

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं
प्रौद्योगिकी संस्थान (सिपेट)
(पूर्व में सेंट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)
इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)
रसायन एवं पेट्रोसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
एच. आई. एल. कॉलोनी, एडयार रोड, पातालम्
उद्योगमंडल पी.ओ. कोच्चि, केरल - 683 501
फोन : 0484-2547741, 2546740
ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com
वेबसाइट : www.cipet.gov.in



सिपेट CIPET

परीक्षण रिपोर्ट

TEST REPORT

**CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)**
(Formerly Central Institute of Plastics Engineering & Technology)
INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
HIL Colony, Edayar Road, Pathalam
Udyogamandal P.O., Kochi, Kerala-683 501
Ph: 0484-2546740
E-mail: kochi@cipet.gov.in, cipetkochi@gmail.com
Web : www.cipet.gov.in

क्र.सं. / SI.No. **12706**

ANALYSIS REPORT

Issued to:

M/s.NATURE BIOTECH COMPANY
Saripalli Industrial Area, Saripalli (V)
Nellimarla (M)
Vizianagaram District.

Page 1 of 4

Customer Ref. No. & date : Letter dt 26.07.2024

Work order Ref.No. : 288/24-25

As per Standard: : As per part C

Test Report No : 241149

Date: 04.03.2025

PART A: PARTICULARS OF SAMPLE SUBMITTED

- | | |
|--|---|
| a)Name of the sample | : Compostable Film as stated by the party |
| b)Grade / Variety / type / Size / Class etc. | : Nil |
| c)Code No. | : Nil |
| d)Quantity (pcs/mtr/gm/nos) | : 2 Kg |
| e)Mode of Packing
(Sealed cartoon/polypouch/container or not) | : Sealed carton |
| f)Date of receipt of sample | : 02.08.2024 |
| g)Date of Performance of test | : 22.08.2024 - 25.02.2025 |
| h)Any other information | : Interim Report No. 24954 dt. 20.12.2024 |
| i) Unique Sample ID | : 240804 |

PART B: SUPPLEMENTARY INFORMATION

- | | |
|---|---------------------------------|
| a) Reference to sampling procedure | : Drawn & Supplied by the party |
| b) Supporting documents for
measurements taken and results derived like
graphs, tables, sketches and / or Photographs as
appropriate to test report, if any (to be attached) | : As per part -C |
| c) Deviation from the test methods as prescribed in
relevant ASTM/ISO/BIS /
Work instructions, if any | : --- |


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory


Dr. K.A. Rajesh
Director & Head
Authorized Signatory



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TEST REPORT

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ANALYSIS REPORT

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PART C: TEST RESULTS

Report No.:241149

Date: 04.03.2025

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement as per IS/ISO : 17088-2021
Sample details: Compostable Film as stated by the party					
1.	Material Identification	FTIR/DSC	--	Poly(lactic acid) (PLA) and Poly(butylene adipate - co-terephthalate) (PBAT)	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	ISO 20200:2023	%	8.14	Not more than 10% of its original dry mass
3.	Ultimate aerobic biodegradation (with reference to 100% degradation of positive reference)	ISO 14855-1:2012	%	91.62 (at the end of 119 days)	> 90% (At the end of the test period not more than 180 days)
4.	Plant Growth study Monocotyledon(Paddy) % Seed emergence Dicotyledon(Tomato) % Seed emergence	OECD : 208 Guidelines	% %	93 92	> 90% of those from the corresponding blank compost

Note: The detailed observation on biodegradability test is enclosed as Annexure. I

Dr. S. Anbudayanidhi
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Authorized Signatory

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ANALYSIS REPORT

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PART C: TEST RESULTS

Report No.:241149

Date: 04.03.2025

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement as per IS/ISO : 17088-2021
5.	Acute Ecotoxic Effects to earthworm				
a.	Survival of adult earthworm at the end of 7 days	ISO 11268-1:2012	%	100	> 90% of those from the corresponding blank compost
b.	Survival of adult earthworm at the end of 14 days		%	100	
c.	Biomass at the end of 14 days		%	94.95	
6	Chronic Ecotoxic Effects to earthworm				
a.	Survival of adults earthworm at the end of 28 days	ISO 11268-2:2023	%	100	> 90% of those from the corresponding blank compost
b.	Offspring at the end of 56 days		%	94.06	
c.	Biomass at the end of 56 days		%	95.70	

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ANALYSIS REPORT

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PART C: TEST RESULTS

Report No.: 241149

Date: 04.03.2025

Sl. No.	Property	Test method / Standard	Unit	Results obtained	Specified Requirements (Max.) as per IS 17899 T:2022
7.	<u>Heavy Metal Analysis</u> (on dry mass basis)				
	Arsenic (As)	IS 3025 (Part 37):2022	mg / kg	0.0193	10
	Copper (Cu)	IS 3025 (Part 42):1992		0.7921	300
	Nickel (Ni)	IS 3025 (Part 54):2003		0.8440	50
	Zinc (Zn)	IS 3025 (Part 49):1994		0.3992	1000
	Chromium (Cr)	IS 3025 (Part 52):2003		0.7676	50
	Mercury (Hg)	IS 3025 (Part 48):1994		0.0155	0.15
	Cadmium (Cd)	IS 3025 (Part 41):2023		0.3457	5
	Lead (Pb)	IS 3025 (Part 47):1994		1.7995	100

PART D: REMARKS: NIL

Note

1. This Test Report / Certificate is issued only for the samples submitted to the laboratory.
2. The results stated above related only to the items tested.
3. The quality of the subsequent production lot has to be ensured by the purchaser.
4. This Test Report shall not be reproduced except in full without the written approval of the laboratory.
5. Any anomaly/discrepancy in this report should be brought to the notice of the laboratory within 30 days from the date of issue.
6. Subcontracted Tests (if any): Nil

Dr. S. Anbudayanidhi
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Authorized Signatory

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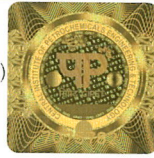
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ANNEXURE-I

Continuation Sheet

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TR. NO.: 241149

ANALYSIS RESULT

Date: 04.03.2025

OBSERVATION FOR BIODEGRADABILITY TEST AS PER IS/ISO 17088:2021

Name of the Customer:

M/s. NATURE BIOTECH COMPANY
Saripalli Industrial Area, Saripalli (V)
Nellimarla (M)
Vizianagaram District.

1. Sample Details: Compostable Film as stated by the party.

The average thickness of film sample was observed as 32 microns.

2. Material Identification by FTIR & DSC: Poly (lactic acid) (PLA) and
Poly (butylene adipate - co- terephthalate) (PBAT)

3. Observations:

a. Conditions of reaction Mixture

Origin of Compost	: Livestock excrement, municipal and vegetable waste
Reaction Temperature	: 58°C (±2°C)
Dry Solid (%)	: 52.08 %
Volatile content (%)	: 31.26%
CO ₂ evolved during 1 st 10 days in blank vessels	: 57.93 mg/g of volatile solids of compost
Test Duration (Days)	: 119 Days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000ml

S. An 75
Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

Dr. K.A. Rajesh
Director & Head
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उद्योगमंडल पी.ओ., कोच्चि, केरल - 683 501

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TR. NO.: 241149

ANALYSIS RESULT

Date: 04.03.2025

b. pH of test medium

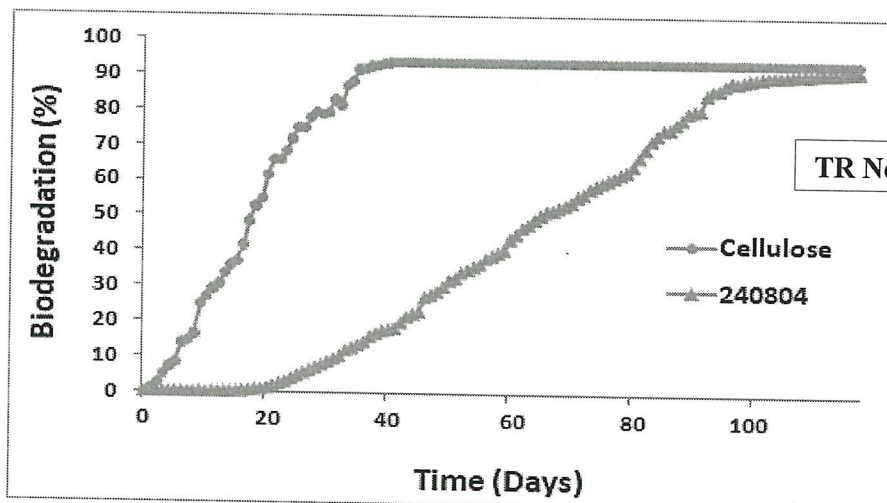
Sl. No	Composting Vessel (Material with test medium)	pH (Before)	pH (After)
1	Sample 1	7.3	7.4
2	Sample 2	7.2	7.4
3	Sample 3	7.3	7.4
4	Blank	7.2	7.3
5	Blank	7.2	7.3
6	Blank	7.3	7.5
7	Positive 1	7.6	7.7
8	Positive 2	7.6	7.7
9	Positive 3	7.5	7.6
10	Negative	7.6	7.7
11	Negative	7.5	7.7
12	Negative	7.5	7.6

4. Result:

Percentage biodegradation relative to positive reference

Mean (%) : 91.62%

The reference material- cellulose (%) : ~100%



Dr. S. Anbudayanidhi
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Authorized Signatory

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एच.आई.एल.कॉलोनी, एडयार रोड, पाथालम

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Continuation Sheet

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TR. NO.: 241149

ANALYSIS RESULT

Date: 04.03.2025

5. Visual observation of Sample

Description	Week 1	Week 7	Week 11	Week 14	Week 17
Structure	Film Sample	Fragmented Film Sample	Disintegrated Film Sample	--	--
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Translucent	Translucent	--	--	--
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like

6. Visual observation of compost

Description	Week 1	Week 7	Week 11	Week 14	Week 17
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like

S. Anandhi
Dr. S. Anbudayanidhi
Manager (Technical)
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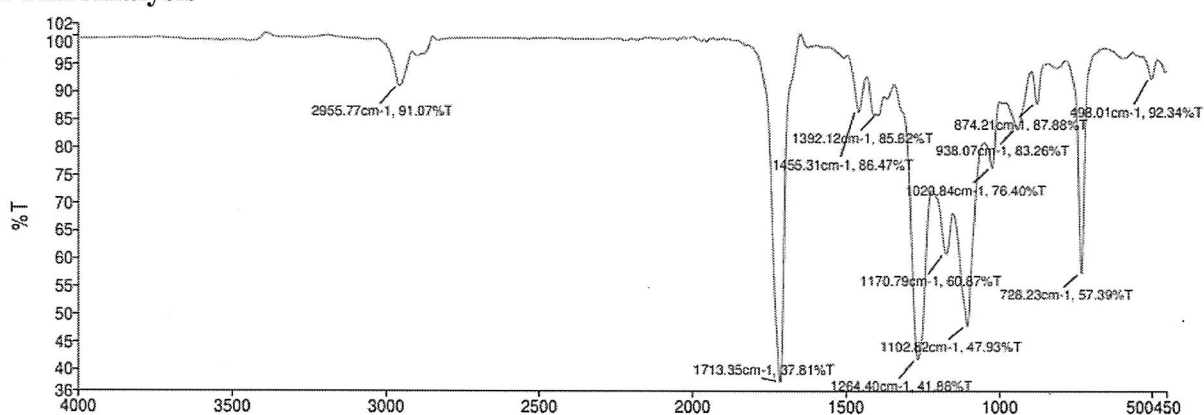
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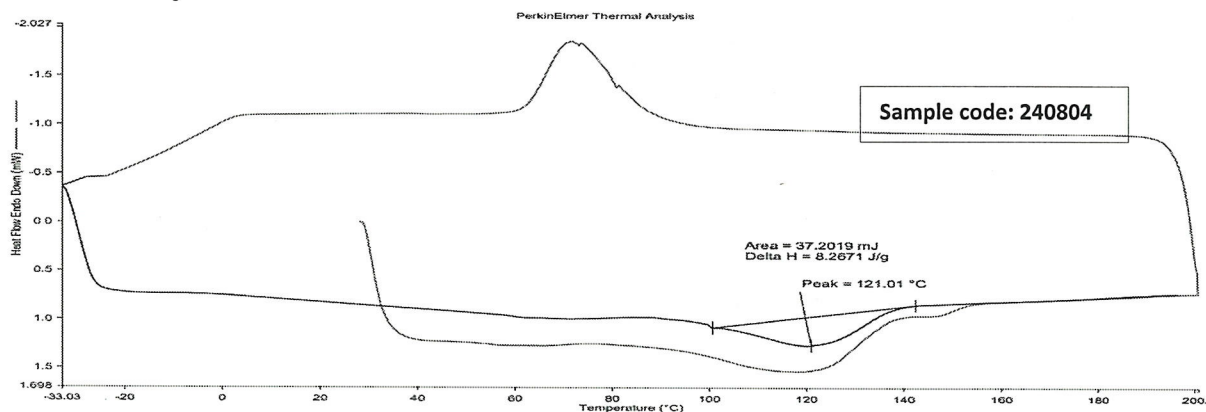
Sample Details: Compostable Film as stated by the party.

7. FTIR Analysis



Wave number(cm ⁻¹)	Nature of Bond
2955.77	C-H stretching vibration
1713.35	C=O stretching vibration
1455.31	C-H bending vibration
1264.40	C-O stretching vibration

8. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is Poly (lactic acid) (PLA) and Poly (butylene adipate - co- terephthalate) (PBAT).

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फोन : 0484-2547741, 2546740

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वेबसाइट : www.cipet.gov.in



**CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)**

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala - 683 501

Ph: 0484-2547741, 2546740

E-mail: kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

Continuation Sheet

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TR. NO.: 241149

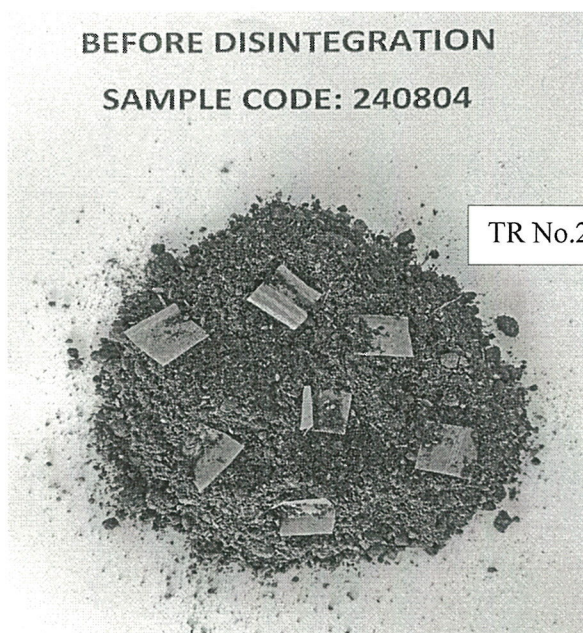
ANALYSIS RESULT

Date: 04.03.2025

9. DISINTEGRATION- AFTER 12 WEEKS

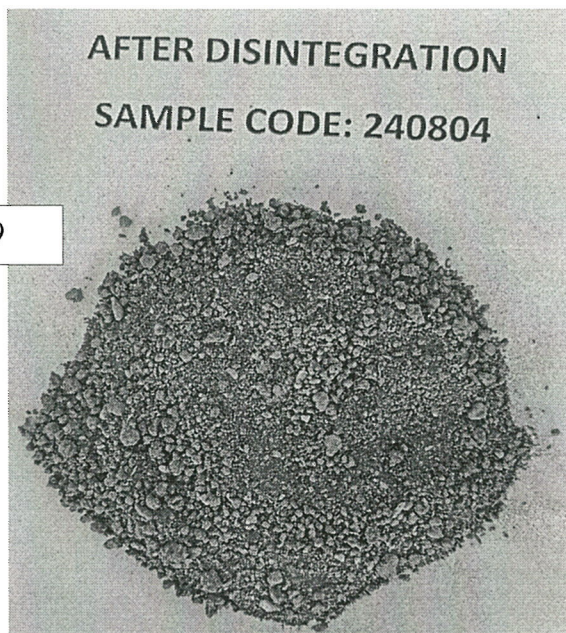
BEFORE DISINTEGRATION

SAMPLE CODE: 240804



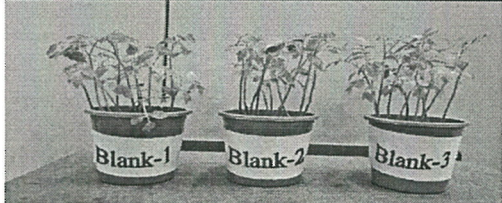
AFTER DISINTEGRATION

SAMPLE CODE: 240804



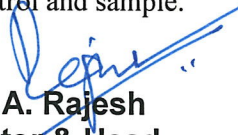
The disintegration of the supplied sample by passing through 2 mm sieve after 12 week in composting condition as per ISO 17088-2021 was found not more than 10% of original dry mass remain.

10. SEED GERMINATION AND PLANT GROWTH STUDY

 Paddy growth in Compost (Control)	 Paddy growth in Compost (Sample)
 Tomato growth in Compost (Control)	 Tomato growth in Compost (Sample)

The percentage of seed germination was found to be greater than 90% for both control and sample.


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory


Dr. K.A. Rajesh
Director & Head
Authorized Signatory

**केंद्रीय पेट्रोसायन अभियांत्रिकी
एवं प्रौद्योगिकी संस्थान (सिपेट)**

(पूर्व में सेंट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)

इंस्टिट्यूट ऑफ पेट्रोसायन टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच.आई.एल.कॉलोनी, एडयार रोड, पातालम्

उद्योगमंडल पी.ओ., कोच्चि, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल : kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



पिपेट
सिपेट CIPET

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Continuation Sheet

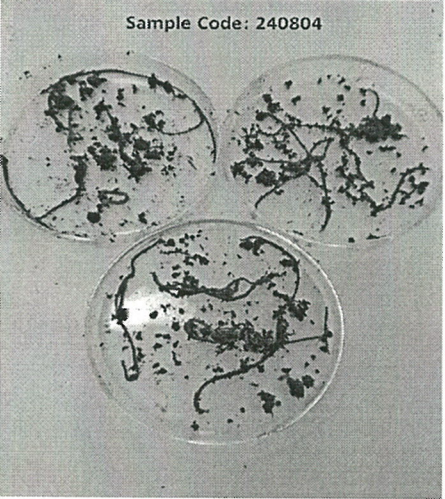
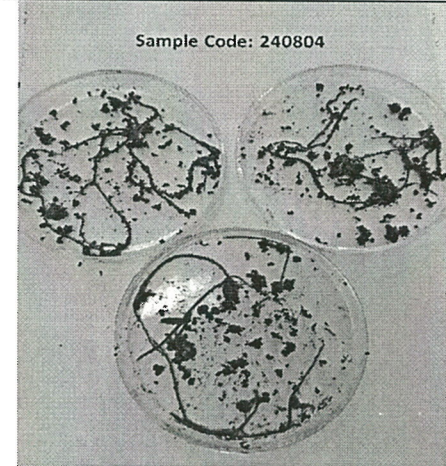
Page 6 of 6

TR. NO.: 241149

ANALYSIS RESULT

Date: 04.03.2025

11. Acute & Chronic Ecotoxicity effects to Earthworm

Sample Code: 240804 	Sample Code: 240804 
Photograph of Live earthworm in the sample compost at the end of 7 days Photograph of Live earthworm in the sample compost at the end of 14 days	
The surviving adult earthworms grown in the sample compost exposed to the test material after an incubation period of 14 days is more than 90 % of those from the corresponding blank compost not exposed to any material.	
Sample Code: 240804 	Sample Code: 240804 
Photograph of Live earthworms in the sample compost at the end of 28 days. Photograph of Live earthworm in the sample compost at the end of 56 days.	
The surviving adult earthworms grown in the sample compost exposed to the test material after an incubation period of 28 days and the counted number of offspring after an incubation period of 56 days is more than 90 % of those from the corresponding blank compost.	

S. Anand
Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

K.A. Rajesh
Dr. K.A. Rajesh
Director & Head
Authorized Signatory