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

सिपेट CIPET

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),
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Head Office : Guindy, Chennai - 600 032.

सिपेट / विजयवाड़ा / पीटीसी / 2024–25
CIPET/VJA/PTC/2024-25

दिनांक : 28.03.2025
Date : 28.03.2025

सेवा मे
To
M/s Vardhan's Green bags,
Plot No 154/A7, Reddys Lab, CTO-1 Road,
IDA Bollaram, Hyderabad – 502325.

Sub: Test Report – Reg

Ref: Letter No dt: 22.04.2024

प्रिय महोदय, / Dear Sir,

उपरोत्क विशय के संदर्भ में, क्पया इस पत्र के साथ परीक्षण प्रतिवेदन सं : 003631(S) दिः 28.03.2025 ण्तथा प्रतिपुप्टी प्रात्प संलग्नीय हैं । क्पया इसे भरकर हमें वापस लौटा दे ।

With reference to the above cited subject, we are enclosing herewith Supplementary Test Report No.003631(S) dated 28.03.2025 Invoice. We are also enclosing herewith feedback form. Kindly fill it and sent it back to us.

धन्यवाद तथा अच्छी सेवा के आश्तासन के साथ।

Thanking you and assuring you of our best services.

आपका भवदिय, / Yours faithfully,

Director & Head

निदेशक एवं प्रमुख / Encl : As above

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौघोगिकी संस्थान (सिपेट)
रसायन एवं पेट्रोरसायन विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार
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क्रम सं / Sl. No. 001823

Issued to :

M/s Vardhan's Green bags,
Plot No 154/A7, Reddys Lab, CTO-1 Road,
IDA Bollaram, Hyderabad – 502325.

Date: 28.03.2025

Customer Ref. No. & date : Letter dt: 22.04.2024
Work order Ref. No. : 57/24-25
Test Report as per Standard: : As per IS 17088:2021
Test Report No : **003631(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	: 10Kg
h) Mode of Packing	: Carton Box
i) Date of receipt	: 15.05.204
j) Seal	: Un Sealed
k) I.O's signature on the sample	: Un Signed
l) Test duration	: 07.06.204 to 28.03.2025

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

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Test Report

PART- C: TEST RESULTS AS PER IS: IS 17088:2021
Report No.:**003631(S)**

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: 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	%	9.14	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	%	90.24 (at the end of 154days)	> 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	Cl. 6.4.3 of ISO 17088:2021 (Annex C)	% % %	93 92	> 90% of those from the correspondin g blank compost

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

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Test Report

PART- C: TEST RESULTS AS PER IS: IS 17088:2021
Report No.:**003631(S)**

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		%	94.24	
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)	%	100	> 90% of those from the corresponding blank compost
b.	Survival of adults earthworm at the end of 56 days		%	100	
c.	Offspring at the end of 56 days		%	93	
d.	Biomass at the end of 56 days		%	93.02	

Sl. No.	Property	Test method / Standard	Unit	Results obtained	Specified Requirements
7.	Heavy Metal Analysis Arsenic (As) Copper (Cu) Nickel (Ni) Zinc (Zn) Chromium (Cr) Mercury (Hg) Cadmium(Cd) Lead (Pb)	Cl. 6.5.2 of ISO 17088:2021 / Cl.4.3 of IS 17899 T:2022	mg / L	 0.3423 0.6125 0.2416 0.3374 0.6473 0.1017 0.3549 0.9379	 10 300 50 1000 50 0.15 5 100

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 theLaboratory.
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 ± 20 C, Humidity: 65 ± 5 %
7. Statement of Conformity / Decision Rule: NA

*** End of Report ***

K K Rao
Reviewed By / Authorized Signatory

Dr.Ch Sekhar
Authorized Signatory

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौघोगिकी संस्थान (सिपेट)
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क्रम सं / Sl. No. 001823

ANNEXURE-I

TR. NO.:003631(S) ANALYSIS RESULT Date: 28.03.2025

OBSERVATION FOR COMPOSTABILITY TEST AS PER ISO 17088:2021

Name of the Customer: M/s Vardhan's Green bags,
Plot No 154/A7, Reddys Lab, CTO-1 Road,
IDA Bollaram, Hyderabad - 502325

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 (%)	: 52.20 %
Volatile content (%)	: 35.36 %
CO_2 evolved during 1st 10 days in blank vessels	: 50.35 mg/g of volatile solids of compost
Test Duration (Days)	:151 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	7.2
6	Positive 2	7.5	7.1
7	Positive 3	7.5	7.1
8	Negative	7.5	7.2

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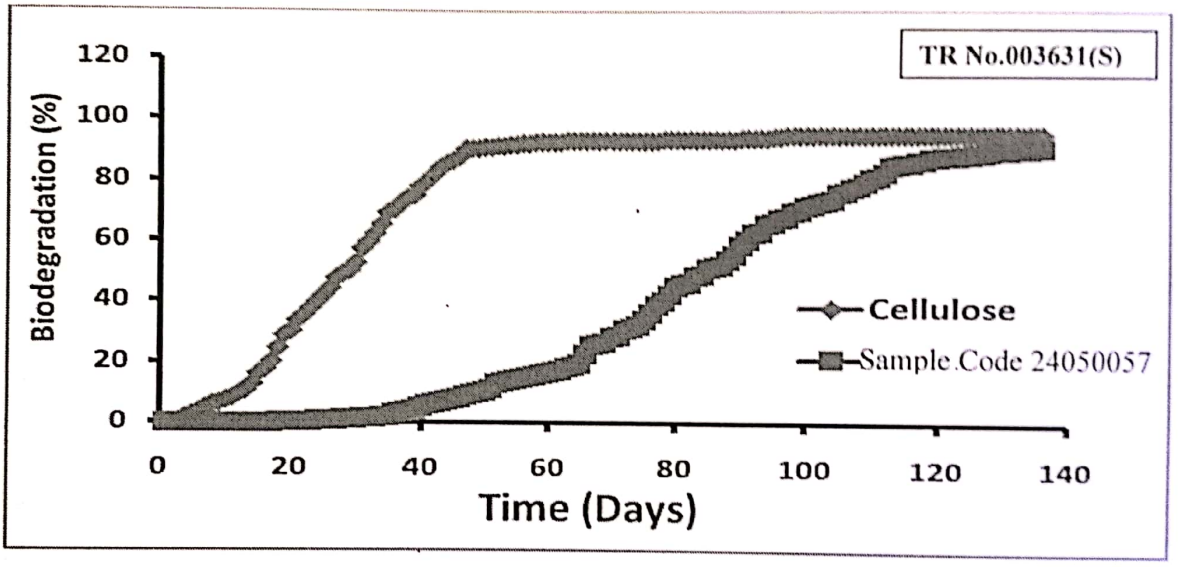
4. Result: Percentage biodegradation relative to positive reference

Mean(%) : 90.42%

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



5. Visual observation of Sample

Description	Week 1	Week 5	Week 10	Week 14	Week 19
Structure	Cup Sample	Disintegrated cup	Disintegrated cup	--	--
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

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौघोगिकी संस्थान (सिपेट)
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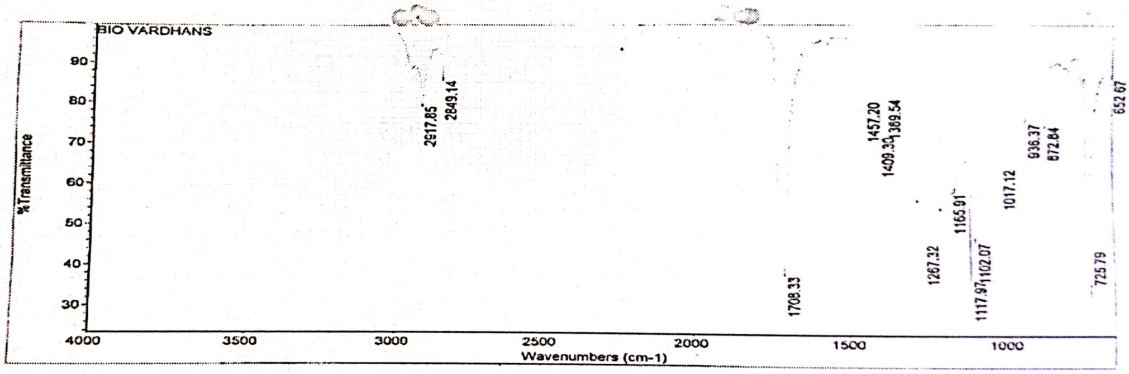
TR. NO.:003631(S) ANALYSIS RESULT Date: 28.03.2025

6. Visual observation of compost

Description	Week 1	Week 5	Week 10	Week 14	Week 19
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



Tue Oct 01 15:44:41 2024 (GMT+05:30)
FIND PEAKS:
Spectrum: BIO VARDHANS
Region: 4000.12 649.89
Absolute threshold: 87.646
Sensitivity: 50
Peak list:

Position:	652.67	Intensity:	87.340
Position:	725.79	Intensity:	33.814
Position:	872.84	Intensity:	74.198
Position:	936.37	Intensity:	76.449
Position:	1017.12	Intensity:	64.246
Position:	1102.07	Intensity:	47.474
Position:	1117.97	Intensity:	54.654

Sample Details:

Wavenumber(cm^{-1})	Nature of Bond
2917.85	C-H stretching vibration
1708.33	C=O stretching vibration
1267.32	C-H bending vibration
1117.97	C-O stretching vibration
725.79	C-O stretching vibration

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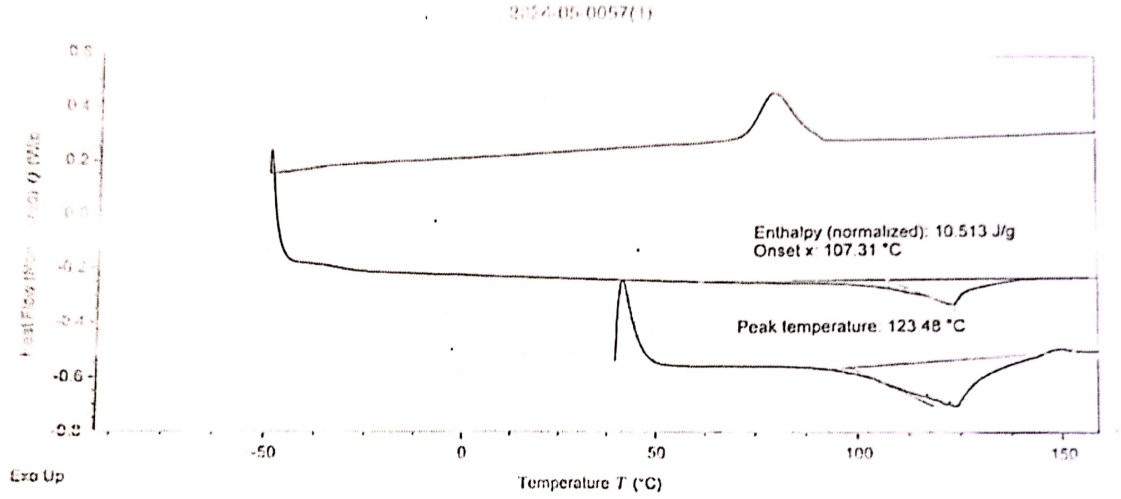
क्रम सं / Sl. No. 001823

TR. NO.:003631(S) ANALYSIS RESULT Date: 28.03.2025

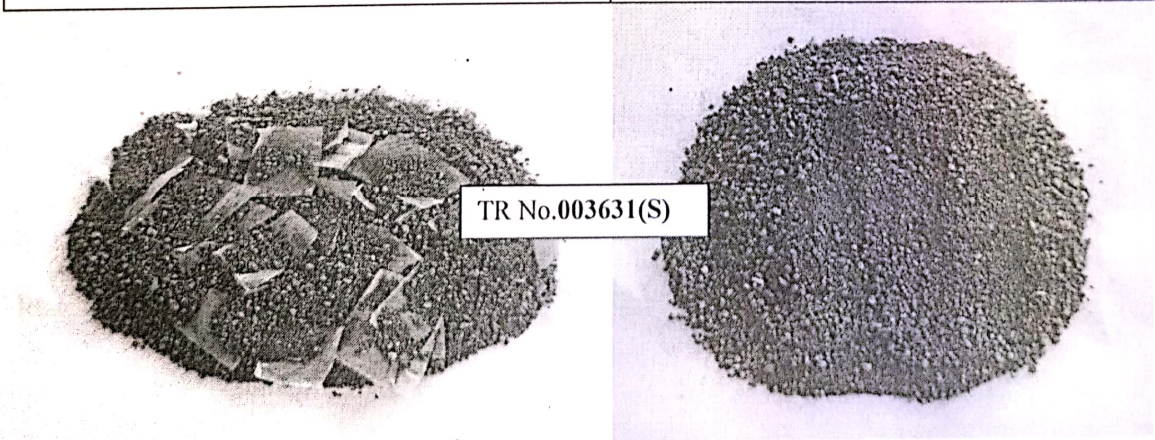
8. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is 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.

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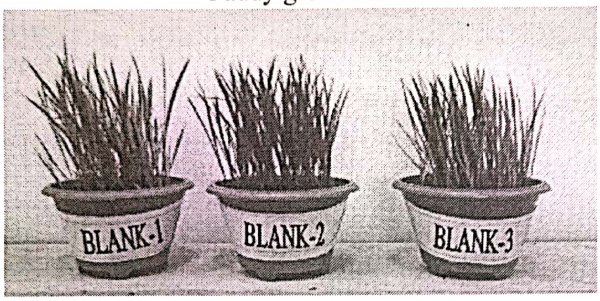
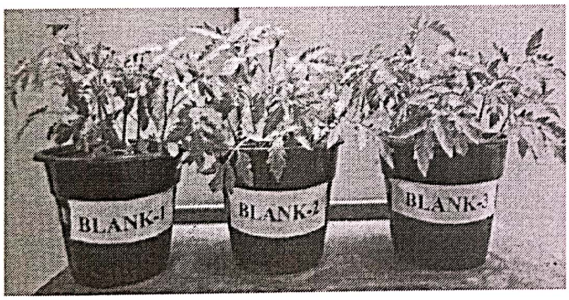
TR. NO.: 003631(S) ANALYSIS RESULT Date: 28.03.2025

10. SEED GERMINATION AND PLANT GROWTH STUDY

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

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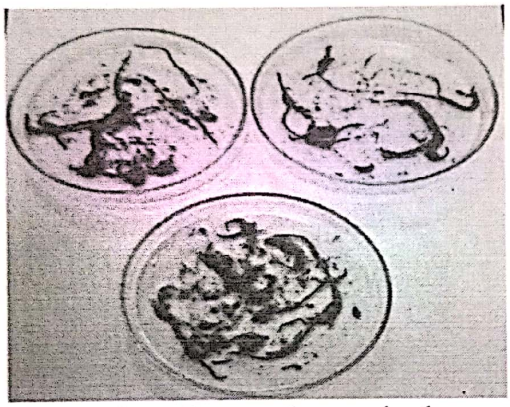
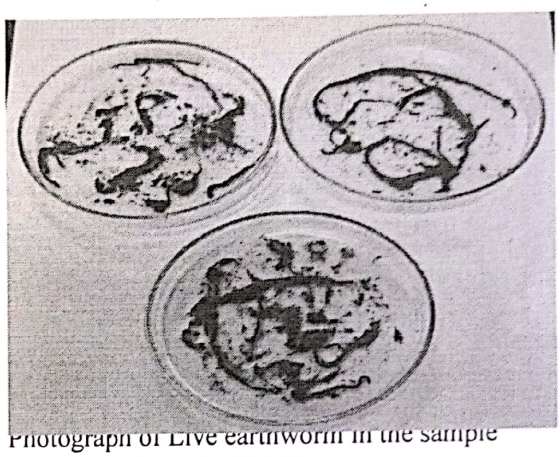
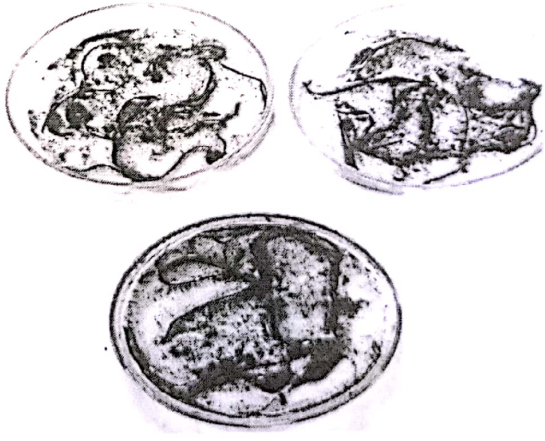
TR. NO.:003631(S) ANALYSIS RESULT Date: 28.03.2025

11. Acute & Chronic Eco-toxicity effects to Earthworm

Sample Code 24050057	Sample Code 24050057
	
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 24050057	Sample Code 24050057
	
Photograph of Live earthworms in the sample compost at the end of 28 days	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.	