

सिपेट : एस. ए. आर. पि.-पॉलीमेरीक, मटेरीयल में अत्याधुनिक अनुसंधान हेतु प्रयोगशाला

रसायन एवं पेट्रोरसायन विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार

बी/२५, सि.एन.आई.कॉम्प्लेक्स, पटिआ, भुवनेश्वर-751024, ओडिशा

CIPET : SARP - LABORATORY FOR ADVANCED RESEARCH IN POLYMERIC MATERIALS



सिपेट CIPET

Dept. of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India

B/25, C.N.I. Complex, Patia, Bhubaneswar-751 024, Odisha

Ph : 0674 - 2742852, 2740173, Fax : 0674 - 2740463

E-mail : larpm@cipet.gov.in, Web : www.larpm.gov.in

LARPM/CIPET/Testing/2024-25/

Date- 12.07.2024

To,

M/s. SunPro Barrier Pack

SunPro Industrial Estate, Block Survey No. 612,

Plot No. 1 & 3, Ajaji ni muvadi, Vadod,

Chandiyal Chokdi, Ahmedabad, Gijarat-382433

Mob: 7383115721

Sub –Test Report –Reg.

Dear Sir,

Ref No: 1) SSF dated 06.04.2023 & email dated 06.12.2023 & 06.07.2024

2) Our Work Order No.: LARPM/BBS./2023-24/012 dated 17.04.2023

With reference to the above cited subject, please find enclosed herewith **Test Report No. 01259 dated 12.07.2024.**

Kindly acknowledge the receipt of the same.

Thanks & Regards,

Smita Mohanty
12.7.2024

**Principal Director & Head
(Sr. Principal Scientist)**

Encl: As above

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ANALYSIS REPORT

Report No. : 01259

Date : 12.07.2024

Issued to

M/s. SunPro Barrier Pack

SunPro Industrial Estate, Block Survey No. 612,

Plot No. 1 & 3, Ajaji ni muvadi, Vadod,

Chandiyal Chokdi, Ahmedabad, Gijarat-382433

Customer Ref. No. & Date : SSF dated 06.04.2023 & email dated 06.12.2023 & 06.07.2024

Work order Ref. No. & Date : LARPM/BBS./2023-24/012 dated 17.04.2023

As per Standard : Refer part C

PART A: PARTICULARS OF SAMPLE SUBMITTED

- a) Name of the Sample : "Biopolymer coated compostable paper / paper boards"
- as stated by the party.
- b) Grade/verity/Type/Size/Class etc. : Nil.
- c) Code No. : ROLL - as stated by the party.
- d) Quantity (pcs./mtr/gm/nos) : 500 gm (Approx)
- e) Mode of packing
(Sealed carton/polypouch/container or not) : Packed in Carton.
- f) Date of receipt of sample : 17.04.2023
- g) Date of Performance of test : 26.05.2023 – 17.05.2024
- h) Any other information : Interim Report No. 01028 dated 29.11.2023

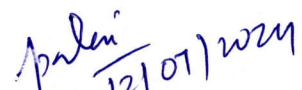
PART B: SUPPLEMENTARY INFORMATION

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


Mr. Pinaki Chatterjee

(Technical Manager)

AUTHORISED SIGNATORY


12/07/2024

Dr. Akshaya Kumar Palai

(Quality Manager)

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PART C: TEST RESULTS

ANALYSIS REPORT

Report No : 01259


Date : 12.07.2024

| Sl. No | Name of the Test | Test Method/Standard | Unit | Results Obtained | Specified Requirements |
|---|--|----------------------|------|---|---|
| Sample Details: "Biopolymer coated compostable paper / paper boards, Sample ID : ROLL" - as stated by the | | | | | |
| 1. | Material Identification | FTIR/DSC | -- | Paper material one side coated with Polylactic Acid (PLA) based dispersion coating. | --- |
| 2. | Disintegration (Dry mass remains in 2 mm sieve after 84 days) | ASTM D 6868 | % | 7.81 | Not more than 10% of its original dry mass |
| 3. | Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference) | ASTM D 6868 | % | 90.79 (at the end of 175 days) | > 90 (at the end of the test period not more than 180 days.) |
| 4. | Plant Growth study a) Monocotyledon (Rice) % Seed Emergence b) Dicotyledon (Mung) % Seed Emergence | ASTM D 6868 | % | 96.51 95.60 | > 90 > 90 |


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ANALYSIS REPORT

Report No.: 01259

Date : 12.07.2024

PART C: TEST RESULTS

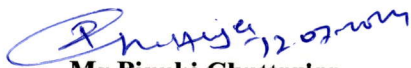
| Sl. No | Name of the Test | Test Method/Standard | Unit | Results obtained | | Specified Requirements (*) |
|--------|----------------------------|----------------------|-------|--------------------|---------|----------------------------|
| 5. | Heavy metals concentration | | | Sample as received | Compost | |
| a | Arsenic (As) | ICP-OES | mg/kg | - | 0.04 | 10 |
| b | Cadmium (Cd) | | | 0.82 | 0.98 | 5 |
| c | Chromium (Cr) | | | 0.08 | 1.43 | 50 |
| d | Copper (Cu) | | | 0.06 | 0.73 | 300 |
| e | Lead (Pb) | | | 3.21 | 3.62 | 100 |
| f | Mercury (Hg) | | | - | 0.01 | 0.15 |
| g | Nickel (Ni) | | | 0.29 | 0.89 | 50 |
| h | Zinc (Zn) | | | 0.12 | 9.68 | 1000 |

(*) – Based on the solid waste management Rules, 2016 notified on 08th April 2016 by Ministry of Environment, Forests & Climate Change, Government of India.

PART D: REMARKS: NIL

- Note:**
1. This Test Report / Certificate is issued only for the samples submitted to CIPET:SARP-LARPM.
 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 CIPET:SARP-LARPM within 30 days from the date of issue.
 6. Subcontracted Tests (if any): Nil.

** End of the Report **



Mr. Pimuki Chatterjee
(Technical Manager)

AUTHORISED SIGNATORY



Dr. Akshaya Kumar Palai
(Quality Manager)

AUTHORISED SIGNATORY

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ASTM D 6868

To

M/s. SunPro Barrier Pack
SunPro Industrial Estate, Block Survey No. 612,
Plot No. 1 & 3, Ajaji ni muvadi, Vadod,
Chandiyal Chokdi, Ahmedabad, Gijarat-382433

Date of Initiation : 26.05.2023

Date of Completion : 17.05.2024

1. Sample detail: Biopolymer coated compostable paper / paper boards, Sample ID : ROLL
- as stated by the party.
2. Material Identification by DSC & FTIR: DSC & FTIR graph indicates the base material of the supplied sample is Paper material one side coated with Polylactic Acid (PLA) based dispersion coating.

3. Observation: -

a. Conditions of reaction mixtures

Origin of compost: Vermicompost, Garden Waste, Municipality Waste.

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

Dry Solid : 54.3 (%)

Volatile Solid : 30.7 (%)

Test duration : 175 days

Reference material : Cellulose

Volume of reaction vessel : 3000 ml

b. pH of test medium:-

| Sl. No. | Composting Vessel | pH(before) | pH(After) |
|---------|-------------------|------------|-----------|
| 1 | Blank 1 | 7.2 | 7.1 |
| 2 | Blank 2 | 7.4 | 7.3 |
| 3 | Blank 3 | 7.3 | 7.4 |
| 4 | Cellulose 1 | 7.4 | 7.2 |
| 5 | Cellulose 2 | 7.3 | 7.1 |
| 6 | Cellulose 3 | 7.4 | 7.4 |
| 7 | Negative 1 | 7.2 | 7.2 |
| 8 | Negative 2 | 7.5 | 7.4 |
| 9 | Negative 3 | 7.3 | 7.3 |
| 10 | Sample 1 | 7.5 | 7.3 |
| 11 | Sample 2 | 7.4 | 7.3 |
| 12 | Sample 3 | 7.6 | 7.5 |



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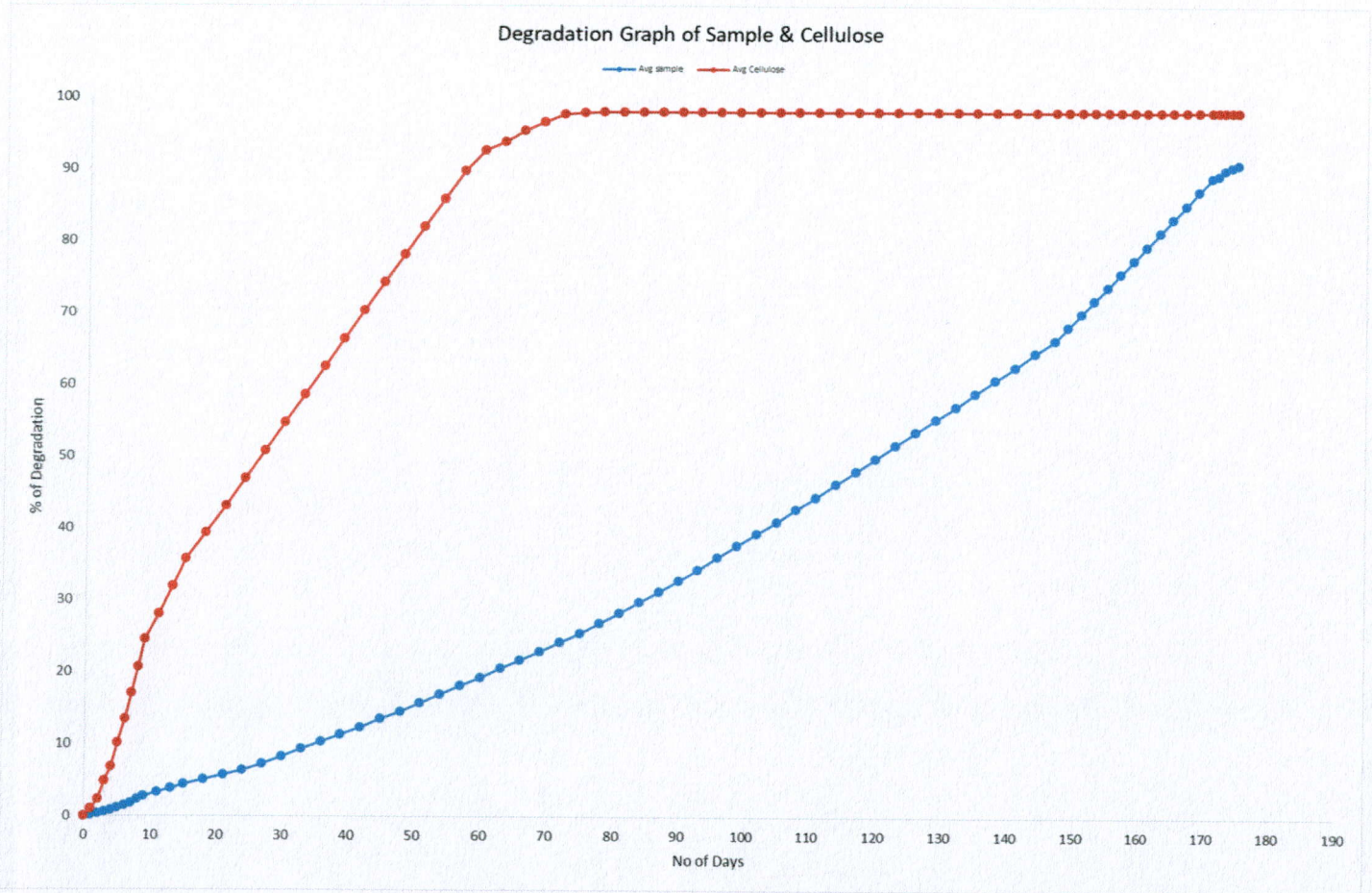


Dr. Akshaya Kumar Palai

(Quality Manager)

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4. Result: Percentage biodegradation relative to positive reference
 MEAN(%) : 90.79 %
 The reference material-cellulose (%) : 100



5. Visual Observation:-

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Structure | Paper Sample | Paper Sample | Paper Sample | Paper Sample | Paper Sample |
| Moisture | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level |
| Color | White | White | White | White | Grey |
| Fungal Development | None | None | None | None | None |
| Smell | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like |

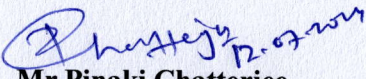
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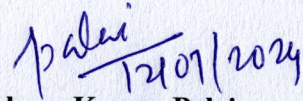
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| | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Structure | Paper Sample | Paper Sample | Paper Sample | Paper Sample | Paper Sample |
| Moisture | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level |
| Color | Grey | Grey | Grey | Grey | Grey |
| Fungal Development | None | None | None | None | None |
| Smell | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like |

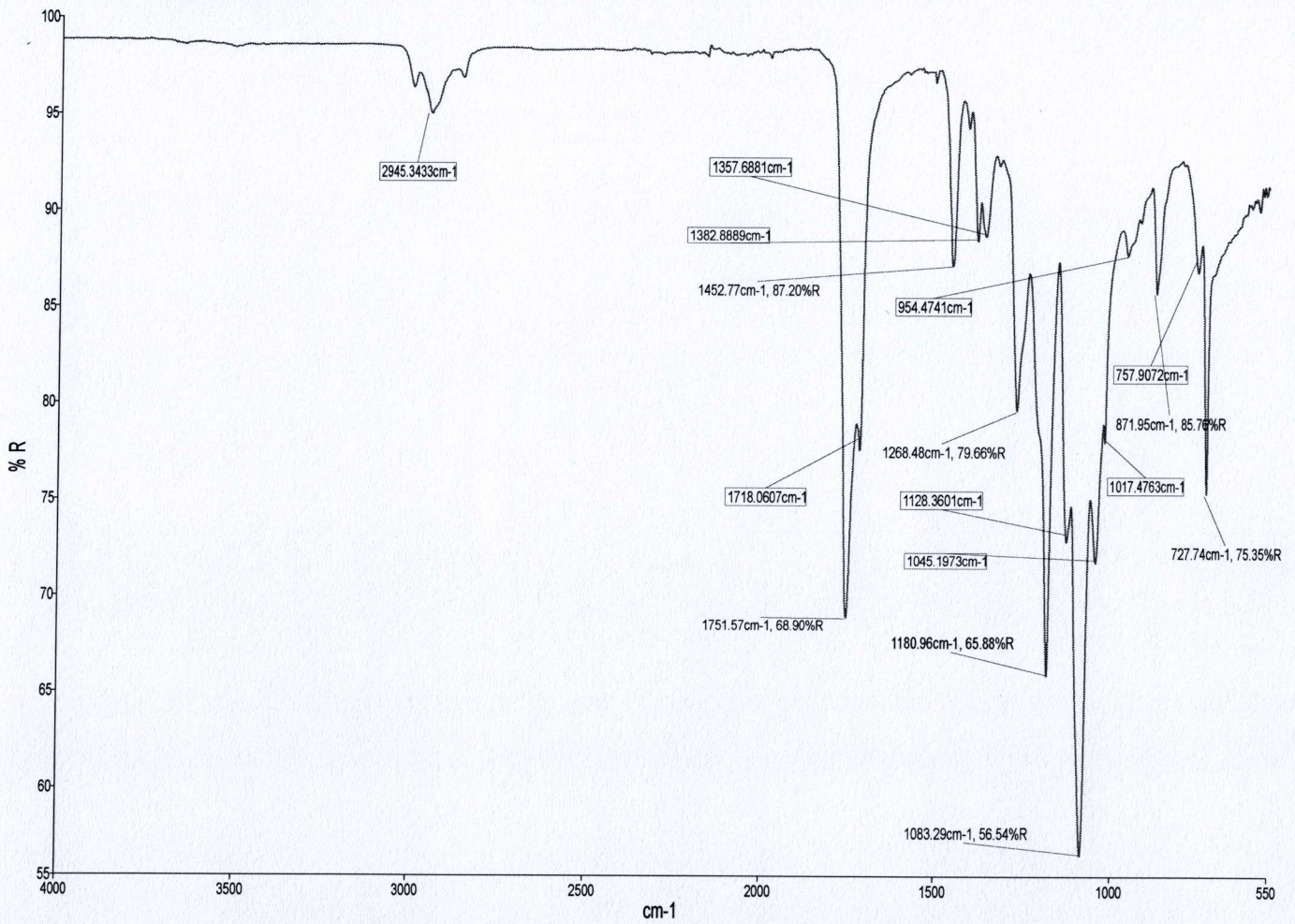
| | Week 11 | Week 12 | Week 13 | Week 14 | Week 15 |
|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Structure | Disintegration initiated | Disintegration observed | Disintegration observed | Disintegration observed | Disintegration observed |
| Moisture | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level |
| Color | Grey | ---- | ---- | ---- | ---- |
| Fungal Development | None | None | None | None | None |
| Smell | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like |

| | Week 16/17 | Week 18/19 | Week 20/21 | Week 22/23 | Week 24/25 |
|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Structure | Disintegration observed | Disintegration observed | Disintegration observed | Disintegration observed | Disintegration observed |
| Moisture | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level | Appropriate moisture Level |
| Color | ---- | ---- | ---- | ---- | ---- |
| Fungal Development | None | None | None | None | None |
| Smell | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like | Organic/dirt like |


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6 FTIR Analysis:-

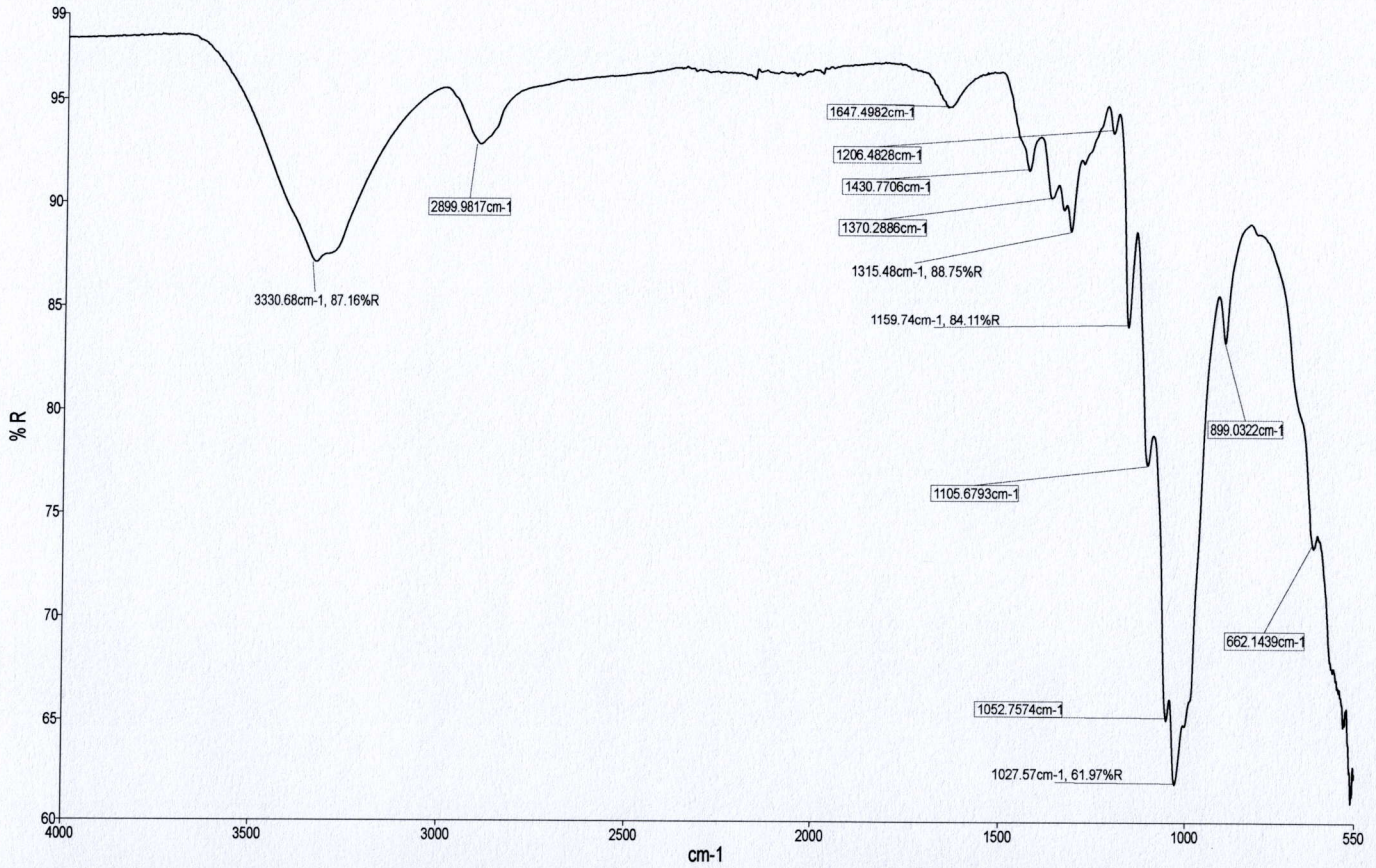


| Wave number (cm ⁻¹) | Possible Nature of Bond |
|---------------------------------|-------------------------|
| 2945.34 | CH Stretch |
| 1751.57, 1718.06 | C=O Stretch |
| 1452.77 | CH ₂ Bend |
| 1268.48, 1180.96 | C-O Stretch |

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6.1 FTIR Analysis:-

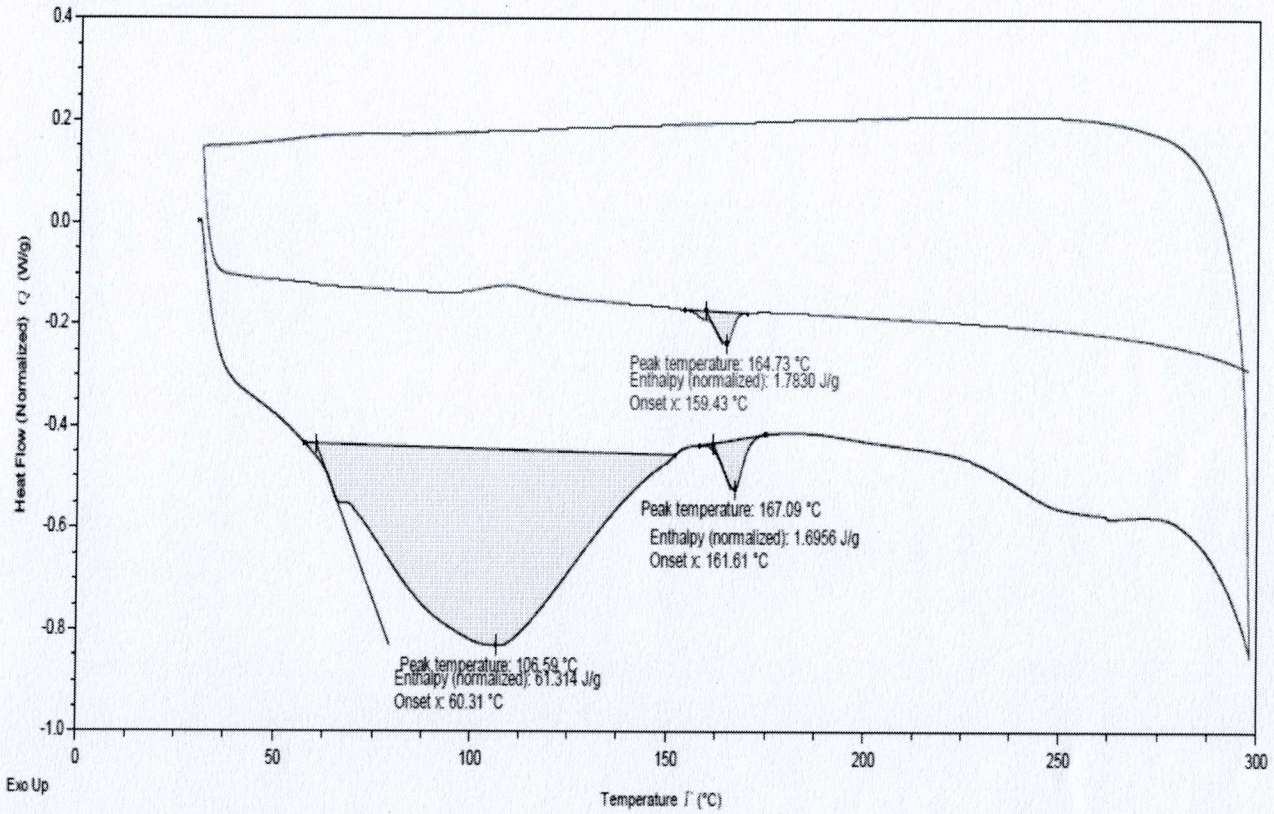


| Wave number (cm ⁻¹) | Possible Nature of Bond |
|---------------------------------|-------------------------|
| 3330.68 | OH Stretch |
| 2899.98 | CH Stretch |
| 1647.49 | C=C Stretch |
| 1430.77 | CH Bend |
| 1159.74 | OH Stretch |
| 1027.57 | C-O Stretch |

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7 **DSC Analysis:-**



Comment: DSC & FTIR graph indicates the above sample is Paper material one side coated with Polylactic Acid (PLA) based dispersion coating.

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8 DISINTEGRATION- AFTER 12 WEEKS



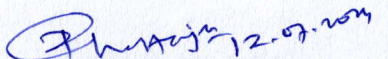
BEFORE DISINTEGRATION

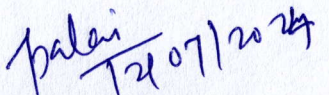


AFTER DISINTEGRATION

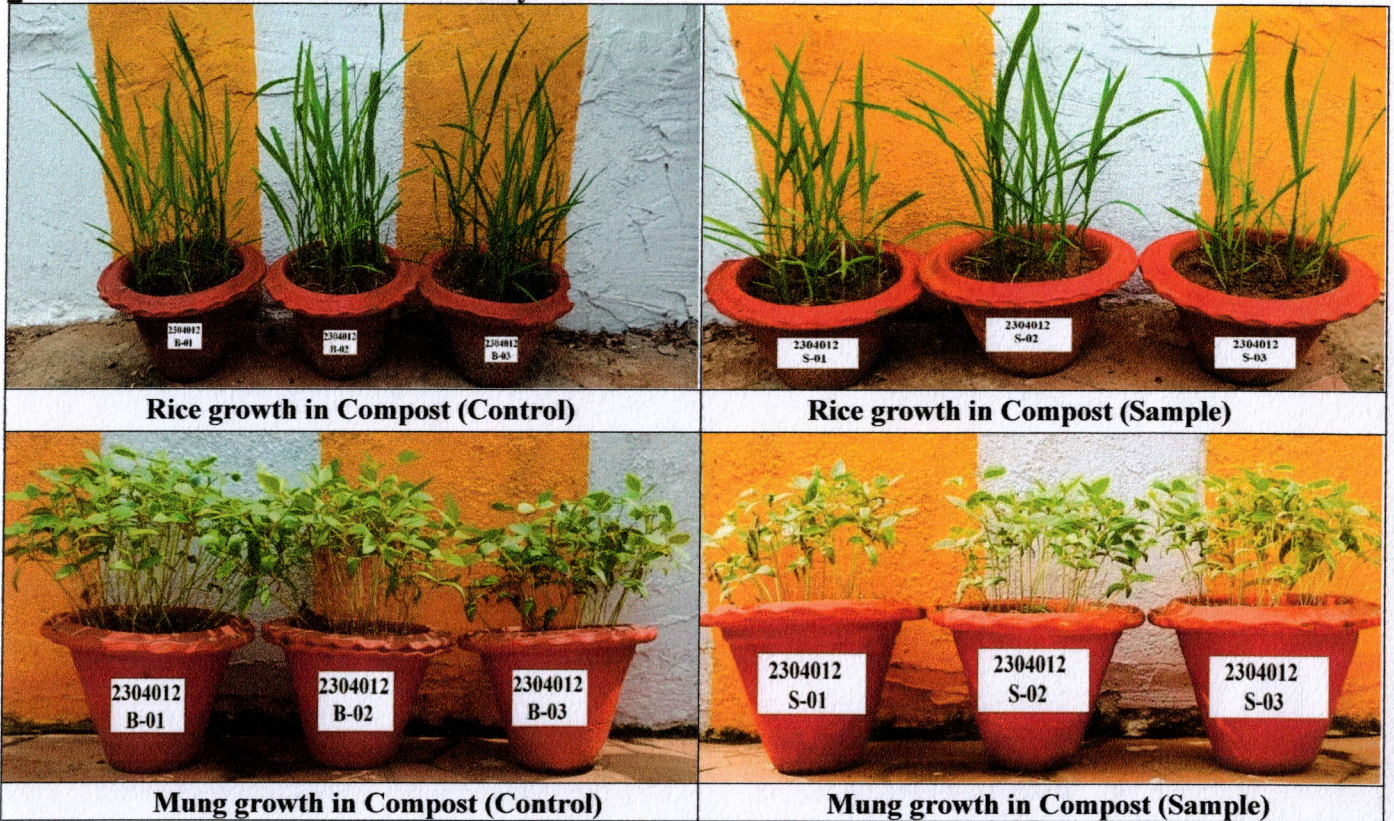
Comment:-

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


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9 Germination and Plant Growth Study



The percentage of seedling germination rate was found greater than 90% for both control and sample.

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