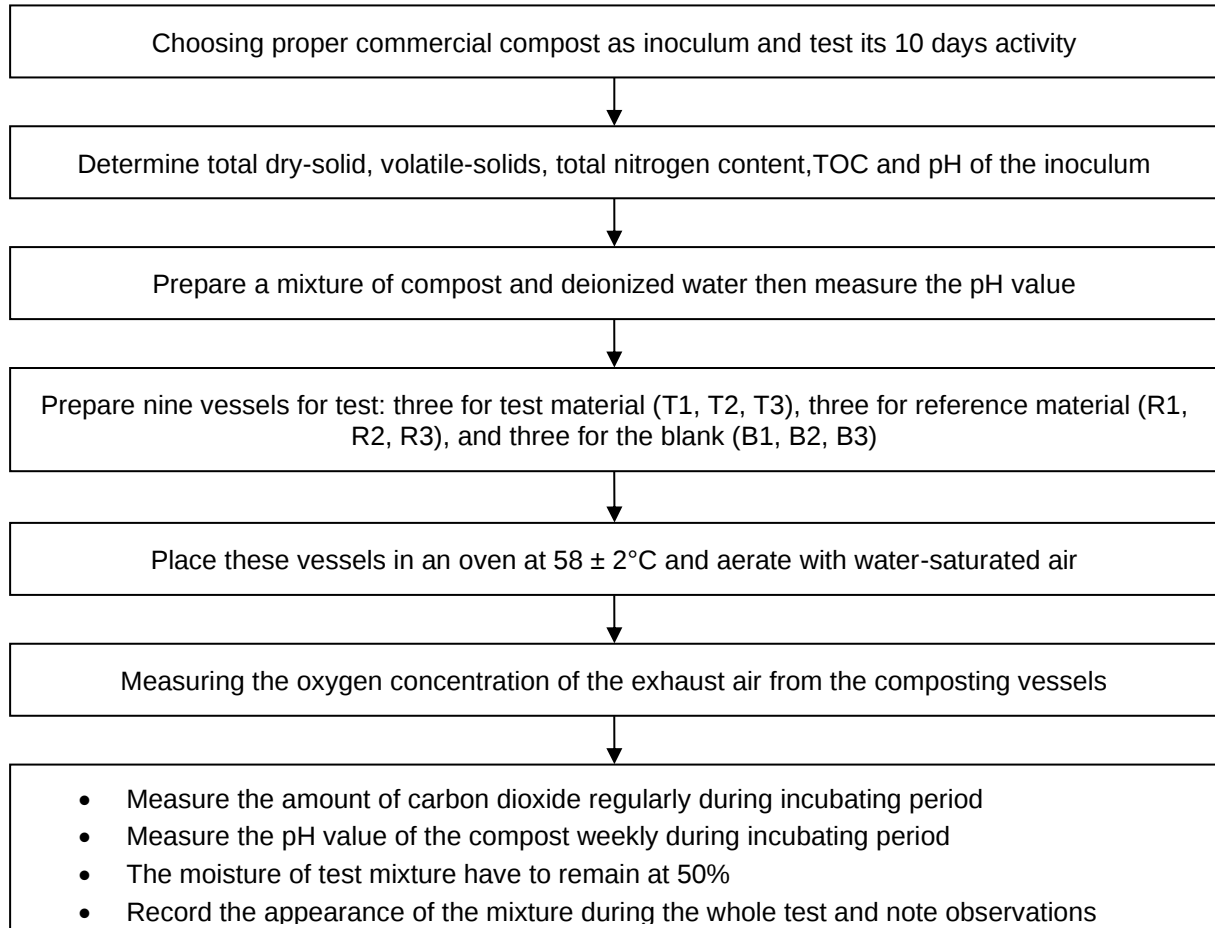
Validity Criteria :Degree of biodegradation of reference material after 45 days > 70%. ☒ Yes ☐ NoDifference between percentage biodegradation of reference material in the different vessels at the end of test < 20%. ☒ Yes ☐ NoAverage CO₂ production in the blank vessels after 10 days in the range 50 mg to 150 mg CO₂/g volatile solids. ☒ Yes ☐ No

As the three criteria above have been fulfilled, the test is considered to be valid.

For detailed information, please see the following pages.

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4.3 Flow Chart of Experiment

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4.4 Results

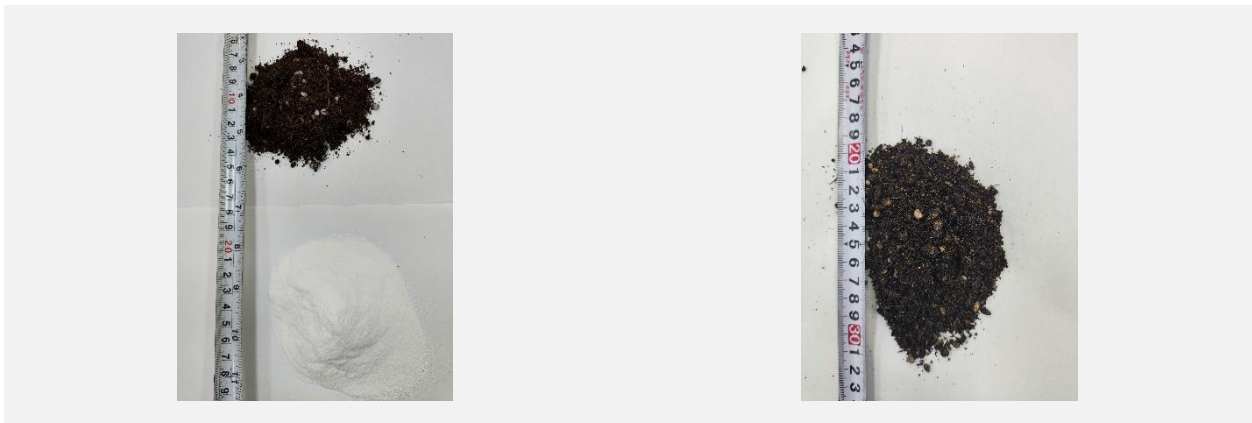
4.4.1 Appearance of Compost and Sample



Before test

After test

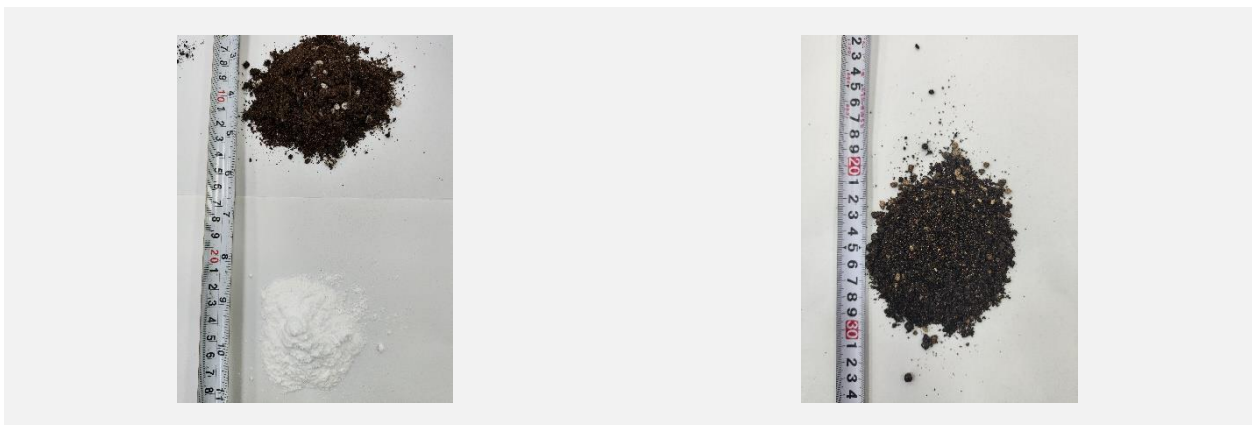
Compost without any material before and after test



Before test

After test

Compost with reference material before and after test



Before test

After test

Compost with test material before and after test

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4.4.2 Properties of inoculum

A commercial compost (Peilei) is used as the inoculum. The properties of inoculum are listed in the table below.

Properties	Data and description
Age	2 months
Storage condition	dry and room temperature
Handling	sieved through 10 mm
Total dry solids (%)	51.7
Moisture content (%)	48.3
Volatile solids (%)	47.8
Ash (%)	52.2
Compost Activity Test (mg CO ₂ /g volatile solid)	56.0
Total organic carbon (%)	18.4
Total nitrogen content (g/kg)	10.4
Carbon/ Nitrogen ratio	17.7
pH of suspension	7.21

4.4.3 Activity of inoculum

The amount of CO₂ for the first 10 days

Days	Amount of Carbon Dioxide (mg)
1~3	4430.0
4~6	1670.0
7~8	5600.0
9~10	4920.0
Total	16620.0

Compost Activity = 56.0 (mg CO₂ /g volatile solid)

Calculation:

Amount of CO₂ evolved during the first 10 days (mg) / (1200.0g * total dry solids * volatile solids)
 1200.0g is the amount of compost used for each vessel.

4.4.4 Properties of Test and Reference Materials

The contents of organic carbon in test and reference material (microcrystalline cellulose) are determined. Results are used for calculation of amount of test material necessary to have an amount of 20.0g organic carbon in each vessel.

For reference material: m = amount of organic carbon each vessel / TOC

$$m = 20.0g / 0.418g/g = 47.8g$$

20.0g of organic carbon lead to a theoretical amount of 73.3g CO₂ evolved by microorganisms when the rate of biodegradation reaches 100%.

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Parameter	Unit	Reference Material	Test Material
Total organic carbon (TOC)	(%)	41.8	41.5
Amount of organic carbon (TOC) in test vessel	(g)	20.0	20.0
Theoretical amount of evolved carbon dioxide	(ThCO ₂), (g)	73.3	73.3
Size	(cm × cm)	—	—
Shape	—	powder	powder
Volatile solids		100.0	62.2
Requirement for volatile solids	(%)	—	≥ 50
Total dry solids	(%)	95.7	99.7
Moisture content	(%)	4.3	0.3

4.4.5 The Amount of Material and Compost in Vessels

	Compost		Material	
	Weight (g)	Total Dry Solids (g)	Weight (g)	Total Dry Solids (g)
Blank	1200.0	620.4	None	None
Reference	1200.0	620.4	47.8	45.7
Test	1200.0	620.4	48.2	48.1

4.5 pH Value

The pH value of the compost is checked regularly during the test. It is determined by diluting compost with distilled water by 1:5 and measuring the value with an electrical pH-meter.

pH values during test

Day	B1	B2	B3	R1	R2	R3	T1	T2	T3
1	7.21	7.09	7.12	7.15	7.08	7.11	7.19	7.10	7.21
8	7.04	7.18	7.21	7.10	7.32	7.17	7.22	7.03	7.09
15	7.32	7.07	7.31	7.25	7.10	7.19	7.13	7.40	7.17
22	7.11	7.19	7.12	7.08	7.17	7.10	7.09	7.02	7.14
29	7.17	7.04	7.15	7.19	7.20	7.13	7.14	7.19	7.21
36	7.21	7.16	7.09	7.13	7.04	7.16	7.17	7.11	7.20
43	7.09	7.12	7.35	7.02	7.19	7.07	7.13	7.18	7.21
50	7.18	7.04	7.22	7.09	7.17	7.11	7.09	7.13	7.24
56	7.14	7.09	7.15	7.18	7.24	7.09	7.15	7.08	7.20
64	7.19	7.23	7.18	7.14	7.22	7.21	7.10	7.13	7.19
71	7.13	7.21	7.35	7.20	7.13	7.14	7.24	7.19	7.20
78	7.21	7.05	7.13	7.24	7.17	7.11	7.21	7.16	7.13

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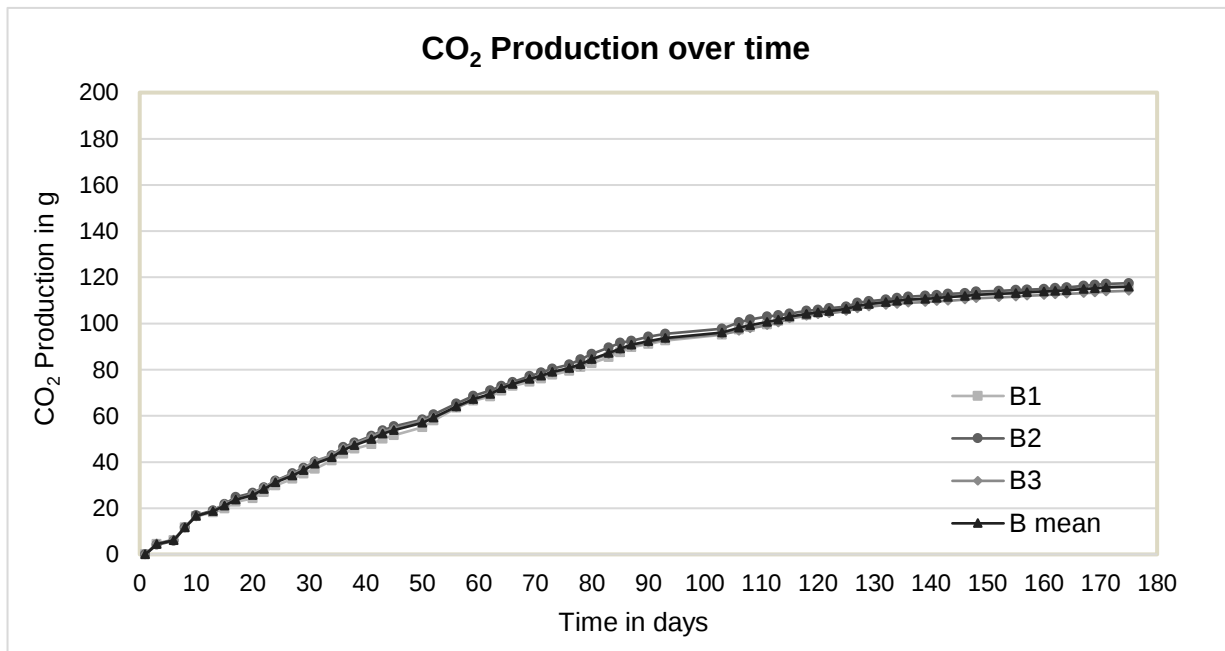
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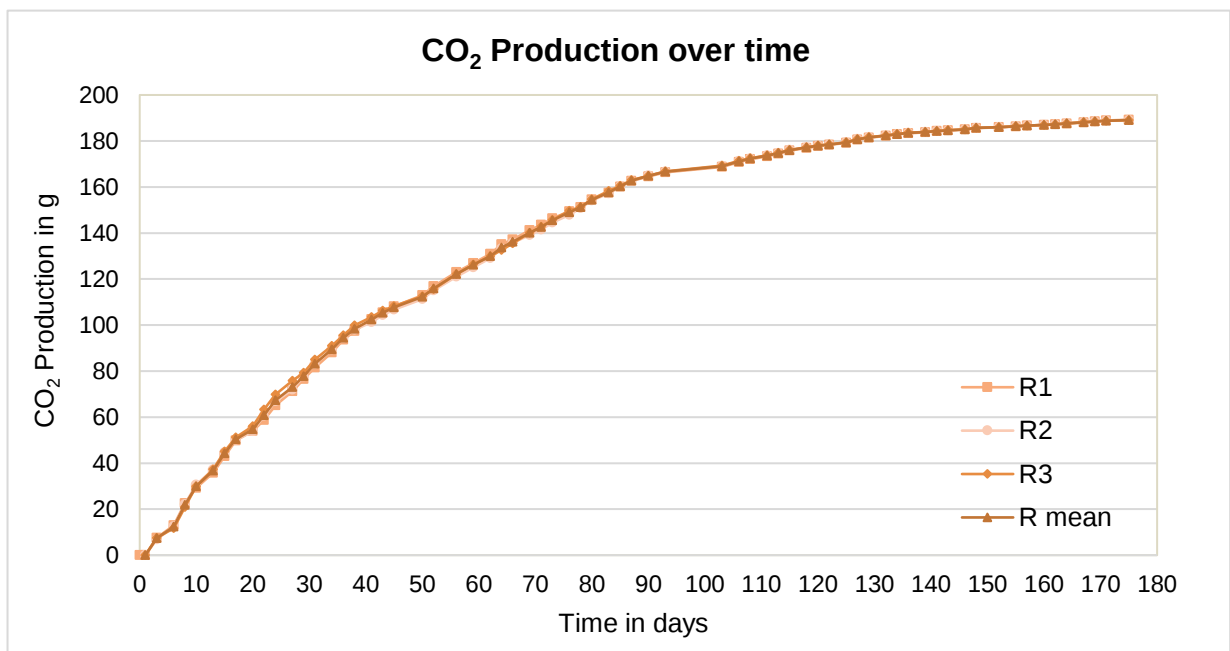
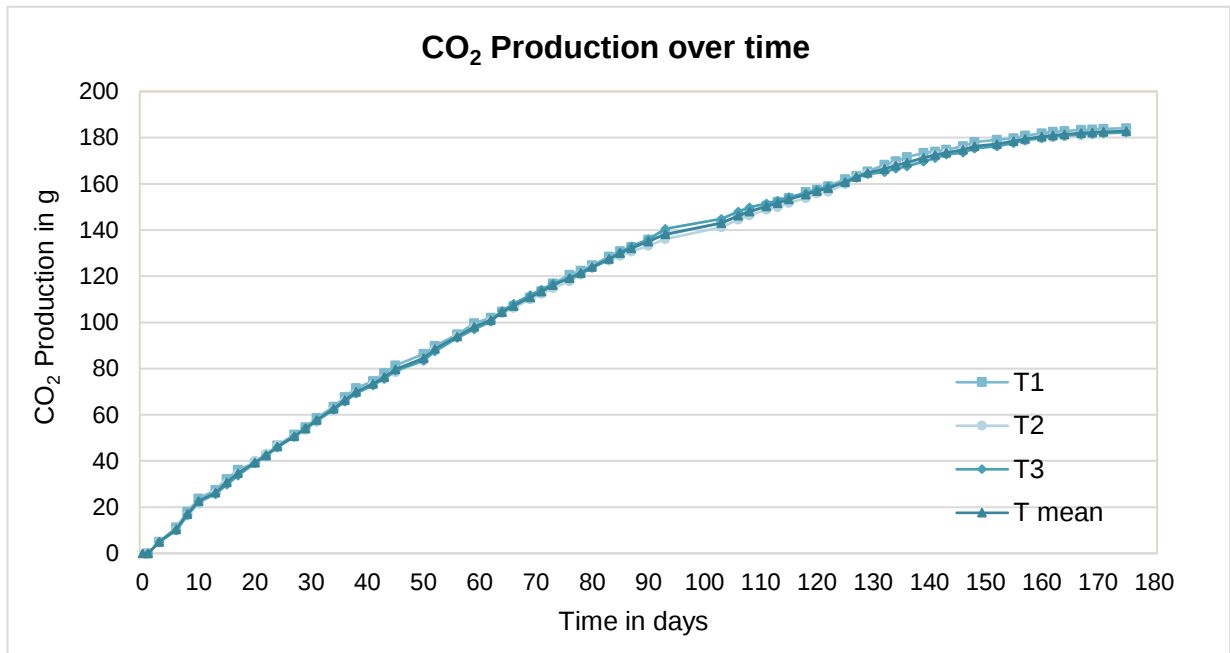
85	7.11	7.08	7.25	7.17	7.13	7.15	7.14	7.10	7.21
106	7.19	7.04	7.11	7.13	7.20	7.18	7.19	7.20	7.11
113	7.24	7.13	7.20	7.04	7.12	7.29	7.15	7.07	7.16
120	7.16	7.04	7.24	7.11	7.19	7.04	7.10	7.15	7.19
127	7.15	7.09	7.12	7.19	7.07	7.13	7.12	7.09	7.13
134	7.10	7.15	7.19	7.20	7.12	7.15	7.16	7.24	7.18
141	7.21	7.10	7.14	7.31	7.19	7.16	7.20	7.11	7.15
148	7.10	7.24	7.16	7.08	7.13	7.15	7.15	7.08	7.13
155	7.14	7.11	7.07	7.12	7.16	7.20	7.16	7.13	7.10
161	7.12	7.09	7.15	7.20	7.14	7.08	7.10	7.22	7.15
169	7.19	7.03	7.10	7.14	7.11	7.17	7.15	7.09	7.12
175	7.20	7.19	7.17	7.21	7.14	7.10	7.08	7.13	7.16

The pH values of the vessels do not show any obvious differences to the other vessels. Big differences in the pH value could ask for rejecting single values.

4.6 Controlled Aerobic Biodegradation Test

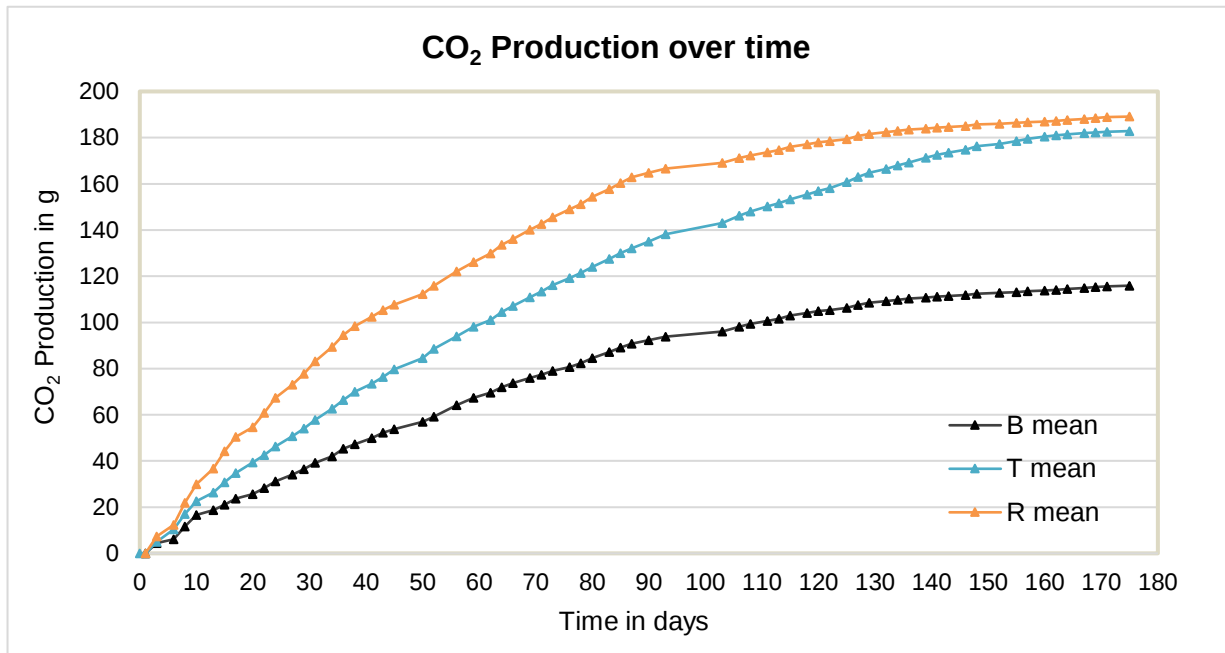
4.6.1 CO₂ Evolution Curve



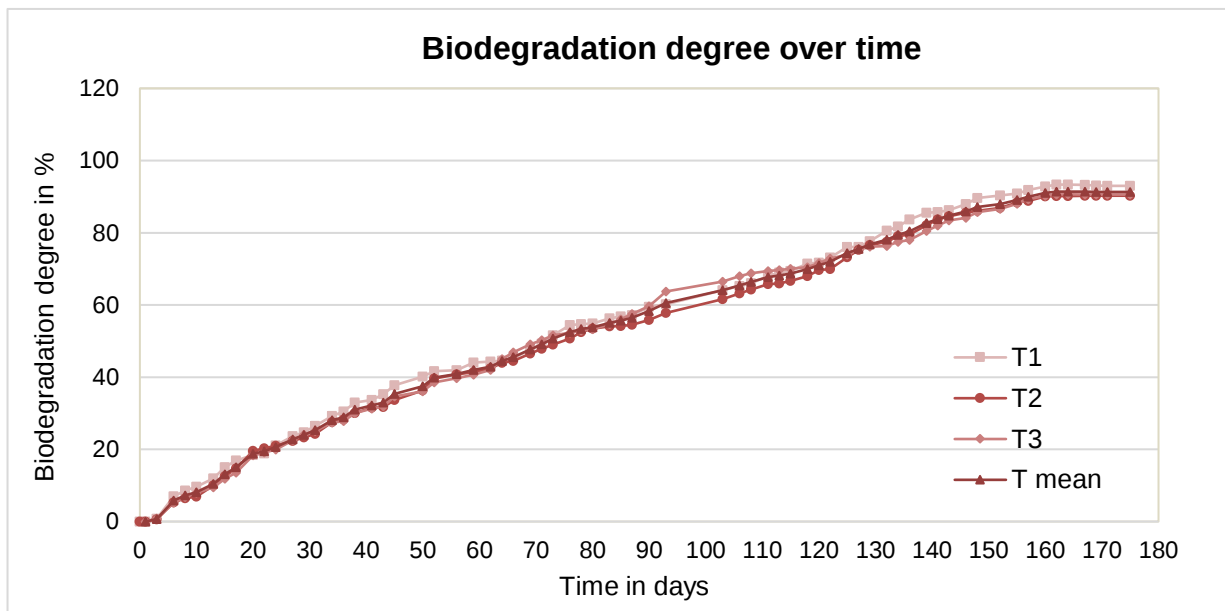


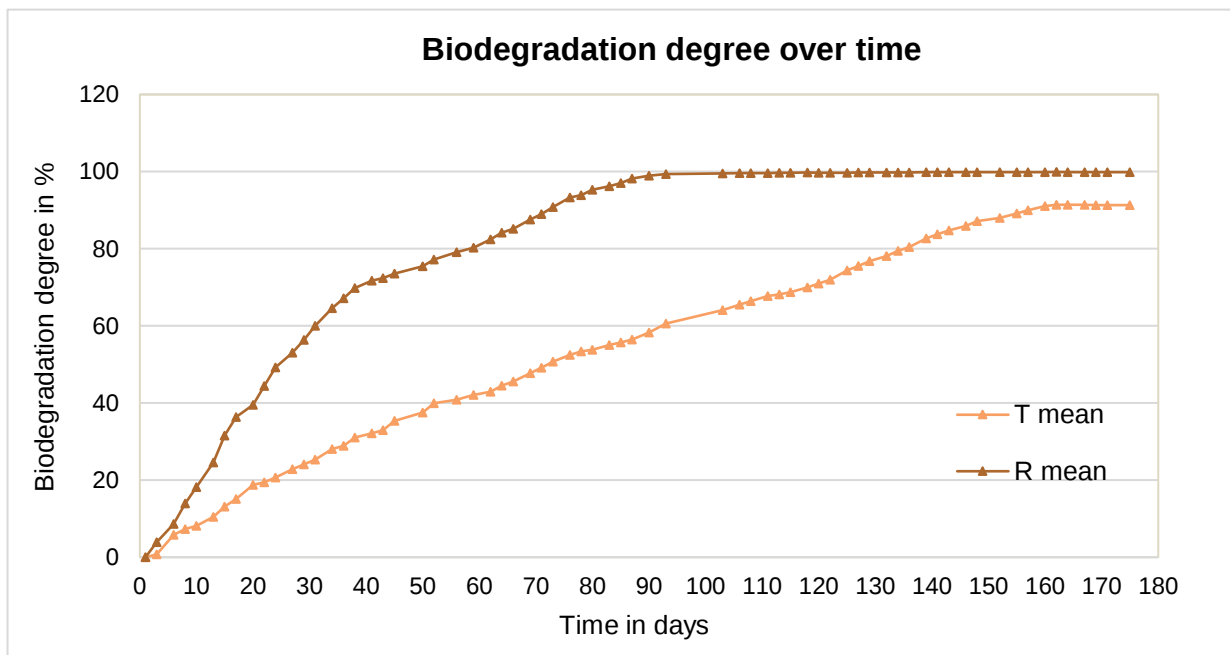
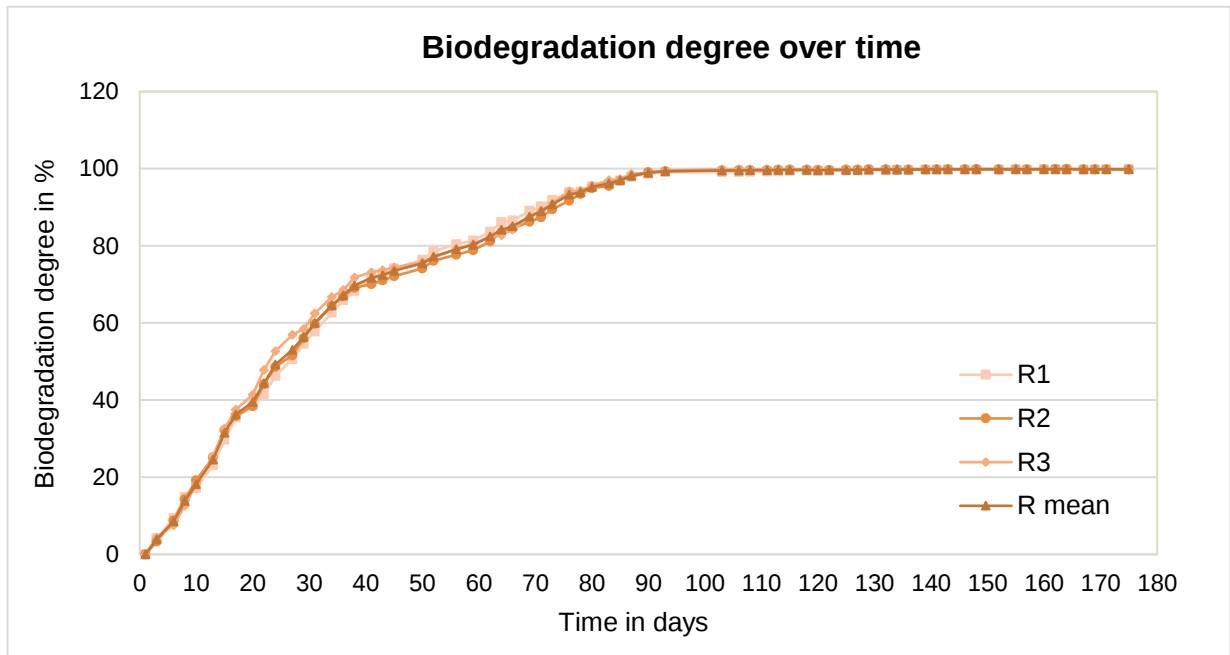
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4.6.2 Biodegradation curve





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4.6.3 Controlled Aerobic Biodegradation Test Data of Test Material

Day	CO ₂ (g/vessel)								D* (%)			
	B1	B2	B3	B _{mean}	T1	T2	T3	T _{mean}	T1	T2	T3	T _{mean}
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	4.40	4.21	4.69	4.43	4.97	4.87	5.04	4.96	0.74	0.60	0.83	0.72
6	1.73	1.60	1.68	1.67	6.25	5.13	4.89	5.42	6.25	4.72	4.39	5.12
8	5.58	5.91	5.31	5.60	6.74	6.43	6.77	6.65	1.56	1.13	1.60	1.43
10	4.84	5.17	4.76	4.92	5.72	5.24	5.78	5.58	1.09	0.44	1.17	0.90
13	1.56	2.14	2.61	2.10	3.80	4.36	3.19	3.78	2.32	3.08	1.49	2.30
15	1.73	2.75	2.76	2.41	4.67	4.31	4.14	4.37	3.08	2.59	2.36	2.68
17	2.91	3.09	1.90	2.63	4.01	4.22	3.90	4.04	1.88	2.17	1.73	1.93
20	1.57	1.69	2.45	1.90	3.02	5.45	5.37	4.61	1.53	4.84	4.73	3.70
22	2.55	2.45	2.80	2.60	2.93	3.13	3.23	3.10	0.45	0.72	0.86	0.68
24	2.94	2.94	2.94	2.94	4.57	3.44	3.51	3.84	2.22	0.68	0.78	1.23
27	2.87	3.09	2.74	2.90	4.75	3.87	4.74	4.45	2.52	1.32	2.51	2.12
29	2.23	2.45	2.53	2.40	3.22	3.10	3.63	3.32	1.12	0.95	1.68	1.25
31	2.17	2.57	3.36	2.70	3.99	3.47	3.39	3.62	1.76	1.05	0.94	1.25
34	3.56	2.77	2.29	2.87	4.89	5.26	4.59	4.91	2.76	3.26	2.35	2.79
36	2.91	3.57	3.13	3.20	4.08	3.72	3.48	3.76	1.20	0.71	0.38	0.76
38	2.17	2.00	1.87	2.01	3.86	3.30	3.66	3.61	2.52	1.76	2.25	2.18
41	1.94	2.90	3.00	2.61	3.09	3.73	3.49	3.44	0.65	1.53	1.20	1.13
43	2.38	2.41	2.28	2.36	3.51	2.50	2.83	2.95	1.57	0.19	0.64	0.80
45	1.60	1.70	1.27	1.52	3.36	2.91	3.53	3.27	2.51	1.90	2.74	2.38
50	3.39	2.92	3.39	3.23	4.99	5.17	4.31	4.82	2.40	2.65	1.47	2.17
52	2.94	2.26	1.55	2.25	3.34	4.68	4.01	4.01	1.49	3.32	2.40	2.40
56	5.49	4.74	4.35	4.86	5.11	5.69	5.76	5.52	0.34	1.13	1.23	0.90
59	3.03	3.36	3.18	3.19	4.75	3.69	3.85	4.10	2.13	0.68	0.90	1.24
62	1.87	2.29	2.50	2.22	2.41	2.96	3.21	2.86	0.26	1.01	1.35	0.87
64	2.51	1.97	2.79	2.42	2.56	3.53	4.63	3.57	0.19	1.51	3.02	1.57
66	1.99	1.66	1.75	1.80	2.41	2.19	3.17	2.59	0.83	0.53	1.87	1.08
69	1.90	2.57	2.08	2.18	3.72	3.69	3.82	3.74	2.10	2.06	2.24	2.13
71	1.37	1.56	1.38	1.44	2.75	2.39	2.26	2.47	1.79	1.30	1.12	1.40
73	1.68	1.74	1.37	1.60	3.32	2.43	2.62	2.79	2.35	1.13	1.39	1.62
76	1.57	1.80	1.73	1.70	3.78	2.97	2.18	2.98	2.84	1.73	0.65	1.74
78	1.66	2.20	1.12	1.66	1.85	2.94	2.10	2.30	0.26	1.75	0.60	0.87
80	1.66	2.33	2.72	2.24	2.35	2.94	2.50	2.60	0.15	0.95	0.35	0.48

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83	2.65	2.75	2.39	2.60	3.66	3.07	3.65	3.46	1.45	0.64	1.43	1.17
85	2.12	2.04	1.93	2.03	2.44	2.13	3.05	2.54	0.56	0.14	1.39	0.70
87	2.21	0.88	1.67	1.59	1.83	1.85	2.68	2.12	0.33	0.35	1.49	0.72
90	1.36	1.75	1.38	1.50	3.15	2.44	3.02	2.87	2.25	1.28	2.07	1.87
93	1.56	1.31	1.62	1.50	2.04	2.91	4.54	3.16	0.74	1.92	4.15	2.27
103	2.46	2.23	2.11	2.27	5.16	5.13	4.26	4.85	3.94	3.90	2.71	3.52
106	2.31	2.73	1.34	2.13	2.93	3.26	3.23	3.14	1.09	1.54	1.50	1.38
108	1.02	1.24	1.15	1.14	1.74	1.92	1.75	1.80	0.82	1.06	0.83	0.90
111	1.12	1.32	1.38	1.27	2.73	2.39	1.74	2.29	1.99	1.53	0.64	1.39
113	1.51	0.46	1.11	1.03	1.72	1.12	1.17	1.34	0.94	0.12	0.19	0.42
115	1.41	0.76	1.85	1.34	1.70	1.86	1.64	1.73	0.49	0.71	0.41	0.54
118	1.10	1.19	1.04	1.11	2.56	2.11	1.44	2.04	1.98	1.36	0.45	1.26
120	1.15	0.51	0.75	0.80	1.00	2.04	1.64	1.56	0.27	1.69	1.15	1.04
122	0.56	0.60	0.43	0.53	1.57	0.70	1.40	1.22	1.42	0.23	1.19	0.95
125	1.00	0.76	0.90	0.89	3.02	3.31	1.67	2.67	2.91	3.30	1.06	2.42
127	1.18	1.61	1.20	1.33	1.37	2.81	2.31	2.16	0.05	2.02	1.34	1.14
129	1.04	0.69	0.79	0.84	1.97	1.87	1.50	1.78	1.54	1.41	0.90	1.28
132	0.83	0.77	0.63	0.74	2.88	1.33	0.86	1.69	2.92	0.80	0.16	1.29
134	0.66	0.64	0.53	0.61	1.51	1.82	1.46	1.60	1.23	1.65	1.16	1.35
136	0.47	0.56	0.50	0.51	1.89	0.81	0.94	1.21	1.88	0.41	0.59	0.96
139	0.41	0.39	0.28	0.36	1.73	2.24	2.13	2.03	1.87	2.56	2.41	2.28
141	0.65	0.29	0.34	0.43	0.55	1.60	1.55	1.23	0.16	1.60	1.53	1.10
143	0.32	0.50	0.24	0.35	0.79	1.01	1.42	1.07	0.60	0.90	1.46	0.99
146	0.36	0.36	0.48	0.40	1.62	1.16	0.89	1.22	1.66	1.04	0.67	1.12
148	0.48	0.72	0.56	0.59	1.79	0.94	1.75	1.49	1.64	0.48	1.58	1.23
152	0.47	0.25	0.40	0.37	0.92	0.96	1.04	0.97	0.75	0.80	0.91	0.82
155	0.39	0.33	0.28	0.33	0.72	1.46	1.39	1.19	0.53	1.54	1.45	1.17
157	0.27	0.22	0.50	0.33	1.05	0.66	1.19	0.97	0.98	0.45	1.17	0.87
160	0.25	0.30	0.28	0.28	1.02	1.18	1.03	1.08	1.01	1.23	1.02	1.09
162	0.28	0.34	0.28	0.30	0.64	0.35	0.56	0.52	0.46	0.07	0.35	0.29
164	0.51	0.33	0.27	0.37	0.38	0.40	0.41	0.40	0.01	0.04	0.05	0.03
167	0.60	0.70	0.23	0.51	0.45	0.52	0.48	0.48	-0.08	0.01	-0.04	-0.04
169	0.23	0.41	0.34	0.33	0.19	0.37	0.33	0.30	-0.19	0.05	0.00	-0.05
171	0.35	0.40	0.32	0.36	0.30	0.36	0.34	0.33	-0.08	0.00	-0.03	-0.04
175	0.20	0.31	0.37	0.29	0.29	0.29	0.31	0.30	0.00	0.00	0.03	0.01
After 45 days	51.64	55.41	54.37	53.77	81.43	78.44	79.16	79.68	37.74	33.66	34.64	35.35

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Total	116.19	117.46	114.15	115.92	184.08	182.09	182.35	182.84	92.99	90.27	90.63	91.30
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Remark:* D = Degree of degradation calculated from CO₂ evolution.**Equation:** $(CO_2)_B$ = Measured cumulative CO₂ production by blank $(CO_2)_T$ = Measured cumulative CO₂ production by test material $(CO_2)_{Bmean} = [(CO_2)_{B1} + (CO_2)_{B2} + (CO_2)_{B3}] / 3$ $D = [(CO_2)_T - (CO_2)_{Bmean}] / ThCO_2$ $D_{Tmean} = (D_{T1} + D_{T2} + D_{T3}) / 3$ **4.6.4 Controlled Aerobic Biodegradation Test Data of Reference Material**

Day	CO ₂ (g/vessel)								D (%)			
	B1	B2	B3	B _{mean}	R1	R2	R3	R _{mean}	R1	R2	R3	R _{mean}
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	4.40	4.21	4.69	4.43	7.51	6.85	7.59	7.32	4.20	3.30	4.31	3.94
6	1.73	1.60	1.68	1.67	5.47	5.72	4.07	5.09	5.18	5.53	3.27	4.66
8	5.58	5.91	5.31	5.60	9.61	9.60	9.28	9.50	5.47	5.46	5.02	5.32
10	4.84	5.17	4.76	4.92	6.63	8.51	9.03	8.06	2.33	4.90	5.61	4.28
13	1.56	2.14	2.61	2.10	6.51	6.49	7.35	6.78	6.02	5.99	7.16	6.39
15	1.73	2.75	2.76	2.41	7.20	7.56	7.72	7.49	6.53	7.03	7.24	6.93
17	2.91	3.09	1.90	2.63	6.91	5.32	6.22	6.15	5.84	3.67	4.90	4.80
20	1.57	1.69	2.45	1.90	4.15	3.77	4.80	4.24	3.07	2.55	3.96	3.19
22	2.55	2.45	2.80	2.60	4.66	6.77	7.23	6.22	2.81	5.69	6.32	4.94
24	2.94	2.94	2.94	2.94	6.52	6.30	6.54	6.45	4.88	4.58	4.91	4.79
27	2.87	3.09	2.74	2.90	6.04	5.07	6.02	5.71	4.28	2.96	4.26	3.83
29	2.23	2.45	2.53	2.40	5.31	5.63	3.50	4.81	3.97	4.41	1.50	3.29
31	2.17	2.57	3.36	2.70	5.05	5.42	5.70	5.39	3.21	3.71	4.09	3.67
34	3.56	2.77	2.29	2.87	6.45	6.29	5.95	6.23	4.88	4.67	4.20	4.58
36	2.91	3.57	3.13	3.20	5.59	5.02	4.52	5.04	3.26	2.48	1.80	2.51
38	2.17	2.00	1.87	2.01	3.75	3.66	4.40	3.94	2.37	2.25	3.26	2.63
41	1.94	2.90	3.00	2.61	5.21	3.28	3.58	4.02	3.55	0.91	1.32	1.93
43	2.38	2.41	2.28	2.36	2.82	3.07	2.79	2.89	0.63	0.97	0.59	0.73
45	1.60	1.70	1.27	1.52	2.71	2.34	2.00	2.35	1.62	1.12	0.65	1.13
50	3.39	2.92	3.39	3.23	4.91	4.69	4.28	4.63	2.29	1.99	1.43	1.90
52	2.94	2.26	1.55	2.25	3.85	3.70	3.07	3.54	2.18	1.98	1.12	1.76
56	5.49	4.74	4.35	4.86	6.19	6.01	6.54	6.25	1.81	1.57	2.29	1.89

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59	3.03	3.36	3.18	3.19	3.88	4.01	4.17	4.02	0.94	1.12	1.34	1.13
62	1.87	2.29	2.50	2.22	3.94	3.96	3.52	3.81	2.35	2.37	1.77	2.16
64	2.51	1.97	2.79	2.42	4.21	4.20	2.77	3.73	2.44	2.43	0.48	1.78
66	1.99	1.66	1.75	1.80	2.13	2.47	2.87	2.49	0.45	0.91	1.46	0.94
69	1.90	2.57	2.08	2.18	3.98	3.46	4.55	4.00	2.46	1.75	3.23	2.48
71	1.37	1.56	1.38	1.44	2.33	2.29	2.73	2.45	1.21	1.16	1.76	1.38
73	1.68	1.74	1.37	1.60	2.77	3.09	2.86	2.91	1.60	2.03	1.72	1.78
76	1.57	1.80	1.73	1.70	3.19	3.37	4.10	3.55	2.03	2.28	3.27	2.53
78	1.66	2.20	1.12	1.66	1.72	2.89	1.67	2.09	0.08	1.68	0.01	0.59
80	1.66	2.33	2.72	2.24	3.29	3.34	3.25	3.29	1.43	1.50	1.38	1.44
83	2.65	2.75	2.39	2.60	3.00	3.05	3.64	3.23	0.55	0.61	1.42	0.86
85	2.12	2.04	1.93	2.03	2.70	3.07	2.17	2.65	0.91	1.42	0.19	0.84
87	2.21	0.88	1.67	1.59	2.38	2.40	2.63	2.47	1.08	1.11	1.42	1.20
90	1.36	1.75	1.38	1.50	2.05	2.27	1.72	2.01	0.75	1.05	0.30	0.70
93	1.56	1.31	1.62	1.50	1.80	1.71	1.90	1.80	0.41	0.29	0.55	0.42
103	2.46	2.23	2.11	2.27	2.30	2.45	2.53	2.43	0.04	0.25	0.35	0.21
106	2.31	2.73	1.34	2.13	2.14	2.16	2.12	2.14	0.01	0.04	-0.01	0.01
108	1.02	1.24	1.15	1.14	1.20	1.15	1.16	1.17	0.08	0.01	0.03	0.04
111	1.12	1.32	1.38	1.27	1.31	1.29	1.28	1.29	0.05	0.03	0.01	0.03
113	1.51	0.46	1.11	1.03	1.10	1.04	1.01	1.05	0.10	0.01	-0.03	0.03
115	1.41	0.76	1.85	1.34	1.41	1.35	1.33	1.36	0.10	0.01	-0.01	0.03
118	1.10	1.19	1.04	1.11	1.12	1.13	1.14	1.13	0.01	0.03	0.04	0.03
120	1.15	0.51	0.75	0.80	0.79	0.74	0.72	0.75	-0.01	-0.08	-0.11	-0.07
122	0.56	0.60	0.43	0.53	0.52	0.54	0.53	0.53	-0.01	0.01	0.00	0.00
125	1.00	0.76	0.90	0.89	0.92	0.93	0.92	0.92	0.04	0.05	0.04	0.04
127	1.18	1.61	1.20	1.33	1.34	1.36	1.35	1.35	0.01	0.04	0.03	0.03
129	1.04	0.69	0.79	0.84	0.88	0.87	0.86	0.87	0.05	0.04	0.03	0.04
132	0.83	0.77	0.63	0.74	0.78	0.73	0.76	0.76	0.05	-0.01	0.03	0.02
134	0.66	0.64	0.53	0.61	0.66	0.57	0.61	0.61	0.07	-0.05	0.00	0.01
136	0.47	0.56	0.50	0.51	0.52	0.51	0.52	0.52	0.01	0.00	0.01	0.01
139	0.41	0.39	0.28	0.36	0.42	0.38	0.37	0.39	0.08	0.03	0.01	0.04
141	0.65	0.29	0.34	0.43	0.45	0.46	0.41	0.44	0.03	0.04	-0.03	0.01
143	0.32	0.50	0.24	0.35	0.34	0.36	0.33	0.34	-0.01	0.01	-0.03	-0.01
146	0.36	0.36	0.48	0.40	0.39	0.41	0.40	0.40	-0.01	0.01	0.00	0.00
148	0.48	0.72	0.56	0.59	0.61	0.64	0.59	0.61	0.03	0.07	0.00	0.03
152	0.47	0.25	0.40	0.37	0.36	0.31	0.36	0.34	-0.01	-0.08	-0.01	-0.03

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155	0.39	0.33	0.28	0.33	0.36	0.35	0.36	0.36	0.04	0.03	0.04	0.04
157	0.27	0.22	0.50	0.33	0.31	0.30	0.35	0.32	-0.03	-0.04	0.03	-0.01
160	0.25	0.30	0.28	0.28	0.29	0.30	0.27	0.29	0.01	0.03	-0.01	0.01
162	0.28	0.34	0.28	0.30	0.32	0.33	0.29	0.31	0.03	0.04	-0.01	0.02
164	0.51	0.33	0.27	0.37	0.31	0.36	0.35	0.34	-0.08	-0.01	-0.03	-0.04
167	0.60	0.70	0.23	0.51	0.52	0.49	0.51	0.51	0.01	-0.03	0.00	-0.01
169	0.23	0.41	0.34	0.33	0.41	0.34	0.32	0.36	0.11	0.01	-0.01	0.04
171	0.35	0.40	0.32	0.36	0.36	0.35	0.33	0.35	0.00	-0.01	-0.04	-0.02
175	0.20	0.31	0.37	0.29	0.34	0.27	0.23	0.28	0.07	-0.03	-0.08	-0.01
After 45 days	51.64	55.41	54.37	53.77	108.10	106.67	108.29	107.68	74.12	72.17	74.38	73.56
Total	116.19	117.46	114.15	115.92	189.20	189.12	189.04	189.12	99.97	99.86	99.75	99.86

Equation: $(CO_2)_B$ = Measured cumulative CO₂ production by blank $(CO_2)_R$ = Measured cumulative CO₂ production by reference material $(CO_2)_{Bmean} = [(CO_2)_{B1} + (CO_2)_{B2} + (CO_2)_{B3}] / 3$ $D = [(CO_2)_R - (CO_2)_{Bmean}] / ThCO_2$ $D_{Rmean} = (D_{R1} + D_{R2} + D_{R3}) / 3$ **4.7 Additional Information**

For adjusting humidity in the composting vessels water was carefully added to the vessel once a week.

The concentration of oxygen was checked every day during the first week of the test and once a week afterwards. For aerobic conditions the concentration of oxygen shall be higher than 6%. The concentration did not fall below 18% during the test.

Control and cellulose reactors and the test item reactors showed a good structure. The soil is soft and unconsolidated, moisture content is suitable. Touch the soil, feel somewhat sticky and have some free water available when gently pressed by hand. No fungal growth was observed.

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5 Disintegration

5.1 General Test Information

Test Method: ISO 16929: 2021

Ovens: The ovens used for this test contain of a heating system and a flow-rate adjustable air providing system. The temperature of the compost can be determined at any time. The volume of the composting oven is 60 liters.

O₂-determination: An instrument (CY-C12) is used for determining the concentration of oxygen in the exhaust gas directly.

5.2 Blank Compost

5.2.1 Composition of Blank Compost

The biowaste contains of a mixture of 7.0kg soil (peilei), 1.2kg onions, 1.2kg carrots, 1.2kg pepper, 1.5kg sawdust, 1.9kg rice and 1.0kg soybeans.

Mass for rice and soybeans is wet mass after soaking the rice and the soybeans in water for 12 hours.

5.2.2 Conditions of Blank Compost in Beginning of Test

<u>Conditions</u>	
Water content (%)	63.9
Volatile solids of total dry mass (%)	60.0
C-N-ratio	20.4
pH-Value	6.92

5.3 Set Up of the Testing

The whole mixture is composted in the oven. No nets are used during this test.

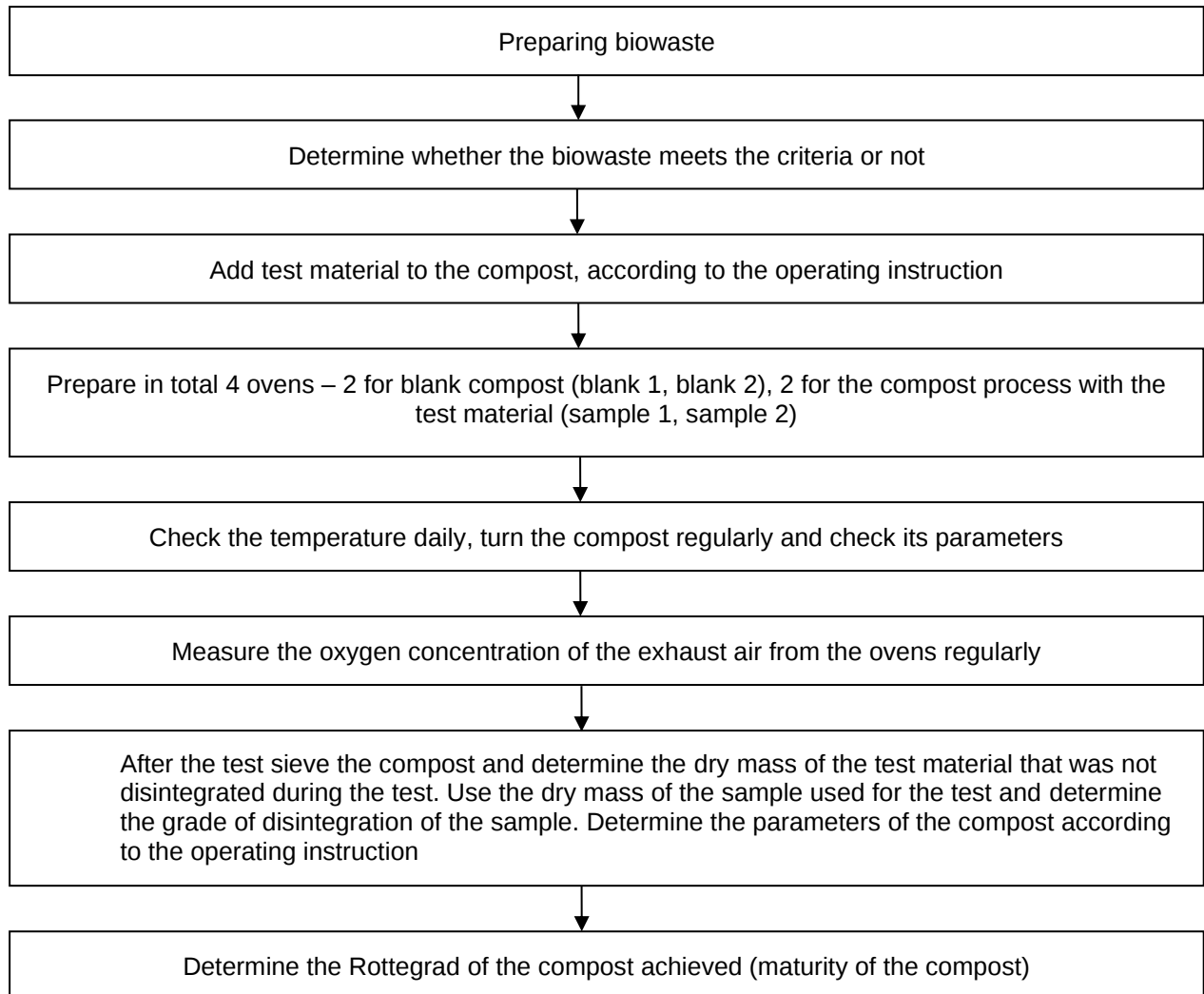
Wet mass of the blank compost: 15.0kg

Sample compost: film (M001) pieces in around 10cm*10cm size + granules (M002) are added to the blank compost to make the sample compost.

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5.4 Flow Chart of Experiment



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5.5 Results**5.5.1 Properties of Test Material**

Parameter	M001
Total dry solids (%)	99.8
Volatile solids of total dry mass (%)	60.4
Requirement for volatile solids (%)	≥ 50
Moisture content (%)	0.2

5.5.2 Amount of Test Material and Biowaste in Ovens before Disintegration

	Biowaste	Test Material	
	Wet mass (kg)	Wet mass in final form (g) M001	Wet mass in fine form (g) M002
Blank 1	15.0	None	None
Blank 2	15.0	None	None
Sample 1	15.0	154.7	1366.2
Sample 2	15.0	154.1	1365.7

5.5.3 Amount of Test Material after the Process of Disintegration**Sample 1**

Parameter	Unit	Result
Total dry mass of the sample used for the test	g	154.4
Total dry mass of sample (>2mm-fraction) after the test:	g	0
Degree of disintegration	%	100

Sample 2

Parameter	Unit	Result
Total dry mass of the sample used for the test	g	153.8
Total dry mass of sample (>2mm-fraction) after the test:	g	0
Degree of disintegration	%	100

The amount of sample found after sieving the final compost through a 2mm sieve, washing and drying the material, is less than 10% of the sample amount placed in the biowaste at the beginning of the test. The physical breakdown during the composting process was successful.

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5.5.4 Test Results of the Compost after Disintegration**5.5.4.1 Wet Mass of the Compost Achieved after Disintegration**

Parameter	Unit	Result
Wet mass of the compost (blank 1)	kg	9.7
Wet mass of the compost (blank 2)	kg	8.9
Wet mass of the compost (sample 1)	kg	10.9
Wet mass of the compost (sample 2)	kg	12.1

5.5.4.2 Parameters of the Compost Achieved after Disintegration by Analyzing the <10mm Fraction

Parameter	Unit	Blank 1	Blank 2	Sample 1	Sample 2
Total dry solids	%	98.8	98.7	98.0	98.2
Volatile solids	%	43.1	37.5	40.0	41.7
pH	-	6.49	8.02	7.04	8.04
Phosphorus	mg/kg	5680	5730	5480	5500
Nitrite as N	mg/kg	< 0.60	< 0.60	< 0.60	< 0.60
Electrical conductivity	mS/m	154	165	157	149
Total nitrogen as N	g/kg	6.18	6.36	6.45	7.05
Nitrate as N	mg/kg	36.2	42.6	22.2	19.4
Ammonium nitrogen as N	mg/kg	23.9	26.4	11.9	13.8
Potassium	mg/kg	21400	21600	19800	18500
Magnesium	mg/kg	6300	6370	6270	6050
Volumetric density	Kg/L	0.72	0.76	0.77	0.75
Total organic carbon	%	10.4	10.8	11.7	12.4

There is no obvious deviation on the tested parameters between the composts obtained after the test on disintegration.

5.5.4.3 Rottegrad of the Compost Achieved after Disintegration

The Rottegrad is a parameter for determining the maturity of the compost obtained after the test on disintegration. After 84 days the final compost is placed in Dewar vessels for 72 hours. The highest temperature during these 72 hours is used for comparing with the limits for the different Rottegrads (see table below).

As mature compost does not undergo a significant self-heating process anymore, the temperature shall be below 30°C.

Parameter	Amount of Compost (kg)	Temperature after 72 h (°C)	Rottegrad
Blank 1	1.0	15.8	V
Blank 2	1.0	14.7	V
Sample 1	1.0	15.5	V

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Sample 2	1.0	14.3	V
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Reference:

Maximum Temperature	> 60°C	50.1°C to 60°C	40.1°C to 50°C	30.1°C to 40°C	≤ 30°C
Rottegrad	I	II	III	IV	V

Validity parameter: The compost shall have a Rottegrad of IV to V after 12 weeks. This validity parameter has been fulfilled.

5.5.5 Appearance of Blank and Sample Compost**5.5.5.1 Appearance of Blank Compost****Before test****After 1 week****After 3 weeks****After 4 weeks****After 5 weeks****After 6 weeks****After 7 weeks****After 8 weeks****After 9 weeks**

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After 10 weeks



After 11 weeks



After test (After 12 weeks)

5.5.5.2 Appearance of Sample Compost



Before test



After 1 week



After 3 weeks



After 4 weeks



After 5 weeks



After 6 weeks



After 7 weeks



After 8 weeks



After 9 weeks

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After 10 weeks



After 11 weeks

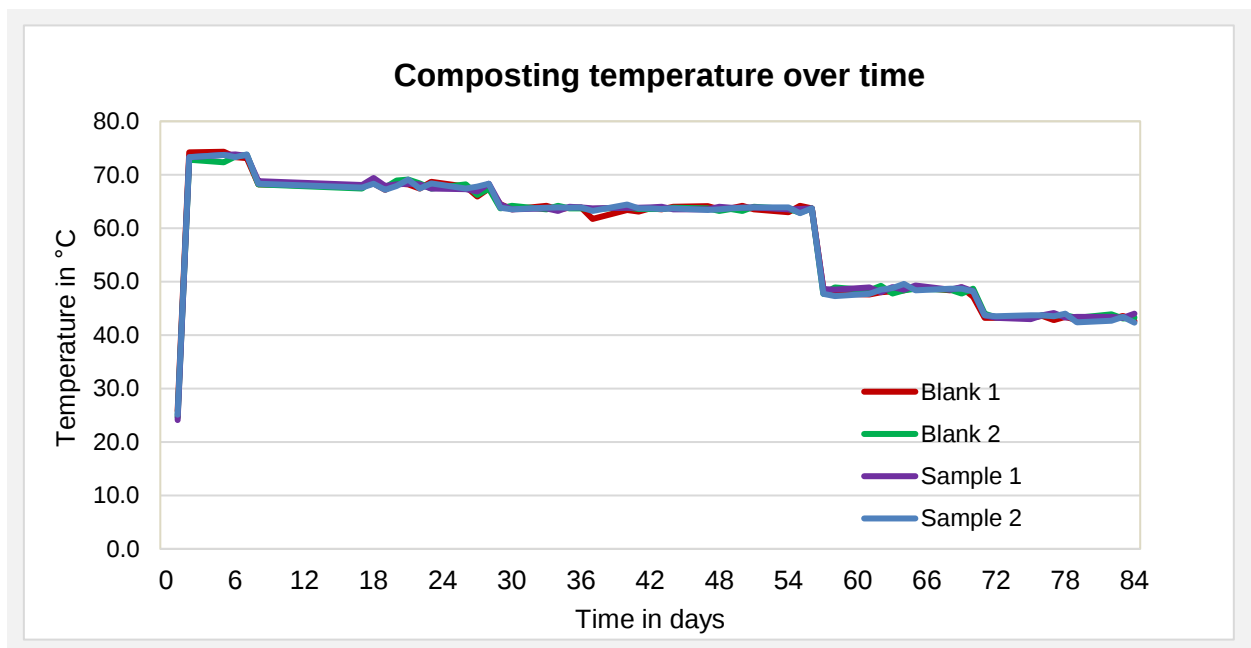


After test (After 12 weeks)

Remark: Due to public holidays, picture of week 2 was skipped. After test, no sample residues are distinguished to the naked eye from the other matter in the compost at a distance of 500 mm. No suspicion of visual contamination can be seen at the end of the test. The final interpretation is to be assessed by the certification body as the presence of visual contamination will render this test result uncompliant with the standard/certification scheme.

5.6 Diagrams

5.6.1 Course of the Temperature during the Test



Temperature over time

Validity parameter:

Following minimum and maximum temperatures shall be respected in the ovens during the test.

- Days 2–7: between 60 °C and 75 °C
- Days 8–28: between 55 (±5) °C and 70 (±5) °C
- Days 29–56: between 50 (±5) °C and 65 (±5) °C
- Days 57–70: below 55 °C
- Days 71–84: below 45 °C

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This requirement has been fulfilled. For single values please see below table.

Temperature of the compost during the test (°C)

Day	Blank 1	Blank 2	Sample 1	Sample 2
1	25.8	24.6	24.1	25.1
2	74.2	72.8	73.3	73.3
5	74.3	72.3	73.7	73.7
6	73.3	73.4	73.8	73.3
7	73.1	73.7	73.5	73.8
8	68.2	68.2	68.8	68.3
17	67.8	67.4	68.1	67.6
18	68.4	69.1	69.4	68.3
19	67.2	67.6	67.9	67.2
20	68.4	68.9	68.2	67.9
21	68.2	69.1	68.3	69.1
22	67.4	68.4	68.2	67.4
23	68.7	67.4	67.4	68.4
26	67.8	68.2	67.3	67.4
27	65.9	66.2	66.9	67.8
28	67.4	67.4	68.3	68.3
29	64.5	63.7	64.4	63.8
30	63.5	64.2	63.5	63.5
33	64.2	63.5	63.7	63.8
34	63.5	64.2	63.2	63.9
35	63.8	63.7	64.0	63.8
36	63.9	63.7	63.9	63.9
37	61.7	63.6	63.7	63.2
40	63.4	63.9	63.8	64.4
41	63.1	63.6	63.8	63.7
42	63.7	63.6	63.9	63.7
43	63.5	63.6	64.0	63.6
44	64.0	63.8	63.5	63.7
47	64.1	63.7	63.5	63.4
48	63.5	63.2	64.0	63.5
49	63.7	63.6	63.8	63.7
50	64.2	63.2	63.8	63.8
51	63.5	64.0	63.9	63.9

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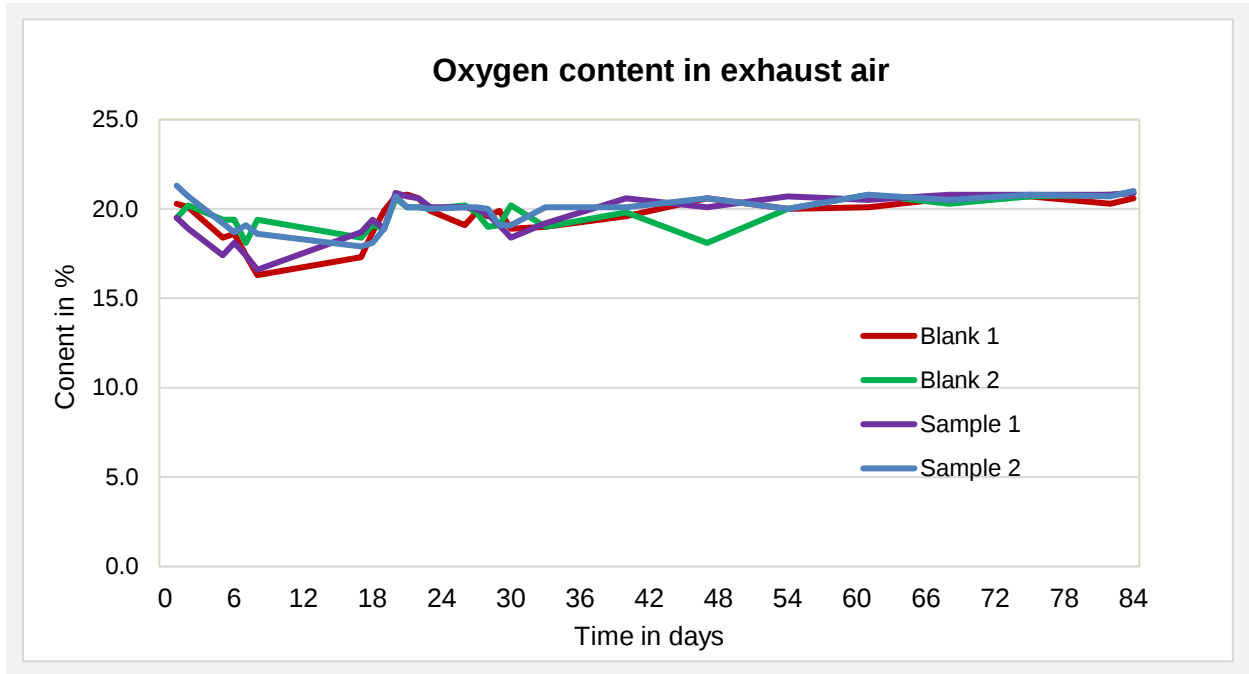
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54	63.0	63.6	63.5	63.9
55	64.2	62.9	63.6	62.8
56	63.7	63.7	63.7	63.7
57	48.7	47.7	48.6	47.7
58	47.8	48.9	48.5	47.3
61	47.6	48.4	48.9	47.7
62	48.0	49.2	48.0	48.5
63	48.2	47.8	49.0	48.8
64	48.4	48.4	48.5	49.6
65	49.0	48.7	49.3	48.4
68	48.4	48.5	48.5	48.7
69	48.9	47.8	49.0	48.7
70	47.2	48.7	48.2	48.2
71	43.2	44.0	43.7	43.7
72	43.2	43.3	43.2	43.5
75	43.3	43.2	43.0	43.7
76	43.6	43.7	43.7	43.7
77	42.8	43.7	44.1	43.5
78	43.4	43.7	43.3	44.0
79	42.8	43.2	43.4	42.4
82	43.0	43.9	43.4	42.7
83	43.6	43.1	43.2	43.4
84	42.6	43.3	44.0	42.3

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5.6.2 Course of the Concentration of Oxygen in the Exhaust Gas during the Test



Concentration of oxygen over time

Validity parameter: For ensuring aerobic conditions, the concentration of oxygen in the exhaust gas never falls below 10%. This requirement has been fulfilled. For single values please see below table.

Concentration of oxygen in the exhaust gas (%)

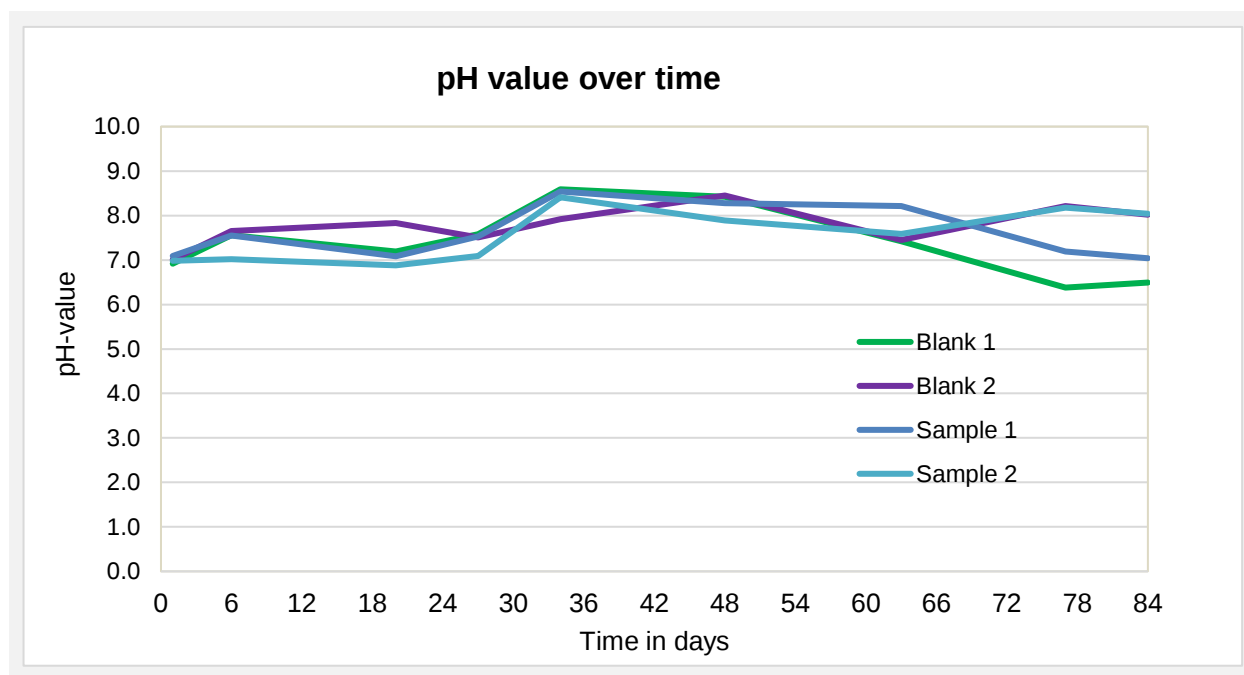
Day	Blank 1	Blank 2	Sample 1	Sample 2
1	20.3	19.5	19.5	21.3
2	20.1	20.2	18.9	20.7
5	18.4	19.4	17.4	19.2
6	18.6	19.4	18.1	18.7
7	17.4	18.1	17.4	19.1
8	16.3	19.4	16.6	18.6
17	17.3	18.4	18.7	17.9
18	18.7	19.1	19.4	18.1
19	19.9	18.9	18.9	18.9
20	20.7	20.6	20.9	20.7
21	20.8	20.1	20.7	20.1
22	20.6	20.1	20.6	20.1
23	19.9	20.0	20.1	20.0
26	19.1	20.2	20.1	20.1
27	19.8	19.8	20.0	20.1

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28	19.6	19.0	19.7	20.0
29	19.9	19.1	19.1	19.1
30	18.9	20.2	18.4	19.1
33	19.0	19.0	19.2	20.1
40	19.6	19.8	20.6	20.1
47	20.6	18.1	20.1	20.6
54	20.0	20.0	20.7	20.0
61	20.1	20.8	20.5	20.8
68	20.6	20.3	20.8	20.5
75	20.7	20.7	20.8	20.8
82	20.3	20.8	20.8	20.7
84	20.6	20.9	20.9	21.0

5.6.3 Graph of Development of pH Value of the Compost during Composting Process



pH Value over time

Validity parameter: The pH-value never falls below 5 and raises to a value above 7 during the test. This requirement has been fulfilled. For single values please see below table.

pH value of the compost during the test

Day	Blank 1	Blank 2	Sample 1	Sample 2
1	6.92	7.01	7.09	6.98
6	7.56	7.65	7.55	7.02
20	7.19	7.83	7.08	6.88

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27	7.58	7.51	7.53	7.09
34	8.59	7.92	8.54	8.41
48	8.42	8.45	8.28	7.89
63	7.42	7.45	8.21	7.59
77	6.38	8.21	7.19	8.18
84	6.49	8.02	7.04	8.04

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6 Plant test**6.1 General test information**Test Method : EN 13432: 2000 Annex E and OECD 208: 2006Plants : For this test seeds for corn and soybean are used. Seeds are stored in dry room at home temperature for no more than 2 months.

Common name	Soybean	Corn
Class	di-cotyledonae	mono-cotyledonae
Family	Fabaceae (Leguminosae)	Poaceae (Gramineae)
Species	<i>Glycine max (G. soja)</i>	<i>Zea mays</i>
percentage germination	> 85%	
seed size	6-9mm	6-10mm

Plant Pots : Plants grow in pots made of PP in volumes of 10L.Reference Substrate : A mixture of commercial potting soil as substrate (peat soil) and siliceous sand has been used.

Soil particle distribution: < 6mm; Total organic carbon: 21.8%; Volatile solids content: 49.6%; Total dry solids: 75.5%; pH value: 7.19

Compost: Use the composts < 10mm fraction including sample compost and blank compost obtained after 12 weeks composting and sieving with 10mm sieve according to ISO 16929: 2021.**6.2 Set up of the plant test**

Prepare 24 pots and fill them with mixtures of the reference substrate with 25% or 50% (w/w) of blank compost or sample compost.

The total soil in each pot is 1400.0g, and peat soil is mixed with siliceous sand in a ratio of 1:1(w/w) to prepare the reference substrate.

In a plant test after complete disintegration, weight setup of each pot is shown in table below.

Mix ratio	Weight (g/pot)		
	Blank compost/Sample compost	Reference substrate	Total
25%	350.0	1050.0	1400.0
50%	700.0	700.0	1400.0

3 parallels were set for each mix ratio and the pots numbers are listed as below:

Plant	Mix ratio	Pot No.	
		Blank compost	Sample compost
Soybean	25 %	Parallel 1~3	Parallel 1~3
	50 %	Parallel 1~3	Parallel 1~3

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Corn	25 %	Parallel 1~3	Parallel 1~3
	50 %	Parallel 1~3	Parallel 1~3

Evenly add 100 seeds of soybean or corn in each pot and add water. After watering, the pots are set in a warm house which staying dark all days during the germination period. For ensuring identical conditions the pots are stored in a greenhouse. The plants are watered daily and no additional fertilization is used.

Temperature: 22°C ± 10°C;

Relative humidity: 70% ± 25%;

Photoperiod: 16hours/day;

Light: luminance of 25900 lx ± 3700 lx (350 ± 50 µE/ m²/s), no less than 14800 lx (200 µE/ m²/s), measured at the top of the canopy.

After 50% of the seeds in the pots with a mixture of blank compost has been emerged, the plant growth test was kept running for 14 ~ 21 days.

6.3 Summary of test results

Parameters	Results			Requirement	Conclusion
	Plant	Mix ratio 25%	Mix ratio 50%		
Mean Germination Rate (%)	Soybean	100.4	101.5	≥ 90	Pass
	Corn	99.6	101.8		
Mean Dry Biomass / plant (%)	Soybean	96.3	96.1	≥ 90	Pass
	Corn	105.5	96.0		
Alternatively, Mean Wet Biomass / plant (%)	Soybean	98.8	98.7	≥ 90	Pass
	Corn	102.8	97.4		

Validity Criteria :

The seedling emergence is at least 70%.

☒ Yes

☐ No

The seedlings do not exhibit visible phytotoxic effects (e.g. chlorosis, necrosis, wilting, leaf and stem deformations) and the plants exhibit only normal variation in growth and morphology for that particular species.

☒ Yes

☐ No

The mean survival of emerged control seedlings is at least 90% for the duration of the study.

☒ Yes

☐ No

Environmental conditions for a particular species are identical and growing media contain the same amount of soil matrix, support media, or substrate from the same source.

☒ Yes

☐ No

As the four criteria above for the blank have been fulfilled, the test is considered to be valid.

For detailed information, please see the following pages.

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6.4 Results**6.4.1 Germination rate**

The pots were placed in the green room. It was 4 days after start, over 50% seeds each pot have been emerged.

Mix ratio	Test No.	Germination of Soybean (numbers)		Germination Rate (%) sample compost as percentage of blank compost	Mean Germination Rate (%)
		Blank compost	Sample compost		
25%	Parallel 1	92	94	102.2	100.4
	Parallel 2	93	93	100.0	
	Parallel 3	93	92	98.9	
50%	Parallel 1	92	92	100.0	101.5
	Parallel 2	92	93	101.1	
	Parallel 3	91	94	103.3	

Mix ratio	Test No.	Germination of Corn (numbers)		Germination Rate (%) sample compost as percentage of blank compost	Mean Germination Rate (%)
		Blank compost	Sample compost		
25%	Parallel 1	92	92	100.0	99.6
	Parallel 2	93	93	100.0	
	Parallel 3	92	91	98.9	
50%	Parallel 1	91	92	101.1	101.8
	Parallel 2	91	94	103.3	
	Parallel 3	92	93	101.1	

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6.4.2 Wet Biomass of the Plants

15 days after the germination rate of the blank mixtures has reached 50%, the test was stopped. The plants were cut right above the soil. Some plants were removed which were attached to the soil. The wet biomass has been determined after then. By comparing the wet mass of plants growing on mixture blank and mixture sample it is checked whether the sample has a negative effect on the plant growth or not.

Mix ratio	Test No.	Total Wet Biomass of Soybean (g)		Wet Biomass of Soybean / plant (g)		Wet Biomass / plant (%) Sample compost as percentage of blank compost	Mean Wet Biomass / plant (%)
		Blank compost	Sample compost	Blank compost	Sample compost		
25%	Parallel 1	265.3	264.7	2.884	2.877	99.8	98.8
	Parallel 2	259.7	258.6	2.854	2.842	99.6	
	Parallel 3	268.1	260.3	2.914	2.829	97.1	
50%	Parallel 1	266.4	260.3	2.896	2.829	97.7	98.7
	Parallel 2	260.3	257.8	2.860	2.833	99.1	
	Parallel 3	256.9	263.5	2.854	2.833	99.3	

Mix ratio	Test No.	Total Wet Biomass of Corn (g)		Wet Biomass of Corn / plant (g)		Wet Biomass / plant (%) Sample compost as percentage of blank compost	Mean Wet Biomass / plant (%)
		Blank compost	Sample compost	Blank compost	Sample compost		
25%	Parallel 1	152.7	160.6	1.678	1.746	104.1	102.8
	Parallel 2	158.2	154.3	1.701	1.696	99.7	
	Parallel 3	150.9	157.7	1.658	1.733	104.5	
50%	Parallel 1	154.8	159.5	1.739	1.734	99.7	97.4
	Parallel 2	164.7	160.3	1.810	1.742	96.2	
	Parallel 3	158.2	157.5	1.758	1.694	96.4	

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6.4.3 Dry Biomass of the Plants

After the plants were dried at 60°C for 12 hours and cooling down, the dry biomass has been determined. By comparing the dry mass of plants growing on mixture blank and mixture sample it is checked whether the sample has a negative effect on the plant growth or not.

Mix ratio	Test No.	Total Dry Biomass of Soybean (g)		Dry Biomass of Soybean / plant (g)		Dry Biomass / plant (%) Sample compost as percentage of blank compost	Mean Dry Biomass / plant (%)
		Blank compost	Sample compost	Blank compost	Sample compost		
25%	Parallel 1	22.3	21.8	0.242	0.237	97.9	96.3
	Parallel 2	21.3	20.5	0.234	0.225	96.2	
	Parallel 3	22.8	21.6	0.248	0.235	94.8	
50%	Parallel 1	22.1	20.3	0.240	0.221	92.1	96.1
	Parallel 2	21.6	20.5	0.237	0.225	94.9	
	Parallel 3	20.6	21.6	0.229	0.232	101.3	

Mix ratio	Test No.	Total Dry Biomass of Corn (g)		Dry Biomass of Corn / plant (g)		Dry Biomass / plant (%) Sample compost as percentage of blank compost	Mean Dry Biomass / plant (%)
		Blank compost	Sample compost	Blank compost	Sample compost		
25%	Parallel 1	9.4	10.3	0.103	0.112	108.7	105.5
	Parallel 2	10.2	10.1	0.110	0.111	100.9	
	Parallel 3	9.2	9.8	0.101	0.108	106.9	
50%	Parallel 1	9.7	10.1	0.109	0.110	100.9	96.0
	Parallel 2	10.8	10.3	0.119	0.112	94.1	
	Parallel 3	10.2	9.8	0.113	0.105	92.9	

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6.4.4 Survival Rate of Blank Compost

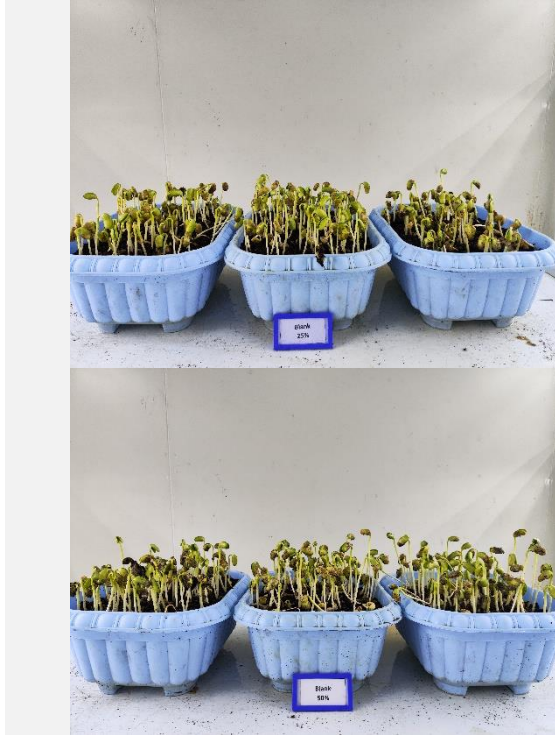
Plant	Mix ratio	Test No.	Survival Numbers	Germination Numbers	Survival Rate (%)	Mean Survival Rate (%)
Soybean	25%	Parallel 1	92	92	100.0	98.9
		Parallel 2	91	93	97.8	
		Parallel 3	92	93	98.9	
	50%	Parallel 1	92	92	100.0	99.3
		Parallel 2	91	92	98.9	
		Parallel 3	90	91	98.9	
Corn	25%	Parallel 1	91	92	98.9	99.3
		Parallel 2	93	93	100.0	
		Parallel 3	91	92	98.9	
	50%	Parallel 1	89	91	97.8	98.5
		Parallel 2	91	91	100.0	
		Parallel 3	90	92	97.8	

Remark: Mean Survival rate (%) = mean survival numbers/mean germination numbers*100%

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6.4.5 Appearance of plants during the test



Blank compost **Sample compost**
Soybean growth, during test
25% Mix on the top, 50% Mix on the bottom



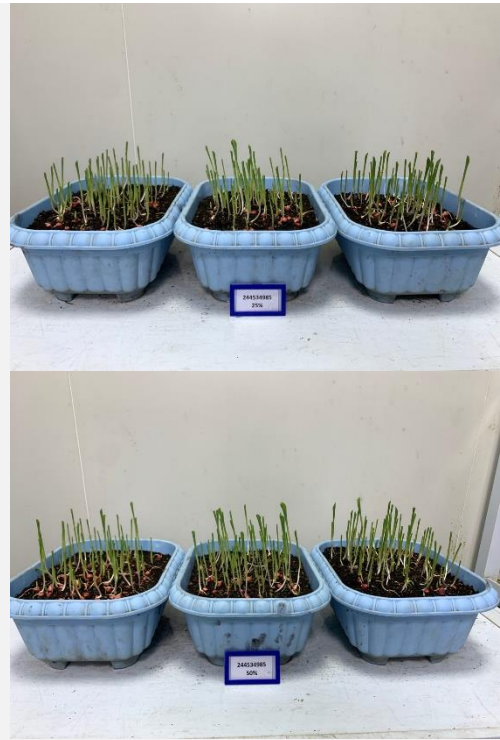
Blank compost **Sample compost**
Soybean growth, after test
25% Mix on the top, 50% Mix on the bottom

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Blank compost



Sample compost

Corn growth, during test
25% Mix on the top, 50% Mix on the bottom



Blank compost



Sample compost

Corn growth, after test
25% Mix on the top, 50% Mix on the bottom

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6.4.6 Additional information

No abnormal observations. The seedlings do not exhibit visible phytotoxic effects (e.g. chlorosis, necrosis, wilting, leaf and stem deformations) and the plants exhibit only normal variation in growth and morphology for soybean and corn.

-END-

General Terms and Conditions of Business of TÜV Rheinland in Greater China

1. Scope
These General Terms and Conditions of Business of TÜV Rheinland in Greater China ("GTCB") are applicable between the client and one or more member entities of TÜV Rheinland in Greater China as made in the case may be by the client. The Greater China hereof refers to the regions within the territories of China. The client hereby indicates:

(a) a natural person capable to form legally binding contracts under the applicable laws who concludes the contract not for the purpose of a daily use;

(b) the incorporated or unincorporated entity duly organized, validly existing and capable to form legally binding contracts under the applicable law;

The following terms and conditions apply to agreed services including consultancy services, information, deliveries and similar services as well as ancillary services and other secondary obligations provided within the scope of contract performance.

Any standard terms and conditions of the client of any nature shall not apply and shall hereby be expressly excluded. No standard contractual terms and conditions of the client shall form part of the contract even if TÜV Rheinland does not explicitly object to them.

In the context of an ongoing business relationship with the client, this GTCB shall also apply to future contracts with the client without TÜV Rheinland having to refer them separately in each individual case.

2. Quotations
Unless otherwise agreed, all quotations submitted by TÜV Rheinland can be changed by TÜV Rheinland without notice prior to its acceptance and confirmation by the other party.

3. Coming into effect and duration of contracts
The contract shall come into effect for the agreed terms upon the quotation letter of TÜV Rheinland or a separate contractual document being signed by both contracting parties, or upon the works requested by the client being carried out by TÜV Rheinland, if the client instructs TÜV Rheinland without receiving a quotation from TÜV Rheinland (quotation). TÜV Rheinland is, in its sole discretion, entitled to accept the order by giving written notice of such acceptance (including notice sent via electronic means) or by performing the requested services.

The contract term starts upon the coming into effect of the contract in accordance with article 3.1 and shall continue until the term agreed in the contract.

If the contract provides for an extension of the contract term, the contract term will be extended by the term provided for in the contract unless terminated in writing by either party with a three-month notice prior to the end of the contractual term.

4. Scope of services
The scope and type of the services to be provided by TÜV Rheinland shall be specified in the contractually agreed service scope of TÜV Rheinland by both parties. If no such separate service scope of TÜV Rheinland exists, then the written confirmation of order by TÜV Rheinland shall be decisive for the service to be provided. Unless otherwise agreed, services beyond the scope of the service description (e.g. checking the correctness and functionality of parts, products, processes, installations, organizations not listed in the service description, as well as the intended use and application of such) are not owed. In the case of responsibility for the construction, selection of materials and assembly of installations construction or intended use of an examined part, product, process and plant, unless this is expressly stated in the order.

The agreed services shall be performed in compliance with the regulations in force at the time the contract is entered into.

TÜV Rheinland is entitled to determine, in its sole discretion, the method and nature of the assessment unless otherwise agreed in writing or if mandatory provisions require a specific procedure to be followed. On execution of the work there shall be no simultaneous assumption of any guarantee of the correctness (propriety) and working order of other tests or examined parts nor of the installation as a whole and its upstream and/or downstream processes, organizations, use and application in accordance with regulations, nor of the systems on which the installation is based. In particular, TÜV Rheinland shall assume no responsibility for the construction, selection of materials and assembly of installations examined, nor for their use and application in accordance with regulations, unless these questions are expressly covered by the contract.

In the case of inspection work, TÜV Rheinland shall not be responsible for the accuracy or checking of the safety programmes or safety regulations on which the inspections are based, unless otherwise expressly agreed in writing.

If mandatory legal regulations and standards or official requirements for the agreed service scope change after conclusion of the contract, with a written notice to the client, TÜV Rheinland shall be entitled to additional remuneration for resulting additional expenses.

The services to be provided by TÜV Rheinland under the contract are agreed exclusively with the client. A contract of third parties with the services of TÜV Rheinland, as well as making available of and justifying confidence in the work results (test reports, test results, expert reports, etc.) is not part of the agreed services. This also applies if the client passes on work results - in full or in extracts - to third parties in accordance with clause 11.4.

The client understands and agrees that in order to perform the contract with TÜV Rheinland, the client may need to sign one or more contracts/agreements with a/more third party(ies) and establish legal relationships with/third/those third party(ies) according to such contracts/agreements. TÜV Rheinland will merely bear the corresponding legal liability according to this contract and the direct services actually to be provided by our company in the service process. If the relevant services are not directly provided by TÜV Rheinland (including but not limited to any testing and certification services to be provided by third testing and certification bodies), TÜV Rheinland will provide the client as agent for such relevant services. In order to achieve the purpose of the contract, the client hereby agrees that TÜV Rheinland can also sub-entrust to a third party to provide agency services, but TÜV Rheinland shall not bear any responsibility for any services to be provided by any third parties (including but not limited to the testing and/or certification services to be entrusted and/or applied for by our company on behalf of the client or third testing and/or certification bodies, agency services provided by any other agent(s)), etc.). Besides, the client shall be liable in accordance with the relevant laws and regulations and/or the terms under the contract. If the client is required to conduct any annual review/surveillance of the relevant testing and/or certification service results and pay additional fees in accordance with the relevant laws and regulations or the testing and certification rules, such fees are not within the scope of the contract price, the client shall timely perform the obligation of such annual review/surveillance and pay the corresponding fees. If the client fails to perform such obligations of the annual review/surveillance or less payment, it may lead to adverse consequences (such as failed suspending/cancellation/invalidity of testing and/or certification results, which shall not be borne/liable by TÜV Rheinland).

The service contract agreed in the contract, if the client requires TÜV Rheinland to deliver relevant test samples, data, etc., to any overseas laboratory or other places or sites to be designated by the client, TÜV Rheinland shall not have any responsibilities or risks for any problems during such delivery and the transportation procedure and the safety of the samples and/or the materials, etc.). Besides, the relevant freight fees shall be borne by the client.

5. Performance period/dates
The contractually agreed period/dates of performance are based on estimates of the work involved as they are provided in the details provided by the client. They shall only be binding if confirmed as binding by TÜV Rheinland in writing.

If binding periods of performance have been agreed, these periods shall not commence until the client has submitted all required documents to TÜV Rheinland.

Sections 5.1 and 5.2 also apply, even without express approval by the client, to all extensions of agreed period/dates of performance not caused by TÜV Rheinland.

TÜV Rheinland is not responsible for a delay in performance, in particular if the client has not fulfilled his duties to cooperate in accordance with clause 5.1 or has not done so in time and, in particular, has not provided TÜV Rheinland with all documents and information required for the performance of the service as specified in the contract.

If the performance of TÜV Rheinland is delayed due to unforeseeable circumstances such as force majeure, strikes, business interruptions, business relocations, transport obstacles, etc., TÜV Rheinland is entitled to postpone performance for a reasonable period of time which corresponds at least to the duration of the hindrance plus any time period which may be required to resume performance.

If the client is obliged to comply with legal, officially prescribed and/or by the accreditator prescribed deadlines, it is the client's responsibility to agree on performance dates with TÜV Rheinland, which enable the client to comply with the legal and/or officially prescribed deadlines. TÜV Rheinland assumes no responsibility in this respect unless TÜV Rheinland expressly agreed in writing specifically stating that ensuring the deadlines is the contractual obligation of TÜV Rheinland.

6. The client's obligation to cooperate
The client shall guarantee that all cooperation required on its part, its agents or third parties will be provided in good time and at no cost to TÜV Rheinland.

Design documents, supplies, auxiliary staff, etc. necessary for performance of the services shall be made available free of charge by the client. Moreover, a laboration action of the client must be undertaken in accordance with legal provisions, standards, safety regulations and accident prevention instructions. And the client represents and warrants that:

a) it has required qualifications;

b) the product, service or management system to be certified complies with applicable laws and regulations; and

c) it doesn't have any illegal and dishonest behaviours or is not included in the list of Enterprises with Serious Illegal and Dishonest Acts of People's Republic of China.

If the client breaches the aforesaid representations and warranties, TÜV Rheinland is entitled to i) immediately terminate the contract/order without prior notice; and i) withdraw the issued testing report/certificates if any.

The client shall bear any additional cost incurred on account of work having to be redone or being delayed as a result of late, incorrect or incomplete information provided by or lack of proper cooperation from the client. Even where a fixed or maximum price is agreed, TÜV Rheinland shall be entitled to charge extra fees for such additional expense.

7. Prices
If the scope of performance is not laid down in writing when the order is placed, invoicing shall be based on costs actually incurred. If no price is agreed in writing, invoicing shall be made in accordance with the prices list of TÜV Rheinland in force at the time of performance.

Unless otherwise agreed, work shall be invoiced according to the progress of the work.

If the execution of an order extends over more than one month and the value of the contract or the agreed fixed price exceeds €25,000 or equivalent value in local currency, TÜV Rheinland may demand payments on account or in instalments.

8. Payment terms
All invoice amounts shall be due for payment within 30 days of the invoice date without deduction on receipt of the invoice. No discounts and rebates shall be granted.

Payments shall be made to the bank account of TÜV Rheinland as indicated on the invoice, stating the invoice and client numbers.

In cases of default of payment, TÜV Rheinland shall be entitled to claim default interest at the applicable short term loan interest rate publicly announced by a reputable commercial bank in the country where TÜV Rheinland is located. If the client is not in default of payment, TÜV Rheinland shall be entitled to claim default interest at the applicable short term loan interest rate publicly announced by a reputable commercial bank in the country where TÜV Rheinland is located.

Should the client default in payment of the invoice despite being granted a reasonable grace period, TÜV Rheinland shall be entitled to cancel the contract, withdraw the certificate, claim damages for non-performance and refuse to continue performance of the contract.

The provisions set forth in 8.4 shall also apply in cases involving retention charges, cessation of payment, commencement of insolvency proceedings against the client's assets or cases in which the commencement of insolvency proceedings has been dismissed due to lack of assets.

Objections to the invoices of TÜV Rheinland shall be submitted in writing within two weeks of receipt of the invoice.

TÜV Rheinland shall be entitled to demand appropriate advance payments.

TÜV Rheinland shall be entitled to raise its fees at the beginning of a month if overheads and/or purchase costs have increased. In this case, TÜV Rheinland shall notify the client in writing of the rise in fees. This notification shall be issued one month prior to the date on which the rise in fees shall come into effect (period of notice of TÜV Rheinland). If the rise in fees remains under 5% of the contractual year, the client shall not have the right to terminate the contract. If the rise in fees exceeds 5% per contractual year, the client shall be entitled to terminate the contract by the end of the period of notice of changes in fees. If the contract is not terminated, the changed fees shall be deemed to have been agreed upon by the time of the expiry of the notice period.

Only legally established and undisputed claims may be offset against claims by TÜV Rheinland.

TÜV Rheinland reserves the right at all times to set off any amount due or payable by the client, including but not limited to set off any amount due or payable by the client under any contracts, agreement and/or orders/quotations reached with TÜV Rheinland.

9. Acceptance of work
Any part of the work result ordered which is complete in itself may be presented by TÜV Rheinland for acceptance as an instalment. The client shall be obliged to accept it immediately.

If acceptance is required or contractually agreed in an individual case, this shall be deemed to have taken place two (2) weeks after completion and handover of the work, unless the client refuses acceptance within the period starting at least one full business day of completion of the work.

The client is not entitled to refuse acceptance due to insignificant breach of contract by TÜV Rheinland.

If acceptance is excluded according to the nature of the work performance of TÜV Rheinland, the completion of the work shall take its place.

During the Follow-Up stage, if the client was unable to make use of the time windows provided for within the scope of a certification procedure for auditing performance by TÜV Rheinland and the certificate is therefore to be withdrawn (e.g. performance of surveillance audits), or if the client cancels or postpones a confirmed audit date within two (2) weeks before the agreed date, TÜV Rheinland is entitled to charge lump-sum damages in the amount of 10% of the order amount as compensation for expenses if the service is not called within one year after the order has been placed. The client reserves the right to prove that the TÜV Rheinland has incurred no damage whatsoever or only a considerably lower damage than the above mentioned lump sum.

9.director as the client has undertaken in the contract to accept services, TÜV Rheinland shall also be entitled to charge lump-sum damages in the amount of 10% of the order amount as compensation for expenses if the service is not called within one year after the order has been placed. The client reserves the right to prove that the TÜV Rheinland has incurred no damage whatsoever or only a considerably lower damage than the above mentioned lump sum.

10. Confidentiality
For the purpose of these terms and conditions, "confidential information" means all know-how, trade secrets, documents, images, drawings, expertise, information, data, test results, reports, samples, project documents, pricing and financial information, customer and supplier information, and marketing techniques and materials, tangible or intangible, that are supplied, transferred or otherwise disclosed by one Party (the "disclosing party") to the other Party (the "receiving party"), in writing or orally, in printed or electronic format. Confidential information is expressly not the data and know-how collected, compiled or otherwise obtained by TÜV Rheinland (non-personal and not proprietary to the client) within the scope of the provision of services by TÜV Rheinland. TÜV Rheinland is entitled to store, use, further develop and pass on the data obtained in connection with the provision of services for the purposes of developing new services, improving services and analysing the provision of services.10.2 The disclosing party shall mark all confidential information disclosed in written form as confidential before passing it onto the receiving party. Where the disclosing party fails to do so within the stipulated period, the receiving party shall not take any confidentiality obligations hereunder towards such information. The client shall avoid using any third party platform and/or system (e.g., Wechat, etc. Unauthorized by TÜV Rheinland) to send any confidential information to TÜV Rheinland. Instead, the client shall send any confidential information to company email of TÜV Rheinland employees through its company email. If the client suffers from any losses or damages due to any theft or leakages to be caused by the adoption of "any unauthorized confidential information sharing method" mentioned above, TÜV Rheinland shall be waived for any compensation liabilities.

All confidential information which the disclosing party transmits or otherwise discloses to the receiving party and which is covered by the performance of work of TÜV Rheinland is required to pass on confidential information, inspection reports or documentation to the government authorities, judicial court, accreditation bodies or third parties (including but not limited to the relevant direct and/or indirect proposed purchasers, providers of services, subcontractors, subcontractors, test standards, etc.) and the requirements provided of the client's test products and/or certified products, etc.) that are involved in the performance of the contract.

The receiving party shall maintain strict secrecy of all confidential information and shall not disclose the information to any third parties or use it for itself.

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In the event of a violation, TÜV Rheinland shall be entitled to terminate the contract with immediate effect and the client shall compensate for the losses incurred thereby by TÜV Rheinland.

14. Data protection notice
The client understands and agrees that TÜV Rheinland processes personal data (including but not limited to personal information) of the client and of its related parties (including but not limited to the supplier of the client) for the purpose of fulfilling this contract. The client confirms that it has obtained the prior consent of the data subject, which entitles TÜV Rheinland to access, use, or process the personal data that the client collected or processed by itself and transfered to TÜV Rheinland. For the services, we may also process sensitive personal data. TÜV Rheinland will use and process the data in accordance with the relevant legal basis. If any personal data has to be disclosed or transferred to any third party or any overseas party outside of the district in which the personal data was collected, the client also confirms that it has obtained the prior consent of the data subject. TÜV Rheinland will carry out cross-border data transmission and protect the data in compliance with the privacy and personal data security related laws and regulations in China and the local country. TÜV Rheinland will take measures to avoid any leakage, abuse, manipulation, damage or unauthorized access of personal data. The personal data will be deleted immediately as soon as a corresponding reason for deletion arises. Data subjects may exercise the following rights: right of information, right of decision, right of rectification, right of deletion, right of processing limitation, right of objection, right of data transferability. In addition, persons concerned by the data processing have the right to revoke their consent at any time with effect for the future, as well as the right to file a complaint with the competent data protection supervisory authority. For further details on the processing of personal data by TÜV Rheinland as the person responsible or contract processor, please refer to the respective data protection information. You can contact the Group Data Protection Officer of TÜV Rheinland by e-mail at dataprotection@tuv.com or by post at the following address: TÜV Rheinland AG, c/o Group Data Protection Officer, Am Grauen Stein, 51105 Cologne, Germany.

15. Retention of test material and documentation
The test samples submitted by the client to TÜV Rheinland for testing will be scrapped following testing or will be returned to the client at the client's expense. The only exceptions are test samples, which are placed in storage on the basis of statutory regulations or of another agreement with the client.

Charges apply if the test samples are stored at the premises of TÜV Rheinland. The cost of placing a test sample into storage will be disclosed to the client in the quotation.

If reference samples or documentations are given to the client to be placed in storage at their premises, the reference samples or documentations must be made available to TÜV Rheinland upon request promptly and free of charge. If the client does not comply with this request, the client is required to make available the reference samples and/or documentation, any liability claims for material and pecuniary damage resulting from the respective testing and certification that is brought forward by the client against TÜV Rheinland shall be waived.

The retention period for the documentation shall be 10 (ten) years after the expiry of the test mark certificates or shall meet the applicable legal requirements for EU/EEC certificates of conformity and GS mark certificates.

After the expiry of the retention period, the test samples for storage on the client's premises are borne by the client. TÜV Rheinland will be liable for the loss of test samples or reference samples from the laboratories or warehouses of TÜV Rheinland only in case of gross negligence.

16. Termination of the contract
Notwithstanding paragraph 13.3 of the GTCB, TÜV Rheinland and the client are entitled to terminate the contract in its entirety or, in the case of services combined in one contract, each of the combined parts of the contract individually and independently of the continuation of the remaining services with six (6) months' notice to the other of the contractually agreed notice period. The notice period shall be extended to (6) weeks in case TÜV Rheinland is prevented from performing the services due to a loss or a suspension of its accreditation or notification.