

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

(पूर्व में केंद्रीय प्लास्टिक्स इंजीनियरिंग एवं तकनीकी संस्थान)
कौशल एवं तकनीकी सहायता केन्द्र (सी.एस.टी.एस.)
रसायन और पेट्रोसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
सरवे नं-३७७, सूरमपल्ली (वि), गन्नावरम (म)
विजयवाड़ा - ५२१ २१२, कृष्णा जिला
फोन : 0866 - 2951466.
वेबसाइट : www.cipet.gov.in
ई-मेल : vijayawada@cipet.gov.in
मुख्यालय : गिन्डी, चेन्नई - 600 032.



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

(Formerly Central Institute of Plastics Engineering & Technology)
CENTRE FOR SKILLING & TECHNICAL SUPPORT (CSTS)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
Survey No. 377, Surampalli (V), Gannavaram (M),
Vijayawada - 521 212, Krishna District
Phone : 0866 - 2951466
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Head Office : Guindy, Chennai - 600 032.

सिपेट / विजयवाड़ा / पीटीसी / 2025-26
CIPET/VJA/PTC/2025-26

दिनांक : 23.12.2025
Date : 23.12.2025

सेवा मे

To
M/s. Navaratna Eco Products
13-5-72, Mella Duppalapalli Road
Nalagonda, telangana – 508001

Sub: Test Report – Reg
Ref: Letter No. Email dt 28.04.2025

प्रिय महोदय, / Dear Sir,

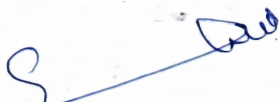
उपरोक्त विषय के संदर्भ में, कृपया इस पत्र के साथ परीक्षण प्रतिवेदन सं : 004142(S) दि: 23.12.2025 प्तथा प्रतिपुष्टी प्राप्त संलग्नीय हैं । कृपया इसे भरकर हमें वापस लौटा दे ।

With reference to the above cited subject, we are enclosing herewith Supplementary Test Report No.004142(S) dated 23.12.2025 Invoice. We are also enclosing herewith feedback form. Kindly fill it and sent it back to us.

धन्यवाद तथा अच्छी सेवा के आश्वासन के साथ ।

Thanking you and assuring you of our best services.

आपका भवदिय, / Yours faithfully,


Director & Head

निदेशक एवं प्रमुख / Encl : As above



सिपेट CIPET

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं पौद्योगिकी संस्थान (सिपेट)

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Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India)

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Plastics Testing Centre

Test Report

क्रम सं / SI. No. 1002249

Issued to :

M/s. Navaratna Eco Products
13-5-72, Mella Duppalapalli Road
Nalagonda, telangana - 508001

Page 1 of 3

Date: 23.12.2025

Customer Ref. No. & date : Nil dated 28.04.2025
Work order Ref. No. : 034/2025-26
Test Report as per Standard: : As per IS 17088:2021
Test Report No : 004142(S)

PART A : PARTICULARS OF SAMPLE SUBMITTED

a) Nature of Sample	: Compostable Film as declared by the party
b) Grade/Variety/ Type/Size/Class etc	: Nil
c) Brand name, if any	: Nil
d) Declared values, if any	: Nil
e) Code No.	: Nil
f) Batch No. and date of Manufacture	: Nil
g) Quantity	: 5 Kgs
h) Mode of Packing	: Carton Box
i) Date of receipt	: 29.04.2025
j) Seal	: Un Sealed
k) I.O's signature on the sample	: Un Signed
l) Test duration	: 01.05.2025 to 23.12.2025
m) Any other information	: Interim Report No. 004142 dt. 16.09.2025

PART- B: SUPPLEMENTARY INFORMATIONS

a) Reference to sampling procedure	: Sample submitted by Party
b) Supporting documents for the measure- ments taken and results derived	: As mentioned in Part C
c) Deviation from the test methods as prescribed in relevant ISS / Work instructions , if any	: Nil

Prima



Plastics Testing Centre

Test Report

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PART- C: TEST RESULTS
Report No.:004142(S)

AS PER IS: IS 17088:2021

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Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: Biodegradable & Compostable film as stated by the party					
1.	Material Identification	FTIR/DSC	--	Poly (butylene adipate-co-terephthalate) (PBAT)	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	Cl. 6.2 of ISO 17088-2021	%	9.2	Not more than 10% of its original dry mass
3.	Ultimate aerobic biodegradation (with reference to 100% degradation of positive reference)	Cl. 6.3.1 of ISO 17088-2021 ISO:14855-1	%	90.63 (at the end of 139 days)	> 90% (At the end of the test period not more than 180 days)
4.	Plant Growth study Monocotyledon(Paddy) % Seed emergence Dicotyledon(Brinjal) % Seed emergence	Cl. 6.4.3 of ISO 17088:2021 (Annex C)	% % %	92 91	> 90% of those from the corresponding blank compost

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

Signature



Plastics Testing Centre

Test Report

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PART- C: TEST RESULTS
Report No.:004142(S)

AS PER IS: IS 17088:2021

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Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
5.	Acute Ecotoxic Effects to earthworm				
a.	Survival of adult earthworm at the end of 7 days	Cl. 6.4.4 of ISO 17088:2021 (Annex D)	%	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		%	96	
6	Chronic Ecotoxic Effects to earthworm				
a.	Survival of adults earthworm at the end of 28 days	Cl. 6.4.5 of ISO 17088:2021 (Annex E)	%	98	> 90% of those from the corresponding blank compost
b.	Survival of adults earthworm at the end of 56 days		%	96	
c.	Offspring at the end of 56 days		%	92	
d.	Biomass at the end of 56 days		%	93	
7.	Heavy Metal Analysis	Cl. 6.5.2 of ISO 17088:2021/Cl.4.3 of IS 17899 T:2022	mg / L	0.0321	10
	Arsenic (As)			1.5443	300
	Copper (Cu)			0.6636	50
	Nickel (Ni)			1.2604	1000
	Zinc (Zn)			0.6510	50
	Chromium (Cr)			0.0103	0.15
	Mercury (Hg)			1.3206	5
	Cadmium(Cd)			1.3363	100
	Lead (Pb)				

PART -D : REMARKS: Nil

NB: 1.The results stated above relate only to the items tested.

2. This Test Certificate shall not be reproduced except in full without the written approval of the Laboratory.

3. Details of tests sub-contracted: Nil

4. This Test Report / Certificate is issued only for the samples submitted to CIPET.

5. The quality of the subsequent production lot has to be ensured by the purchaser.

6. Environmental Conditions of Laboratory: Temperature: $27 \pm 2^{\circ}\text{C}$, Humidity: $65 \pm 5\%$

7. Statement of Conformity / Decision Rule: NA

****END OF REPORT****

K K Rao

K K Rao

Reviewed By / Authorized Signatory

Dr.Ch Sekhar

Dr.Ch Sekhar

Authorized Signatory



Plastics Testing Centre

Test Report

क्रम सं / SI. No. 1002247

ANNEXURE-I

TR. NO.:004142(S)

ANALYSIS RESULT

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Date: 23.12.2025

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO IS 17088:2021

Name of the Customer: M/s. Navaratna Eco Products
13-5-72, Mella Duppalapalli Road
Nalagonda, Telangana – 508001.

1. Sample Detail: Compostable Film as stated by the party
2. Material Identification by FTIR & DSC: 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 (%)	: 55.13%
Volatile content (%)	: 32.35%
CO ₂ evolved during 1 st	
10 days in blank vessels	: 52.12 mg/g of volatile solids of compost
Test Duration (Days)	: 139 days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000 ml

b. pH of test medium

Sl. No	Composting Vessel (Material with test medium)	pH (Before)	pH (After)
1	Sample 1	7.5	7.2
2	Sample 2	7.5	7.2
3	Sample 3	7.5	7.3
4	Blank	7.5	7.1
5	Positive 1	7.5	7.1
6	Positive 2	7.5	7.3
7	Positive 3	7.5	7.2
8	Negative	7.5	7.2

P. V. V.



Plastics Testing Centre

Test Report

क्रम सं / SI. No. **002241**

TR. NO.:004142(S)

ANALYSIS RESULT

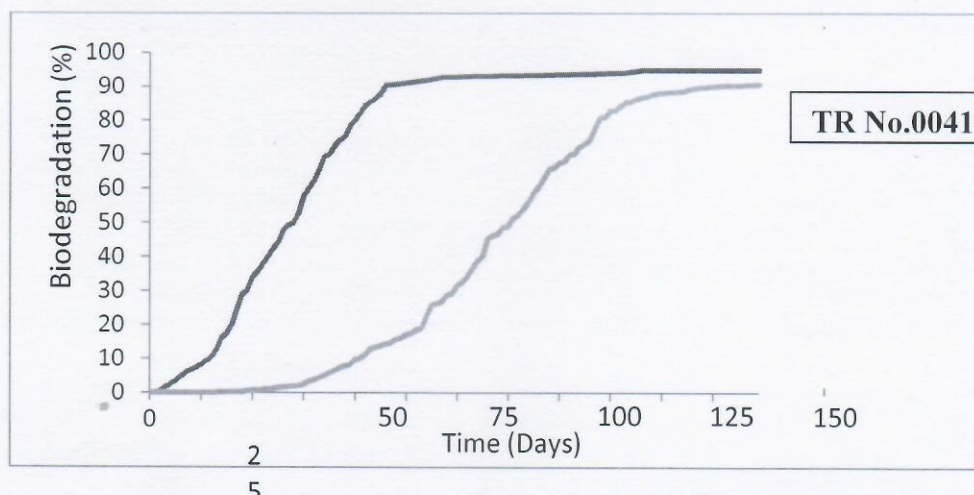
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Date: 23.12.2025

4. Result: Percentage biodegradation relative to positive reference

Mean (%) : 90.46%

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



Cellulose
Sample code 202504034

5. Visual observation of Sample

Description	Week 1	Week 5	Week 10	Week 15	Week 20
Structure	Film sample	Disintegrated film	Disintegrated film	-	-
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Milky white	Faded white	Faded white	-	-
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like

Pinna



**Plastics Testing Centre
Test Report**

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TR. NO.:004142(S)

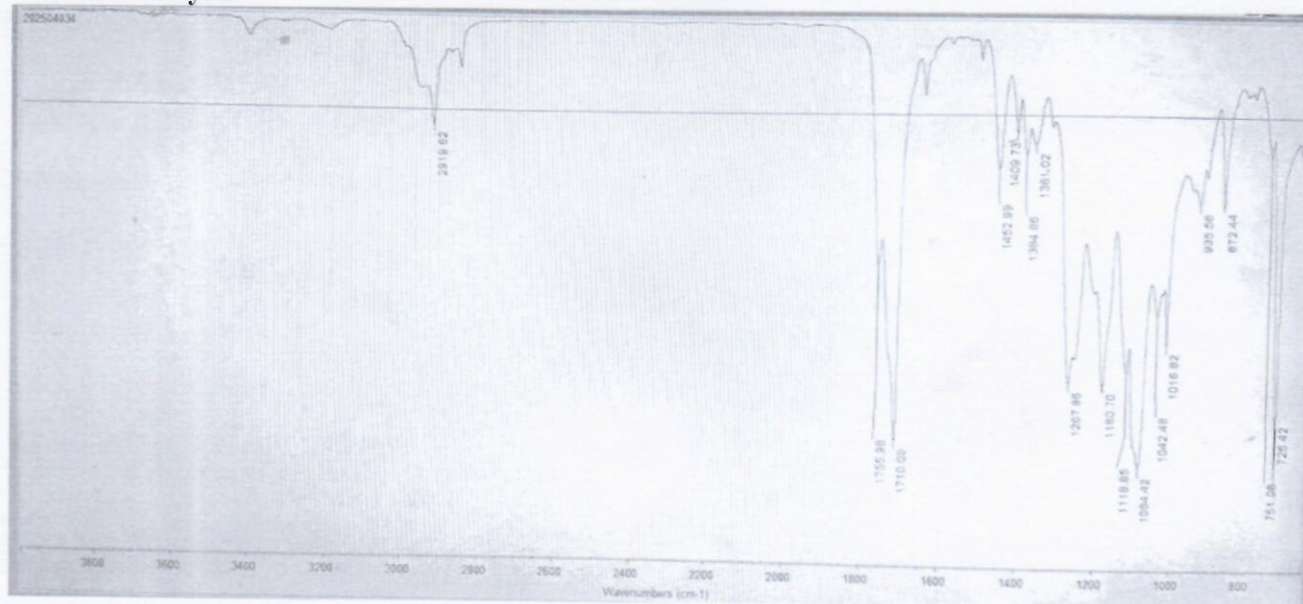
ANALYSIS RESULT

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6. Visual observation of compost

Description	Week 1	Week 5	Week 10	Week 15	Week 20
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

7. FTIR Analysis



Sample Details:

Wave number(cm ⁻¹)	Nature of Bond
2919.62	C-H stretching vibration
1710.09	C=O stretching vibration
1409.73	C=C stretching vibration
1267.86	C-O stretching vibration
726.42	C=C bending vibration

Signature



सिपेट CIPET

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Plastics Testing Centre

Test Report

क्रम सं / SI. No. 1002247

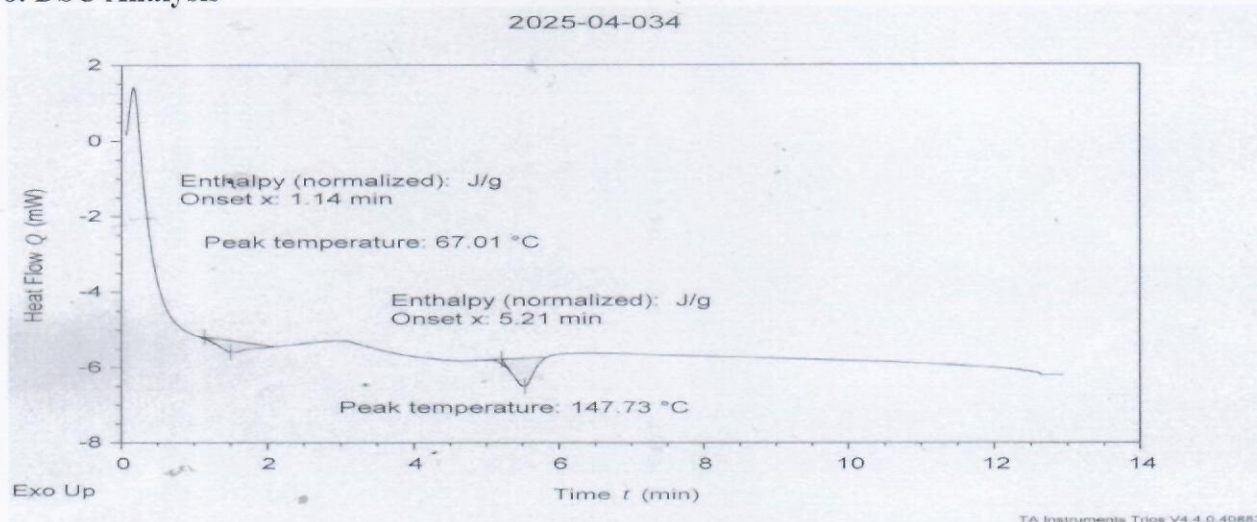
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ANALYSIS RESULT

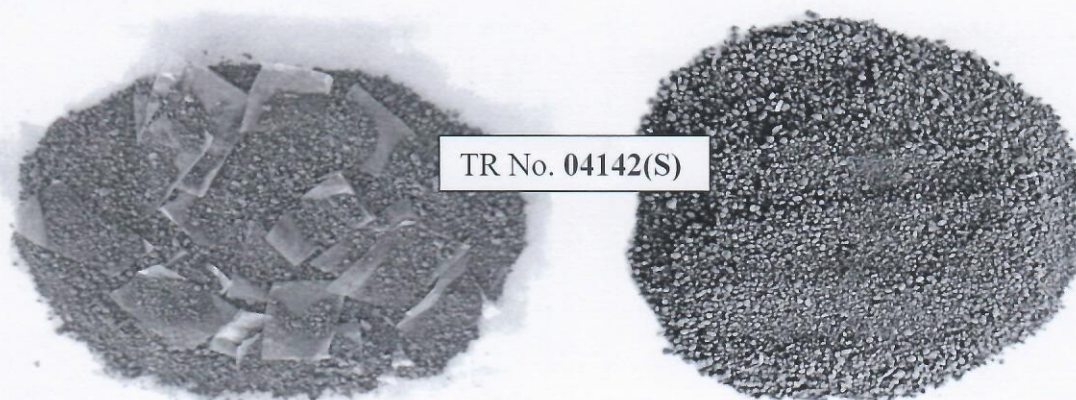
8. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample Poly butylene adipate-co-terephthalate (PBAT)

9. DISINTEGRATION- AFTER 12 WEEKS

BEFORE DISINTEGRATION	AFTER DISINTEGRATION
-----------------------	----------------------



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.

Signature



**Plastics Testing Centre
Test Report**

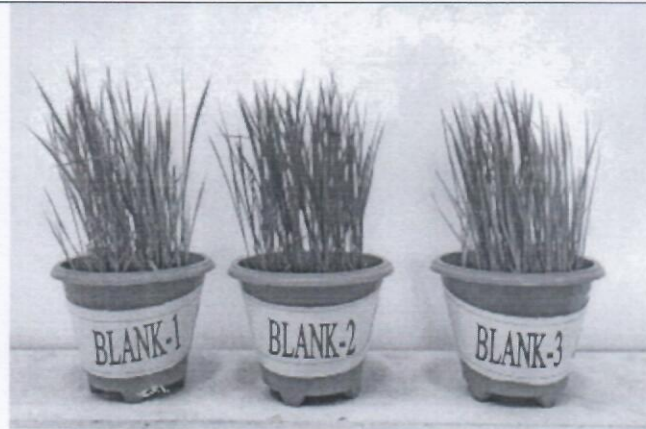
क्रम सं / SI. No. 10022411

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ANALYSIS RESULT

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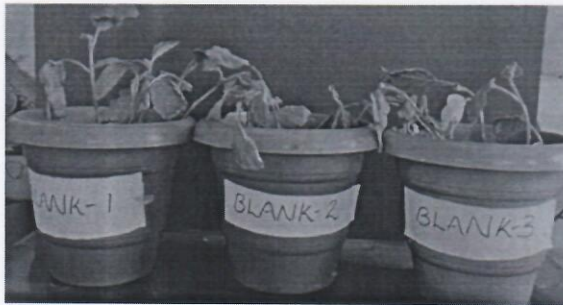
9. DISINTEGRATION- AFTER 12 WEEKS 10. SEED GERMINATION AND PLANT GROWTH STUDY



Paddy growth in Compost (Control)



Paddy growth in Compost (Sample)



Brinjal growth in Compost (Control)



Brinjal growth in Compost (Sample)

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

Signature



**Plastics Testing Centre
Test Report**

क्रम सं / SI. No. **1002247**

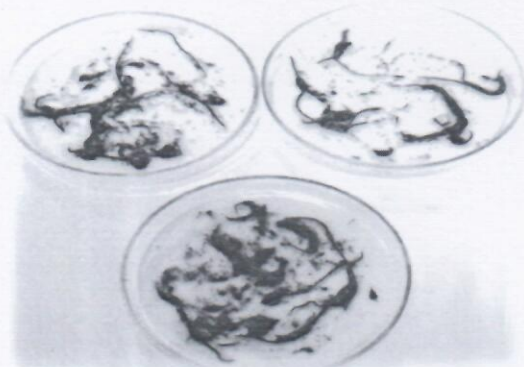
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TR. NO.:004142(S)

ANALYSIS RESULT

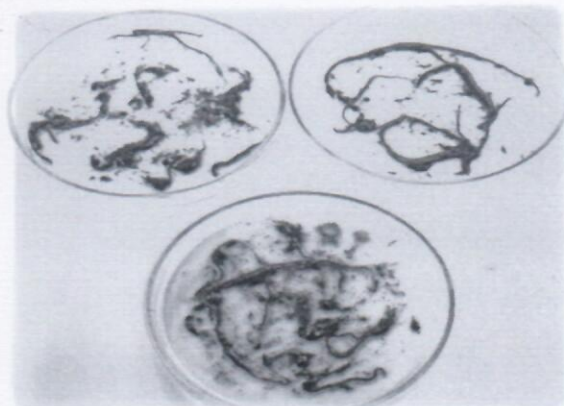
II. Acute & Chronic Ecotoxicity effects to Earthworm

Sample Code 202504034



Photograph of Live earthworm in the sample compost at the end of 7 days

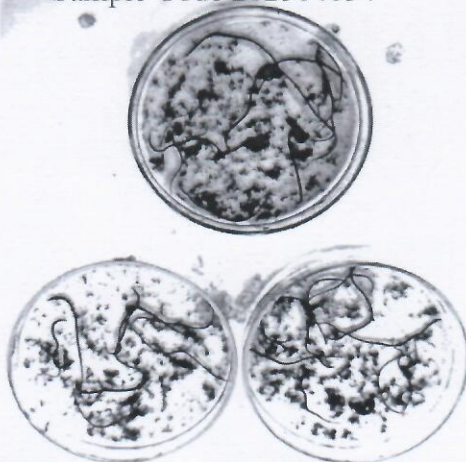
Sample Code 2025004034



Photograph of Live earthworm in the sample compost at the end of 14 days

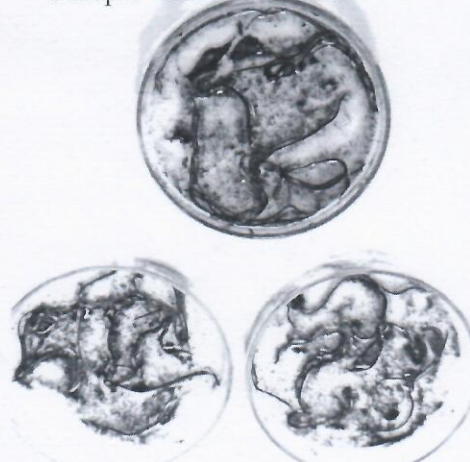
The surviving adult earthworms grown in the sample compost exposed to the test material after an incubation period of 14 days is more than 90 % of those from the corresponding blank compost not exposed to any material

Sample Code 202504034



Photograph of Live earthworms in the sample compost at the end of 28 days

Sample Code 202504034



Photograph of Live earthworms 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.

Signature