

सिपेट : इंस्टिट्यूट ऑफ प्लास्टिक्स

(रसायन एवं उर्वरक मंत्रालय, भारत सरकार)

गिण्टी, चेन्नै - 600 032.

फोन : 91-44-2225 4701-6 फैक्स : 91-44-2225 4707

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CIPET : INSTITUTE OF PLASTICS TECHNOLOGY

(Ministry of Chemicals & Fertilizers, Govt. of India)

Guindy, Chennai - 600 032.

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## परीक्षण रिपोर्ट TEST REPORT

को जारी / Issued to :

M/s. Golbio Packs Pvt. Ltd.,

P-32, Kinfra IIT Park, Kanjikode,

Palakkad, Kerala – 678 621

क्र.सं / Sl. No. 23630

रिपोर्ट सं / REPORT NO. : 60707

Pages.....Nos. Part A,B,C & D

दिनांक / Date : 04.02.2020

संदर्भ / Ref. : Dated: Nil

परीक्षण मानक स्तर के अनुसार परीक्षण रिपोर्ट / TEST REPORT AS PER TEST STANDARD : Refer Part C

### भाग - क / PART - A

#### प्रस्तुत सैपिल का विवरण / PARTICULARS OF SAMPLE SUBMITTED

- अ) सैपिल का नाम / a) Name of the Sample : Golden Biopure Compostable & Biodegradable Bags  
-as stated by the party
- आ) सैपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 29.05.2019
- इ) ग्रेड/प्रकार/आकार/वर्ग / c) Grade / variety / type / size / class : Not applicable
- ई) घोषित मूल्य / d) Declared value, If any : Not applicable
- उ) कोड सं. / e) Code No. : Not applicable
- ऊ) बैच सं. एवं निर्माण तारीख / f) Batch No. and Date of Manufacture: Not applicable
- ऋ) मात्रा / g) Quantity : 1.5 Kg
- ए) पैकिंग की रीति / h) Mode of Packing : Packed in envelope cover
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Not Sealed
- ओ) कोई अन्य सूचना / j) Any other information : --

### भाग - ख / PART - B

#### अनुपूरक सूचनाएँ / SUPPLEMENTARY INFORMATIONS

- अ) सैपिलिंग कार्यवाहियों हेतु संदर्भ / a) Reference to sampling procedure : Sampling not done by this lab
- आ) माप करने हेतु लिए गए सहायक दस्तावेज एवं प्राप्त परिणाम  
b) Supporting documents for the measurement taken and result derived : As given in Part C
- इ) संबंधित कार्य अनुदेशों में निर्धारित के अनुसार परीक्षण रीति से कोई परिवर्तन  
c) Deviation from the test method as prescribed in relevant work instructions, if any : No deviation from the standard

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रिपोर्ट सं / REPORT NO. : 60707

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भाग - ग / PART - C

### परीक्षण परिणाम / TEST RESULTS

Test Duration: 29.05.2019 to 04.02.2020

Sl. No.	Property	Standard	Unit	Results obtained	Specified Requirements
1.	Material Identification by FTIR	--	--	Blend of Poly Lactic Acid (PLA) and Poly Butylene Adipate co-terephthalate (PBAT)	--
2.	Thickness	--	microns	16.0	--
3.	Disintegration (Dry mass passing through 2mm sieve after 84 days)	ISO-17088 / IS-17088	%	94.2	Greater than 90
4.	Ultimate Aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO-17088 / IS-17088	%	90.29 (At the end of 113 days)	Greater than 90
5.	Plant Growth study a) Rice % Seed emergence b) Tomato % Seed Emergence	ISO-17088 / IS-17088	%	91 91	Greater than 90 Greater than 90

(Contd...)

2 of

*[Signature]*



Report No:

**60707**

**TEST RESULTS**

Date:

**04.02.2020**

Sl. No.	Property	Standard	Unit	Results obtained	Specified Requirements (In India Maximum)*
6.	<b>Heavy metals concentration</b>	ISO-17088 / IS-17088	ppm		
	Arsenic (As)			0.018	20
	Copper (Cu)			0.914	500
	Nickel (Ni)			0.763	100
	Zinc (Zn)			1.058	2500
	Cobalt (Co)			2.492	--
	Chromium (Cr)			0.517	300
	Molybdenum (Mo)			2.467	--
	Mercury (Hg)			0.012	10
	Cadmium (Cd)			0.043	20
	Lead (Pb)			1.268	500
	Selenium (Se)			0.130	--

Note:

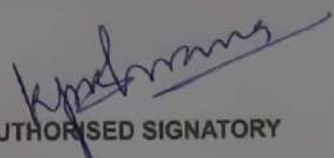
\*-Based on Municipal waste (Management and Handling) Rules, 1999 notified on 27<sup>th</sup> September, 1999 by Ministry of Environment and Forests, Government of India. Note that concentration of metals like cobalt, molybdenum and selenium is not mentioned in the notification.

**PART - D**

**REMARKS - Nil**

**NOTE:**

1. The results related only to the items tested as supplied by the party.
2. The test certificate shall not be reproduced in full except without the written approval of the laboratory.

  
AUTHORISED SIGNATORY





**TR. NO. 60707**

**BIODEGRADABILITY TEST AS PER IS/ISO 17088**

**1. Sample detail: (as declared by the party):** Compostable and Biodegradable carry bags

**2. Material Identification by FTIR:** Blend of Poly Lactic Acid (PLA) & Poly Butylene Adipate Co Terephthalate (PBAT)

**3. Observation**

**(1) Conditions of reaction mixtures**

Origin of compost: Livestock excrement, municipal and vegetable waste

Reaction Temperature : 58°C ( $\pm 2^\circ\text{C}$ )

Dry Solid (%) : 52.8

Volatile content (%) : 13.7

CO<sub>2</sub> evolved during first 10 days in blank vessels: 69.8 mg/g of volatile content of compost

Test duration (day) : 113 days

Reference material : Cellulose

Volume of reaction vessel : 3000 ml

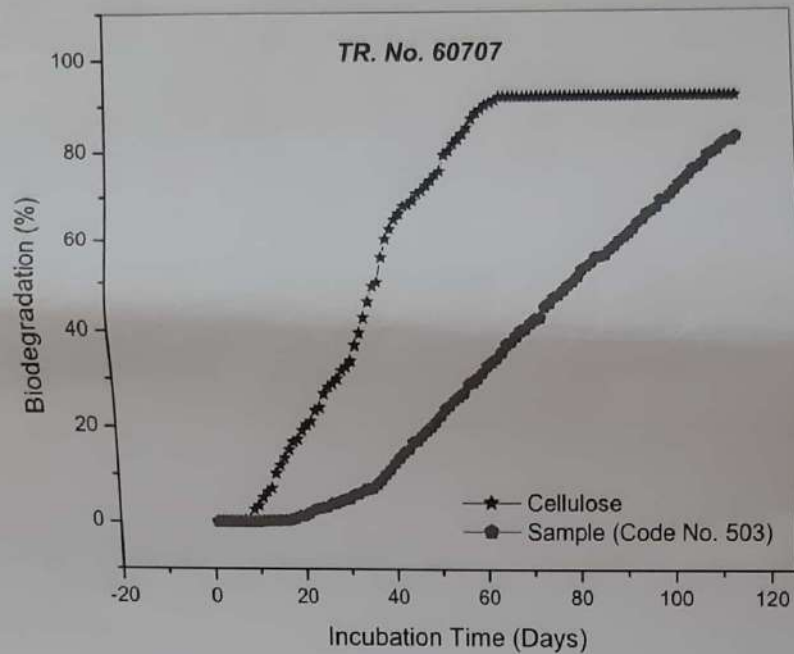
**(2) pH of test medium**

S.No.	Composting Vessel (Material with test medium)	pH (before)	pH (after)
1	Sample 1	7.7	7.3
2	Sample 2	7.5	7.2
3	Sample 3	7.6	7.3
4	Blank	7.5	7.5
5	Cellulose 1	7.6	7.3
6	Cellulose 2	7.5	7.4
7	Cellulose 3	7.6	7.1
8	Negative	7.5	7.2

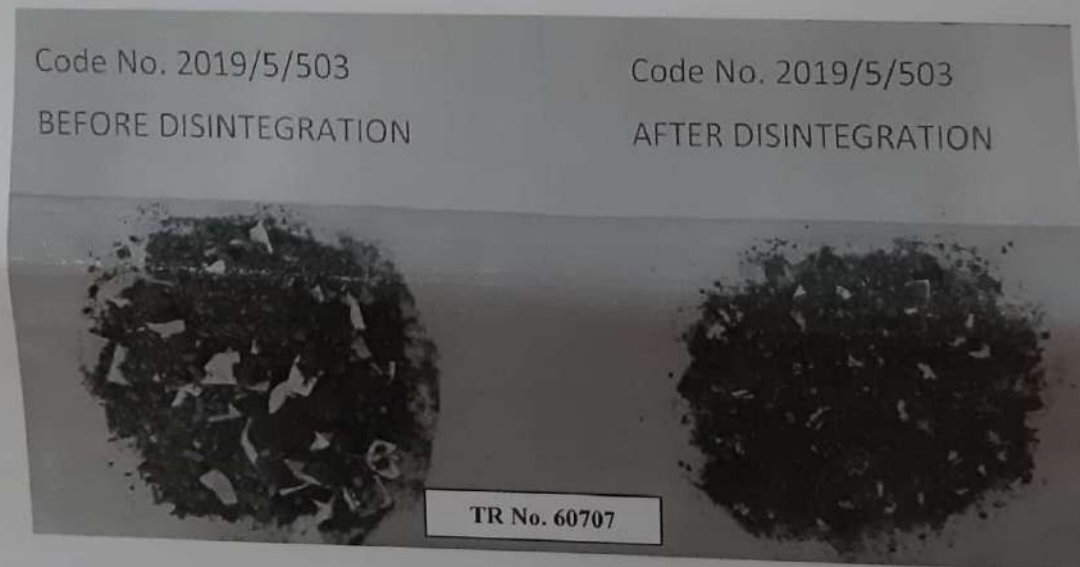




**4. Result:** Percentage biodegradation relative to positive reference  
Sample : 90.29% at the end of 113 days  
Positive reference cellulose : ~ 100 %



**5. Disintegration- After 12 weeks**





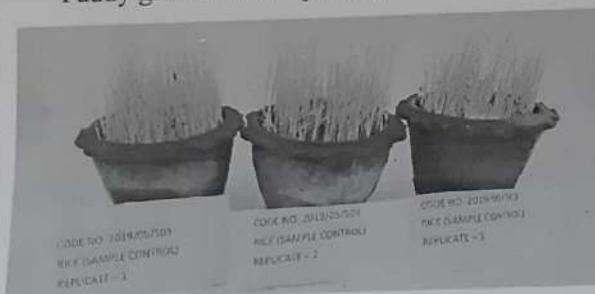
## 6. Visual Observation

Description	Week 1/2	Week 3/4	Week 5/6	Week 7/8
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark brown	Dark brown	Dark brown	Dark brown
Fungal Development	Nil	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

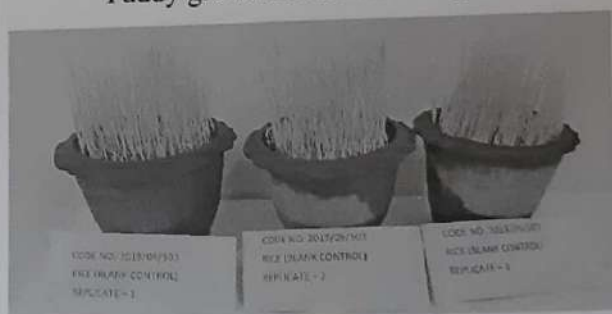
Description	Week 9/10	Week 11/12	Week 13/14	Week 15/16
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark brown	Dark brown	Dark brown	Dark brown
Fungal Development	Nil	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

## 7. Plant Growth Study

Paddy growth in sample degraded compost



Paddy growth in control compost



Tomato growth in sample degraded compost



Tomato growth in control compost



Authorized Signatory

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